of farmers that were interviewed. Through the data base of the German Technical Cooperation (GIZ) restoration support program, 200 farmers were identified, but only 157 finally participated in the interviews. Data were collected using a semi-structured questionnaire to elicit information relevant to the study objectives. Prior to data collection, the questionnaire was pre-tested to ensure consistency, reliability, and validity of the instrument. Data enumerators were recruited and trained before carrying out the survey. The focus group discussion had representatives from the local forest and environment administrations, civil society organisations, development partners, farmers organisations, traditional rulers. The focus group discussion with key informants also permitted the collection of qualitative data related to the study objectives.

The list of factors used in the study were first identified from literature, supported by the researcher's conceptualisation. To ensure that site-specific perception was considered, the identified factors were then examined and validated at the level of the landscape by key informants involved in land restoration during a focus group discussion. The identified factors were grouped and linked under biophysical, climatic, socioeconomic, institutional, and financial categories (Table 5.1). It should be noted that these categories and the factors classified underneath differs to a certain extend from how they are presented and linked in literature. For example, some of the factors listed by the farmers under the financial category are considered in literature as socio-economic factors and vice-versa.

TABLE 5.1:Factors that determine farmers tree planting decision making.

Factors	**Description**
Biophysical factors	
Vegetation cover	To increase the vegetation cover
Soil fertility	To increase the soil fertility of the plot
Combat erosion	To combat erosion
Land availability	Availability of space
Limited land	Insufficient space (case of agroforestry practice)
Biodiversity	To conserve endangered species
Climatic factors	
Shading/microclimate	To create shading

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High winds	To combat high winds
Desertification	To combat desertification
Institutional factors	
Tenure insecurity	Farmer plant's trees to secure plot
Tenure security	Farmer plant's trees because of ownership
Socioeconomic factors	
Access to extension agents	Awareness and presence of extension agents
Markets	Knowledge and access to markets to sell tree products
Availability of inputs	Availability of inputs - labour, planting materials
Demand for tree products	Increase in the demand of tree products
Affordable cost	Cost of tree planting within farmers capacity
Income	Income and related livelihood benefits from tree planting
Financial factors	
Availability of capital	Farmers capacity to raise investment capital/wealth
Access to credit	Access to rural credit facilities
Availability of support programmes	Support programs implemented by development partners

5.1.3 Data analysis

Descriptive statistics and correlation analysis were applied to the primary data using Excel and the Statistical Package for Social Scientists (SPSS V21). The descriptive statistics that included frequencies and percentages were used to understand trends in the responses across the different factors that drive farmers' decision to plant trees. The Spearman correlation analysis was used to understand the relationship between the farmers' characteristics and categories of factors, and the relationship between factors within each category of factors. The Spearman correlation was used because the dataset was not normally distributed following the test of normality (Kolmogorov-Smirnov test) that was applied. The Spearman's rank correlation coefficient assesses how well the relationship between two variables can be described using a monotonic function (Thirumalai *et al.*, 2017; Croux & Dehon, 2010).

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5.2 RESULTS

5.2.1 Farmers' perception regarding factors that influence decision to plant trees

At least one farmer identified all the six biophysical factors as important for influencing farmers' decision to include trees as part of their land use practice. Among the biophysical factors that influenced farmers' decisions the most, planting trees to fight against soil erosion dominated the responses with about 29% of farmers citing this factor as a reason to integrate trees on farms. This was followed by 22% of the farmers interviewed, who indicated that they planted trees since they had enough land.

Concerning the climatic factors, at least one farmer identified all as important for influencing their decision to include trees as part of their land use practice. Among the climatic factors that influenced farmers' decision the most, planting trees to fight against increasing climate-induced desertification in the area dominated the responses with about 59% of farmers citing this factor as a reason to integrate trees on farms.

About 85% of the interviewed farmers indicated that they planted trees on their farm plots because they feel secured in terms of use and ownership of the plot. Thus, they are sure to benefit from the return on their investments in the future. At least one farmer identified all the six socioeconomic factors as important for influencing farmers' decision to include trees as part of their land use practice. Among the socioeconomic factors that influenced farmers' decisions the most, the affordable cost to plant trees dominated the responses.

Concerning the financial related factors, all were identified by at least one farmer as important for influencing farmers' decision to include trees as part of their land use practice. Access to credit to invest in tree planting dominated the responses with about 56% of farmers citing this factor as a reason for involving tree planting as part of their land use practice.

Information from the key informant interviews and focus group discussion indicated that biophysical, climatic, and socioeconomic factors are of primary importance to farmers' decision making on whether to plant trees or not.

5.2.2 Relationship among factors in each category that drive farmers' decision to plant trees.

Concerning the biophysical category of factors, the results (Table 5.2) showed that there was a positive significant correlation ($P<0.01$) between the motivation and interest to plant trees to increase vegetation cover and to plant trees to combat soil erosion. Similarly, there was a

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positive significant correlation (*P<0.01*) between planting trees to increase vegetation cover and planting trees to increase biodiversity. There was a significant correlation (*P<0.05*) between planting trees to combat soil erosion and integrating trees on farms because of limited land. Also, there was a significant correlation (*P<0.01*) between planting trees to combat soil erosion and planting trees to increase biodiversity. There was a negative significant correlation (*P<0.01*) between planting trees because of sufficient land and integrating trees on farms due to limited land.

TABLE 5.2:Relationship among the biophysical category of factors that influence farmers' decision to plant trees.

Factors	Vegetation cover	Soil fertility	Combat erosion	Land availability	Limited land	Biodiversity
Vegetation cover	1.000	0.046	0.444**	-0.065	0.100	233**
		P=0.570	*P=0.000*	*P=0.417*	*P=0.212*	*P=0.003*
Soil fertility		1.000	0.129	-0.024	0.136	0.075
			P=0.108	*P=0.769*	*P=0.089*	*P=0.348*
Combat erosion			1.000	-0.010	0.173*	0.291**
				P=0.901	*P=0.031*	*P=0.000*
Land availability				1.000	-0.734**	0.041
					P=0.000	*P=0.611*
Limited land					1.000	0.166*
						P=0.038
Biodiversity						1.000

**. Correlation is significant at the 0.01 level, *. Correlation is significant at the 0.05 level.

In terms of the climatic factors (Table 5.3), the results showed that planting trees for shading and for adapting to harsh microclimatic conditions was positive and significantly correlated (*P<0.01*) and (*P<0.01*) with the reasons to plant trees to fight against high winds and desertification respectively. Similarly, there was a significant correlation (*P<0.01*) between planting trees to fight against high winds and planting trees to fight against desertification.

TABLE 5.3:Relationship among the climatic category of factors that influence farmers' decision to plant trees.

Factors	Shading/microclimate	High winds	Desertification
Shading/microclimate	1.000	0.340**	0.491**
		P=0.000	*P=0.000*

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High winds	1.000	0.464**
		P=0.000
Desertification		1.000

**. Correlation is significant at the 0.01 level, *. Correlation is significant at the 0.05 level

Concerning the socioeconomic factors, the results showed that engaging in tree planting due to the availability of support from extension agents is positive and significantly correlated (*P<0.01*) and (*P<0.01*) with the demand for forest products and the capacity of some farmers to afford the cost of integrating trees on farms respectively (Table 5.4). There was a significant correlation (*P<0.01*) between planting trees due to the availability of inputs and the capacity of some farmers to afford the cost of integrating trees on farms. There was also a significant correlation (*P<0.05*) between tree planting that is motivated by the demand for forest and tree products and tree planting motivated by the income farmers are expecting from the sale of forest and tree products.

TABLE 5.4:Relationship among the socioeconomic category of factors that influence farmers' decision to plant trees.

Factors	Extension agents	Markets	Availability of inputs	Demand for forest resources	Affordable cost	Income
Extension agents	1.000	0.171*	0.093	0.182*	0.130	0.136
		P=0.032	*P=0.246*	*P=0.023*	*P=0.105*	*P=0.090*
Markets		1.000	0.079	0.291**	0.209**	0.005
			P=0.326	*P=0.000*	*P=0.009*	*P=0.946*
Availability of inputs			1.000	0.124	0.311**	0.011
				P=0.120	*P=0.000*	*P=0.891*
Demand for forest resources				1.000	0.156	0.168*
					P=0.051	*P=0.036*
Affordable cost					1.000	0.116
						P=0.146
Income						1.000

**. Correlation is significant at the 0.01 level, *. Correlation is significant at the 0.05 level

Lastly, regarding the category of factors related to finance, the results showed that planting trees motivated by the ability to raise investment capital by farmers was negative and significantly correlated (*P<0.05*) to planting trees motivated by the presence of tree support programs (Table 5.5).

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TABLE 5.5:Relationship among the financial category of factors that influence farmers' decision to plant trees.

Factors	Availability of capital	Access to credit	Availability of support programmes
Availability of capital	1.000	0.110	-0.159*
		P=0.170	*P=0.047*
Access to credit		1.000	0.031
			P=0.704
Availability of support programmes			1.000

**. Correlation is significant at the 0.01 level, *. Correlation is significant at the 0.05 level.

5.2.3 Relationship between farmers' characteristics and the categories of factors that influence farmers' decision to plant trees.

Following the project database, farmers were characterised by the level of education, gender, farm sizes and type of tree planting practice. Among the respondents, about 46% had no formal education while the rest had attained primary and/or secondary education levels. About 94% of the respondents were male farmers with farm sizes dominated by plots of less than one hectare. The farmers were involved in agroforestry and plantation land use practices, though the agroforestry practices dominated land use activities involving about 62% of interviewed farmers.

The results showed a positive significant correlation (*P<0.05)* between farmers level of education and the biophysical category of factors that influenced farmers decision to plant trees (Table 5.6). The climatic category of factors that influenced farmers decision to plant trees also showed a positive significant correlation (*P<0.05*) with the level of education of farmers. The type of tree planting practice of farmers showed a negative significant correlation (*P<0.01*) with the financial category of factors.

TABLE 5.6:Relationship between farmers' characteristics and categories of factors that influenced farmers decision to plant trees.

Farmers Characteristics	Biophysical	Climatic	Socio-economic	Institutional	Financial

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Level of Education	.229**	.205**	.051	-.079	.092
	P=0.004	*P=0.010*	*P=0.529*	*P=0.326*	*P=0.251*
Gender	.102	.092	-.122	-.075	.028
	P=0.201	*P=0.253*	*P=0.128*	*P=0.348*	*P=0.725*
Farm size	.059	.037	.042	-.145	-.028
	P=0.466	*P=0.646*	*P=0.601*	*P=0.071*	*P=0.729*
Type of tree planting practice	-.063	.021	-.055	-.117	-.264**
	P=0.434	*P=0.795*	*P=0.497*	*P=0.147*	*P=0.001*

**. Correlation is significant at the 0.01 level: *. Correlation is significant at the 0.05 level.

5.2.4 Relationship among the categories of factors that determine farmers' decision to plant trees.

The results showed that the biophysical category of factors was significantly correlated (*P<0.01*) with the climatic category of factors and significantly correlated (*P<0.01*) with the financial category of factors (Table 5.7). The climatic category of factors showed a positive significant correlation (*P<0.05*) with the financial category of factors. Lastly, the institutional category of factors had a positive significant correlation (*P<0.05*) with the financial category of factors (Table 7). On the other hand, the biophysical category of factors showed a negative significant correlation (*P>0.05*) with the socioeconomic category of factors and a negative significant correlation with the institutional category of factors. The climatic category of factors showed a negative significant correlation (*P<0.05*) with the socioeconomic and institutional categories of factors.

TABLE 5.7:Relationship among the categories of factors that determine farmers decision to plant trees.

Categories of factors	Biophysical	Climatic	Socioeconomic	Institutional	Financial

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Biophysical	1.000	0.457**	-0.187*	-0.211**	0.171*
		P=0.000	*P=0.019*	*P=0.008*	*P=0.032*
Climatic		1.000	-.181*	-.193*	.255**
			P=0.024	*P=0.016*	*P=0.001*
Socioeconomic			1.000	-.027	-.094
				P=0.735	*P=0.240*
Institutional				1.000	.281**
					P=0.000
Financial					1.000

*. Correlation is significant at the 0.05 level.
**. Correlation is significant at the 0.01 level.

5.3 DISCUSSION

The results showed that biophysical factors related to vegetation cover and biodiversity, the need to improve soil fertility and soil erosion control, and farm sizes contributed to influencing farmers' decision to integrate trees on their farms. These factors have been reported by other studies as important for motivating farmers' decision to engage in tree-growing (Kpadonou *et al.*, 2017; Binam *et al.*, 2017; Etshekape *et al.*, 2018). It should be noted that the study sites are in a region that is the most affected in Cameroon in terms of vegetation cover loss, soil erosion and fertility loss (MINFOF-MINEPDED, 2020). This implies any initiative to grow trees will be of interest to farmers if the increase in vegetation cover, improved in soil fertility, and reduced in soil erosion constitute part of the expected results of the tree-growing initiative. In the study area, apart from tree planting that dominates approaches to fight against land degradation and soil fertility loss, farmers also use different approaches such as terrace farming on hillsides, assisted natural regeneration and contour farming. A study in Tanzania stated that farmers integrated trees on farms to improve or maintain soil fertility (Jha *et al.*, 2021). The results further showed that farm sizes could influence farmers decision to plant trees. This corroborates with other studies that have shown that farm size is an important factor influencing farmers decision to engage in large-scale tree growing (Oeba *et al.*, 2012; Degefa & Markos, 2022; Tega & Bojago, 2023).

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The study area is part of the region under serious threat following the expansion of the Sahara Desert southwards. Climate change is seen in this area as one of the drivers of desertification where greening using trees is a key approach to counter the advancement of the desert. However, despite the interests to fight desertification through tree-growing, the combined effect of farmers' efforts could be low due to the small and fragmented land sizes. Thus, planned tree-growing initiatives in this region should assess and ensure that large size landowners are part of stakeholder engagement, the designing, and implementation processes. Furthermore, aggregating farmers with adjacent farm holdings to form a cooperative for the purpose of resource sharing could also be useful.

The results showed that secure tenure over land influenced farmerss decision to plant trees. In the study area, farmers working on rented lands were not interested in medium- and long-term land use investments. Land is often hired for a particular period and for a particular land use practice. Any deviation from the initial use must be authorised by the landowner. Landowners are less likely to allow long-term investments on their land because of fear that the user rights can be transformed to ownership rights. In the study villages, traditional rulers dominate in terms of land ownership, thus their engagement in restoration project design and implementation is crucial. The complications that tenure has on tree planting decisions have been reported by other studies (Kpadonou *et al.,* 2017; Yaméogo *et al.,* 2018; Gyau *et al.,* 2012; Alemagi *et al.,* 2015). In Ethiopia, Beyene *et al.* (2019) found that tenure insecurity had a significant effect on the probability of farmers to adopt tree planting. Jha *et al.* (2021) reported in Tanzania that farmers whose rights to plant trees depended on the permission from the landowners, were less likely to include trees in their farms.

The results showed that the socioeconomic factors - access to support from extension agents and inputs, access to markets and increasing demand for forest resources, income and affordable cost of tree planting are important factors that influenced farmers to decide on integrating trees in their farmlands. This implies that farmers will decide to take-up tree planting when they are sure that they will receive technical support and access to quality inputs, generate income from marketing of trees and related farm products (Kpadonou *et al.,* 2017; Yaméogo *et al.,* 2018; Gyau *et al.,* 2012; Binam *et al.,* 2017; Etshekape *et al.,* 2018). Landowners who view the contribution of trees as their source of income were more motivated to invest in tree-growing (Oeba et al., 2012). In Bangladesh, it was reported that farmers having access to extension services and markets were more likely to adopt tree-growing practices (Jahan *et al.,* 2022).

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The results showed that access to credit appears to be important in motivating farmers to invest in tree planting. This is more central for farmers who are interested to invest in bigger land sizes. In the study area credit can take many forms – cash and non-cash, where non-cash can include direct farm input supplies. The relationship between access to credit and farmers tree planting adoption decision have been reported by other studies in Kenya by Kinyili *et al.* (2020) and Pello *et al.* (2021); in Columbia by Jara-Rojas *et al.* (2021); in Tanzania by Jha *et al.* (2021).

The results showed a positive significant correlation between farmers' level of education and the biophysical and climatic conditions. This implies, educated farmers are more likely to assess the biophysical role that tree-growing can have on their farmlands. In this regard, tree-growing restoration project design and implementation should be able to accompany all the different categories of farmers to assess the ex-ante and ex-post contribution of tree-growing to biophysical and climate related problems such as soil erosion and fertility loss and desertification. These are farm level variables that are of interest to farmers because they are directly linked to farm productivity. Evidence from the Sudanian Savannah zone of Burkina Faso, indicated that education level was associated with the biophysical determinants of planting and protecting on-farm trees (Sanou *et al.*, 2017). This type of association has been reported among tree-growing farmers in Bangladesh (Jahan *et al.*, 2022). This result also underscores the relevance of farmers education and extension programs (Jha *et al.*, 2021).

The results showed that the tree-planting practice in the study area is negatively corelated to the financial category of factors related to investment support. This implies that agroforestry farmers with mostly small farm sizes will have very little interests on opportunities to invests in tree-growing. Thus, creation of credit and investment support components in tree-growing projects should ensure that they target the appropriate farmers with the interests and farm sizes that can create impacts in terms of restoration results. This is in contrast to the dominant findings that indicate that access to credits will drive on-farm tree growing (Jahan *et al.*, 2022; Jha *et al.*, 2021).

Furthermore, the results showed that tree planting motivated by the ability to raise investment capital by farmers, was negative and significantly correlated to tree planting motivated by the presence of tree support programs. This implies that farmers' capacity to mobilise resources through informal farm level credit systems to finance tree growing should be explored and supported. Thus, future tree-growing projects should consider encouraging local credit systems supported by local social networks. Such an approach to drive tree-growing investments will

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encourage farmers' engagement and ownership. The positive role of social networks at the farm level to enhance the adoption of tree-growing technology have been reported by other studies (Zerihun, 2020; Amare & Darr, 2020).

5.4 CONCLUSION

The aim of this study was to identify farm level factors and related dynamics that influence farmers decision to plant trees. For this purpose, data were collected from farmers' survey and focus group discussions and analysed using descriptive statistics and correlation analysis.
The results showed that the decision of farmers to include trees or not on their farmlands is influenced by multiple factors that are linked to the biophysical, climatic, socioeconomic context at the farm level. Even though these factors are multiple, the correlation analysis showed that some are interrelated. This interrelated nature of the factors calls for prudence in the process of developing tree-growing initiatives.

The interplay of these factors needs to be taken into consideration when designing tree growing restoration projects. The farmers in the studied area have immense potential for tree-growing, thus involving them in the need's identification process during project design and implementation is crucial. However, for each initiative or project, the factors that influence farmers interests should be monitored over time during the implementation of projects because they can change due to changing social, economic, and political conditions.

Future research should consider understanding the level of contribution of each of the factors to the overall tree-planting decision. This can be helpful in the prioritisation process during project design. In addition, future research should consider comparing across sites, since sites vary in terms of climatic, socioeconomic and biophysical conditions that are likely to have a major influence on tree planting decisions.

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CHAPTER 6

Ensuring continuation in land restoration schemes: an analysis of the behavioural persistence of tree-growing farmers in the Sudano-Sahelian Region of Cameroon

ABSTRACT

Tree-growing support programs are being implemented widely to enhance farmers' involvement in land restoration schemes. However, limited studies have focused on why farmers will continue to engage in restoration activities when support programs end, considered here as "behavioural persistence". Taking the Mogazang landscape of Cameroon as a case study, a mixed methods approach involving farmers surveys, key informant interviews and the review of literature, was applied to investigate the factors that influence the behavioural persistence of tree-growing farmers. Drawing on the concept of behavioural persistence, the findings revealed that farmers decision to continue restoration practices on their farm plots after the end of support programs is influenced by a mix of factors, among which positive attitude and perception of farmers, constant motivation, financial profitability, community influence, played an important role. Findings also showed that farmers behavioural persistence aspects were not adequately addressed during the design of support programs and the inception phase of support programs did not prepare farmers psychologically about post support programs. This empirical investigation of farmers behavioural persistence has provided information that needs to be taken into consideration when assessing the feasibility, including the designing and implementation of planned tree-growing restoration support programs and related policies in Cameroon and other countries.

Keywords: landscape degradation, restoration, tree-growing, behavioural persistence, sustainability, Cameroon[4]

[4] This chapter is based on the forthcoming article "Chia, E.L., Nsubuga, F.W., Chirwa, P.W. Ensuring continuation in land restoration ventures: An analysis of the drivers of behavioural persistence of tree-growing farmers in the Sudano-Sahelian region of Cameroon. *Small-Scale Forestry."* (Under review).

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6.0 INTRODUCTION

Land restoration has become a widespread human response to ecosystem and land degradation, caused by human activities. The response to ecosystem degradation is expected to cushion the ever-increasing threat to the provision of ecosystem services and the resilience of coupled human-natural systems (Kibler *et al.*, 2018). Land degradation is a global phenomenon where 25% of the global land mass is classified as highly degraded or undergoing high rates of degradation, with about 1.5 billion people both in developing and developed countries depending directly on degraded lands (Commonland, 2015). For the past decade, countries, organisations (public and private) and communities have made pledges to restore millions of hectares of degraded lands (Fagan *et al.*, 2020). There is a need to support the transformation of the figures into action, through concrete long-term restoration investments on the ground.

The improvement of the ecological functions of land can be achieved through natural regeneration (with human support and farmer management), tree-growing (with dependence on seed supply and other inputs), soil and water conservation techniques (van Noordwijk *et al.*, 2020). Whatever the type of restoration approach, the decision-making process that drive actions and determines restoration objectives depends on the behaviour of restoration stakeholders (such as farmers, community-based organisations, local NGOs, and councils) (Jalonen *et al.*, 2018). Furthermore, the behaviour of restoration stakeholders, defines expected benefits, influence motivations, preferences, and restrictions. (Jalonen *et al.*, 2018). Getting stakeholders involved is relevant for the success of restoration initiatives. The involvement of stakeholders in restoration actions in the short and long term depends on a mix of factors that are socioeconomic and institutional in nature, originating from the internal and external environment of the stakeholders (Chirwa & Mahamane, 2017; Fox & Cundill, 2018; Walters *et al.*, 2021).

Support programs, for example through the provision of incentives have been used for promoting stakeholder involvement in restoration and conservation actions (Wainaina *et al.*, 2020; Casey *et al.*, 2006; Minang, 2018). It is argued that incentives will help restore and conserve the ecological integrity within the environmental and institutional framework that account for benefits and costs related to the restoration of degraded ecosystems (Bryan, 2013; Guerry *et al.*, 2015). In Cameroon and many other developing countries, governments, non-governmental organisations, agencies, financial and technical partners have invested large sums of money on voluntary land restoration incentive support programs. However, due to decreasing

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funding opportunities to cover the large demand for support, access has been submitted to a competitive application process. In these processes, evaluation is sometimes based on biophysical and ecological variables (for example, surface area and type of species) with limited consideration of social outcomes (for example, the durability of the behavioural change of the beneficiary and beneficiary's conservation stewardship attitude change) (Race & Curtis, 2013; Dayer *et al.,* 2018).

Stakeholders' adoption of tree-growing practices for restoration and participation in voluntary support programs have been studied (Wainaina *et al.,* 2020; Djenotin, *et al.,* 2018; Höhl, *et al.,* 2020). However, research on the reasons why stakeholders will continue in restoration practices after restoration support programs end is poorly represented in the literature. Not enough research has been done to provide empirical evidence on why restoration agents continue their restoration behaviour after support programs stop (Swann, 2016). Researchers signify this as a serious concern given that most conservation successes and benefits depend on sustained behavioural change (Reimer *et al.,* 2014; Gatto *et al.,* 2019; Defrancesco *et al.,* 2022). The behaviour changes or sustained behaviour that is expected is termed "persistence" as it is a continuation of a course of action or behaviour (Dayer *et al.,* 2018). The concept of persistence has been used to study the post program behaviour of beneficiaries in support programs in the energy (Frey & Rogers, 2014) and agriculture sectors (Dunn *et al.,* 2016). The reverse behaviour when a beneficiary returns to a pre-program situation is termed "disadoption" (Claassen & Ribaudo, 2016) or "reversion" (Kuhfuss *et al.,* 2016). In conservation and restoration programs, what remains less known is why there is persistence or reversion (Dayer *et al.,* 2018; Gatto *et al.,* 2019). This study is expected to contribute to filling this gap by using the tree-growing restoration experiences in the Sudano-Sahelian region of Cameroon as a case study.

Cameroon has made commitments to restore 12 million hectares of degraded lands (MINFOF-MINEPDED, 2020). The government and its development partners have been providing support to entities involved in tree-growing through support programs and projects. However, with the dwindling financial resources, programs will not be able to cover the increasing demand for long-term support from tree growers, thus, there is a need to re-strategize and focus on supporting initiatives that will be sustainable and deliver the expected restoration impacts. Financial resources are to be invested in programs to incentivise tree-growing for restoration

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purposes. An empirical examination of the tree-growing behavioural persistence is needed to shape the design and effective implementation of tree-growing support programs and policies.

The behavioural persistence in the context of tree-growing support programs is examined through the following research questions: (1) How is behavioural persistence condition considered in the design and implementation of tree-growing support programs? (2) Why do beneficiaries continue their tree-growing practices after support programs end? Concerning the first research question, the study examined the procedural aspects of tree-growing support programs to check if behavioural persistence and/or sustainability requirements are part of the selection criteria or participation requirements. This includes the level of awareness of beneficiaries on the lifespan of subvention programs and post program continuation. The second research question focused on the beneficiaries of support programs to examine why they continued tree-growing restoration practices after the end of support programs.

The information generated from this analysis, will contribute to the operationalisation of the forest landscape restoration strategy and to enhance understanding in the restoration space in Cameroon, where a diverse set of stakeholder groups are involved such as policy makers, development partners, practitioners, CSOs, and communities. The study will further contribute to the literature on restoration especially on the human and social dimensions of restoration, currently being dominated by the literature on the ecological dimensions (Chazdon *et al.*, 2017). In the following section, the analytical framework is presented, followed by the methodology, results and discussion sections follow.

6.1 ANALYTICAL FRAMEWORK

The framework for this study is informed by the concept of behaviour persistence and the literature on landowner behaviour. Understanding the social mechanisms underlying persistence results is important to fully appreciate, predict, and influence persistence likelihoods. Social science-based explanations are better placed to help us understand why a particular behaviour may or may not last beyond the life of a support program (Dayer *et al.*, 2018). Dayer *et al.* (2018) proposed five pathways by which the behaviour of land users could be expected to last or revert when support programs end. They include:

Land users' attitude and perception: This relates to the fact that attitude towards a specific practice and the perception of an individual's ability to perform a behaviour can influence the adoption of practices in the long term. Dayer *et al.* (2018) noted that if the participation in

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support programs generate positive change in the land users' attitude, then persistence outcomes will be more likely to endure after support programs end. It is further underscored that positive (or negative) outcomes of a support program can influence land users' attitude towards proposed practices and increase (or decrease) behaviour persistence (Dayer *et al.*, 2018). In terms of perception of behavioural control, farmers with a greater sense of control over the adoption of a practice, are more likely to adopt these practices. Perception of behavioural control is also very important after incentive programs (Dayer *et al.*, 2018). In this case persistence outcomes could be facilitated after a support program ends when farmers feel more in control and capable of implementing a practice (Hayes, 2012).

Habit forming*:* Habits have been proposed in health and household energy conservation research programs as another important factor that could influence persistence outcomes (Frey & Rogers, 2014). Frey & Rogers (2014) define habits as an automated tendency to repeat a specific behavioural response and indicates that behaviours that are repeated frequently in the same environmental context are better suited for habit formation. An individual past behaviour is a common determinant of habit strength (Dayer *et al.*, 2018).

Resources: Farmers and other types of land users may require resources such as time, labour, capital equipment to continue conservation behaviour following the end of support programs (Dayer *et al.*, 2018). According to Kwasnicka *et al.* (2016), land users with sufficient resources will be more likely to show behavioural persistence following the end of a support program. The financial cost and benefits of conservation practices is an important factor in decision-making (Kuhfuss *et al.*, 2016; Dunn *et al.*, 2016). Based on this relationship, it can be noted that land users below a certain and unknown level of financial resources will not be able to continue practices after a support program ends. Furthermore, practices that are profitable to a land user are very suited for continuation (Dayer *et al.*, 2018).

Social influence: Decisions concerning land use are made in social contexts that may or may not support persistence of conservation practices (Dayer *et al.*, 2018). A land user's decision-making may be influenced by the beliefs of what other land users are doing (descriptive norms) and what behaviours are socially acceptable (injunctive norms) (Fishbein & Ajzen, 2010). These two norms are part of the community and culture in which a land user is located and operating (Dayer *et al.*, 2018).

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Sustaining motivations: Farmers are driven by different motivations to involve in practices under natural resource management support programs. Farmers whose motivations endure beyond program end are likely to demonstrate persistence behaviour post support program (Kwasnicka *et al.*, 2016; De Snoo *et al.*, 2013). Motivations can be extrinsic (financial incentives, recreation opportunities) or intrinsic (internal satisfaction – food security, income). It is argued that intrinsic motivations are more durable and more likely to results in persistence conditions (Kwasnicka *et al.*, 2016). The study will draw on the pathways (Table 6.1) described above to investigate why tree growers in the context of restoration will continue their activities after support programs end.

TABLE 6.1:Persistence behaviour pathways and factors that drive persistence behaviour in tree growers.

Persistence behaviour pathways	**Factors that drive persistence behaviour in tree growers**	**Behavioural persistence variables**
Land users' attitude and perception	-Tree-growing practices that show success during support program - Adequate control over tree-growing practice i.e., become easier to conduct over time	- Successful tree growing practices (STP) - Appropriate knowledge and capacity (AKC)
Sustaining motivations	- Internal and external benefits of tree-growing i.e., compatible with tree growers' motivations, needs, and goals for their land	- Motivation of tree growers (MTG)
Habit forming	- Tree-growing habit (for example, farmers used to growing trees before the subvention program)	- Tree growing habit (TGH)
Resources	- Availability of resources (time, knowledge, labour) - Financial profitability of tree-growing	- Resources capacity of tree growers (RCT) - Profitability of tree growing (PTG)

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Social influence	- Influence from the behaviour of other tree growers - Tree growing is culturally or socially accepted in the community	- Tree growing behaviour of other farmers (TGB) - Tree growing as a cultural norm (TCN)

6.2 METHODOLOGY

6.2.1 Study area

This study is based on interviews conducted between October and November 2021 in the Mogazang landscape located in the Far Northern region which is part of the Sudano-Sahelian agroecological zone in Cameroon (Figure 5.1). The Sudano-Sahelian agroecological zone is a priority area for restoration in Cameroon and constitutes a greater proportion of the 12 million hectares of national restoration commitments (MIFOF-MINEPDED, 2020). The villages that the farmers were interviewed from, share similar biophysical and socioeconomic characteristics. The area has an undulating topography comprised of flood plains and mountainous areas that favour soil erosion and land degradation. The climate is tropical, of the warm Sudano-Sahelian type with two seasons. A long dry season (8 months) and a short rainy season (June to September). The region experiences an average annual temperature of about 28.25°C and fluctuates around 19°C in the cool season and 38°C in the hot season (ONACC, 2018). Rainfall varies between 500 and 1,200 mm per year, and rainfall records of the last decades showed a drastic decrease (ONACC, 2018).

Socio-economic activities are very diversified in the landscape. Agriculture is the main economic activity based on the production of food crops (rainy season sorghum, off-season sorghum, peanuts, sesame, and cowpeas), cash crops (onions, maize, cotton), tubers (potatoes, cassava), as well as a few fruit trees (mangoes, guavas, lemon, cashew nuts). Average yields are around 1000 kg ha^{-1} for cereals, 800 kg ha^{-1} for legumes, 1200 kg ha^{-1} for tubers particularly potatoes. Livestock rearing is also a key activity in the landscape, for example cattle, sheep, goats, poultry, and pigs. Land users in the area have different levels of resource endowments and socio-economic characteristics that could shape their land use decision making and practices (M2C, 2016).

Forest land in the region is a mix of vegetation formations that meet the Food and Agriculture Organisation (FAO) definition of a forest. These are, in order of decreasing tree density, forest

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plantation, tree savannah, shrub savannah, grassy savannah, tree steppe, shrub steppe and grassy steppe (M2C, 2016). Agricultural land consists of orchards, agroforestry parks and cultivated fields with low tree density. Bare soil, rocky outcrops, housing, road infrastructure, and the river system are classified as other land use types (MINFOF-MINEPDED, 2012).

6.2.2 Data collection

The study design was cross-sectional, descriptive, and co-relational. The study targeted farmers in the Mogazang landscape that benefited from tree-growing support programs. To this regard, a purposive sampling technique was used to select the targeted farmers where 157 farmers were selected following program reports from the landscape. Farmers' participation in support programs and their availability during the data collection period served as the key criteria for inclusion in the list of farmers that were interviewed using a semi-structured questionnaire to elicit information relevant to the study objectives. The semi-structured questionnaire was prepared to capture both quantitative and qualitative data (see appendix 1). Prior to data collection, the questionnaire was pre-tested to ensure consistency, reliability, and validity of the instrument. Data enumerators were recruited and trained before carrying out the survey. Seven key informant interviews were also carried out with past support program project managers and field assistants.

The requirements and process for applying and benefiting from tree-growing support programs in the case study area were examined to understand if beneficiaries were prepared psychologically about the short-lived nature of support programs and the need for them to continue their tree-growing practices after the end of support programs. The program documents of three support programs provided the bases for the assessment. This included the support program of the German Technical Cooperation (GIZ), the support programs of the Ministry of Forestry and Wildlife and the Ministry of Environment, Nature Protection and Sustainable Development.

6.2.3 Data analysis

Descriptive statistics and correlation analysis were applied to analyse the quantitative primary data using Excel and the Statistical Package for Social Scientists (SPSS V21). The descriptive statistics that included frequencies and percentages were used to understand trends in the responses across the different factors that drive farmers behavioural persistence regarding tree-

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growing. The Spearman's correlation analysis was used to understand the relationship, first, between the farmers' characteristics and the factors that drive farmers' behavioural persistence regarding tree growing and second, among different factors that drive farmers behavioural persistence regarding tree-growing. The Spearman's rank correlation coefficient assesses how well the relationship between two variables can be described using a monotonic function. The Spearman's correlation was used because the dataset was not normally distributed following the test of normality ran with Kolmogorov-Smirnov test.

6.3 RESULTS

The results are presented in two sections. First, on whether preparations of tree growers for continuation after the end of support programs are taken into consideration during program design and inception, and second, the factors that caused farmers to continue their tree growing activities after support programs. For each of the factors that are assumed to influence the behavioural persistence of tree-growing farmers, the results of the frequency analysis are presented. This is followed by the results of the correlation analysis between the socioeconomic characteristics of farmers and the factors that drive behavioural persistence. Lastly, the results of the correlation analysis among the factors that drive behavioural persistence in tree growing farmers are presented.

The general characteristics of the farmers interviewed, showed that about 46% had no formal education while the rest had attained primary and/or secondary education levels. About 94% of the respondents were male farmers and farm sizes were dominated by plots of less than one hectare. The farmers were involved in agroforestry and monoculture tree land use practices (considered here as plantation), though the agroforestry practices dominated land use activities involving about 62% of the interviewed farmers.

6.3.1 Preparing tree growing farmers for continuation after tree-growing support programs.

The project documents of the support programs do not indicate any clear approach, requirement, or activity to communicate, raise awareness and sensitise tree-growing farmers about the need to take responsibility and continue in tree-growing after support program ends. These are key issues that were supposed to be part of the inception phase of the programs. Little effort was made to present the facts to farmers, that tree growing is a lengthy process that requires both short and long-term investments, and that the long-term investments will be the farmers'

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responsibility after a support program. Programs focused mostly on short-term investment needs when presenting and engaging with farmers and stakeholders in tree-growing activities. Some projects saw the idea of presenting the potential challenges and needs of tree-growing after the end of support programs as a factor that will create a disincentive environment for farmers to engage during the implementation period of the tree-growing support program. Thus, some programs were seen as focusing on achieving their objectives as a program, rather than tree-growing as the overall objective.

" *Some organisations don't communicate much on the short-term nature of support programs and the long-term implication of farmers because of fear that communities or beneficiaries will not develop interest in the implementation of activities"*, a key informant commented.

Factors that can drive behavioural persistence among tree growers were not taken into consideration as part of the requirements of tree growing support programs. These programs are termed "tree growing" programs, but in practice, they are "tree planting" programs. This situation is worse with the government-supported schemes where support is sporadic with little or no assurance of whether support will be available or not, the following year. Little or no clear guidance was provided to beneficiaries in terms of planning interventions, even though it is known that the government does not have the capacity to fully fund tree growing schemes. Furthermore, in the government support programs, support activities were evaluated on the number of trees planted as opposed to the number of trees grown. This is an indication that tree growing behavioural persistence is not considered in the design of the programs since tree growing necessitates continuation in managing trees to maturity after planting.

6.3.2 Drivers of farmers' tree-growing persistence behaviour

Tree growers' attitude and perception*:* The attitude and perception of tree growers in relation to their behavioural persistence are influenced by the fact that activities implemented during the support program period were successful and farmers had the appropriate knowledge and sufficient technical capacity to continue. About 82% of farmers indicated that they continued tree growing due to the successes they observed during the support program period. While about 72 % of the interviewed farmers specified that they were motivated to continue tree growing as a farm practice because they had adequate control over tree-growing practice i.e., tree growing tasks became easy to handle over time. There was no significant relationship between the level of education, gender, farm size and tree growers' attitude and perception (Table 6.2). The results

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showed a positive significant correlation ($P<0.05$) between type of tree planting practice and farmers' attitude and perception towards tree growing, especially the attitude and perception influenced by the success stories of the support program. Farmers with trees on their farms were more influenced by the success stories of the support program to continue tree-growing practice on their farms.

The results showed a positive significant correlation ($P<0.01$), between farmers' attitudes, influenced by success stories and farmers' attitudes influenced by acquired capacity and knowledge (Table 6.3). Similarly, farmers' attitudes influenced by appropriate capacity and knowledge of farmers showed a positive significant correlation ($P<0.01$), with the farmers sustained motivation resulting from the internal and external benefits of tree planting. The capacity and knowledge of farmers to manage tree planting were highly correlated ($P<0.01$), with the tree planting habit of farmers, where famers have been involved in tree growing before the support program. There was a negative significant correlation ($P<0.05$) between the capacity and knowledge of farmers to manage tree planting and farmers' resources (time, labour, and knowledge for example). Lastly, none of the factors that influenced farmers' attitudes and perception to continue tree growing were correlated with the social context factors i.e., tree-growing as a cultural and social norm and the tree growing behaviour of other farmers (Table 6.3).

Motivation of tree growers: About 72% of the interviewed farmers indicated that the expected benefits from tree-growing contributed to their decision to continue to grow trees after the end of support programs. Motivation originates from the internal and external benefits of tree growing i.e., compatible with the farmer's motivations, needs and objectives. There was no significant association between the farmers motivation and the farmers socioeconomic characteristics such as level of education, gender, farm size and type of tree- growing practice (Table 6.2).

The correlation analysis results between the motivation of farmers to continue tree-growing showed no significant correlation with the other drivers of the behavioural persistence of tree growers such as the tree planting habit of farmers, availability of resources for farmers to continue tree growing, influence from the behaviour of other farmers and tree-growing culture of the community (Table 6.3). However, the results showed a positive significant correlation ($P<0.05$) between the motivation of farmers to continue tree-growing and the financial profitability of tree-growing (Table 6.3).

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Tree-growing habits of tree growers: About 73% of the interviewed farmers identified themselves with the fact that tree-growing was part of their farming habits before the arrival of support programs. The correlation analysis results between the tree-growing habits of tree growers and the farmers' socioeconomic characteristics such as level of education, gender, farm size and type of tree- growing practice, showed no significance (Table 6.2).

The results showed a positive significant correlation ($P<0.05$) between the tree- growing habits of tree growers and the availability of resources for tree-growing in terms of capacity of farmers to mobilise personal resources in relation to material inputs, time, labour. Similarly, there was a positive significant correlation ($P<0.01$) between the tree growing habits of tree growers and the influence of the behaviour of other farmers planting trees (Table 6.3). On the other hand, there were no significant correlations between the tree-growing habits of tree growers and other behavioural persistence factors such as the availability of resources for tree- growing and tree growing as a cultural norm in the community (Table 6.3).

Resource capacity of tree-growers: Only 43% of the interviewed farmers identified their personal resource capacity as a factor that influenced their decision to continue tree-growing after support programs. On the other hand, about 83% of the interviewed farmers indicated that the financial profitability of tree cultivation contributed to their decision to continue tree-growing. The correlation analysis results between the resource capacity of tree growers (i.e., availability of financial resources and financial profitability of tree growing) and the farmers' socioeconomic characteristics such as level of education, gender, farm size and type of tree-growing practice, showed no significant correlation (Table 6.2).

The results showed a positive significant correlation ($P<0.01$) between the availability of resources to continue tree-growing and the continuation of tree growing, influenced by tree growing as a community norm. On the other hand, there were no significant correlations between the availability of resources for tree growers and the other behavioural persistence factors such as financial profitability of tree cultivation and the influence of the behaviour of other farmers planting trees (Table 6.3).

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TABLE 6.2:Relationship between farmers characteristics and the factors that drive farmers tree growing behavioural persistence

Farmers Characteristics	STP	AKC	MTG	TGH	RCT	PTG	TGB	TCN
Level of Education	0.027	-0.033	0.057	-0.061	0.107	0.033	0.034	-0.093
	P= 0.740	*P=0.686*	*P=0.493*	*P=0.458*	*P=0.192*	*P=0.686*	*P=0.677*	*P=0.257*
Gender	0.047	0.049	-0.017	0.057	-0.077	0.118	0.118	-0.149
	P=0.573	*P=0.550*	*P=0.838*	*P=0.488*	*P=0.348*	*P=0.151*	*P=0.151*	*P=0.069*
Farm size	-0.002	0.104	0.063	0.035	-0.088	-0.143	0.059	0.063
	P=0.981	*P=0.207*	*P=0.448*	*P=0.675*	*P=0.289*	*P=0.082*	*P=0.478*	*P=0.448*
Type of tree planting practice	0.244**	-0.130	0.159	0.050	-0.003	0.075	0.009	0.058
	P=0.003	*P=0.117*	*P=0.055*	*P=0.546*	*P=0.967*	*P=0.370*	*P=0.913*	*P=0.483*

***. Correlation is significant at the 0.01 level: *. Correlation is significant at the 0.05 level. STP - Successful tree growing practices; AKC - Appropriate knowledge and capacity; MTG - Motivation of tree growers; TGH - Tree growing habit; RCT - Resources capacity of tree growers; PTG - Profitability of tree growing; TGB - Tree growing Behaviour of other farmers; TCN - Tree growing as a cultural norm.*

Social context of tree growers: The social context of tree growers influences the behaviour of farmers in two ways. First, they were influenced by the tree planting behaviour of individual farmers, and second by the fact that tree planting was a social norm in the community. About

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50% and 72% of the interviewed farmers mentioned that they were influenced by the behaviour of individual farmers and tree growing culture in the community, respectively. For many decades, tree planting to fight harsh climatic conditions has been part of the land use practice for communities in the landscape. The correlation analysis between these two social factors showed no significant relationship (Table 6.3). Even though tree planting was considered a common land use practice in the communities, the decision to plant and retain trees on farms is influenced by a combination of factors that depend on individual farmers' choices.

TABLE 6.3:Relationship among the factors that drive farmers' tree growing behavioural persistence

	STP	AKC	MTG	TGH	RCT	PTG	TGB	TCN
STP	1.000	0.270**	0.143	0.159	0.073	-0.080	0.071	-0.024
		P=0.001	*P=0.084*	*P=0.054*	*P=0.377*	*P=0.332*	*P=0.391*	*P=0.768*
AKC		1.000	-0.271**	0.260**	-0.166*	-0.110	0.124	-0.028
			P=0.001	*P=0.001*	*P=0.043*	*P=0.180*	*P=0.133*	*0.736*
MTG			1.000	-0.058	-0.073	-0.187*	0.085	0.094
				P=0.482	*P=0.374*	*P=0.022*	*P=0.301*	*P=0.254*
TGH				1.000	-0,197*	-0.152	0.216**	0.159

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	P=0.016	*P=0.064*	*P=0.008*	*P=0.053*
RCT	1.000	-0.002	-0.020	-0.256**
		P=0.977	*P=0.812*	*P=0.002*
PTG		1.000	-0.154	-0.061
			P=0.061	*P=0.461*
TGB			1.000	0.124
				P=0.133
TCN				1.000

***. Correlation is significant at the 0.01 level: *. Correlation is significant at the 0.05 level. STP - Successful tree growing practices; AKC - Appropriate knowledge and capacity; MTG - Motivation of tree growers; TGH - Tree growing habit; RCT - Resources capacity of tree growers; PTG - Profitability of tree growing; TGB - Tree growing Behaviour of other farmers; TCN Tree growing as a cultural norm.*

6.3 DISCUSSION

The results showed that tree growing support programs contribute very little to enhance the behavioural persistence of tree-growing farmers in the Mogazang landscape. Support programs, especially government programs are planned on the premise of "tree planting" as opposed to 'tree growing" which is a lengthy process. According to Duguma *et al.* (2020), tree-growing demonstrates the capacity of planted trees being able to survive with the ability to contribute to the objectives they were planted for. The long-term necessities of tree-growing are not taken into consideration during the planning phase of interventions; thus, farmers are not prepared in terms of continuation after the support program ends. Communication and providing information are key to building persistent and behaviour-driven attitudes (Pierro *et al.*, 2012).

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The results showed that support programs do not have strong communication and sensitisation strategies in place to prepare farmers for the need to take responsibility over tree- growing activities after programs end. Asensio & Delmas (2016) reported that developing and implementing effective information and communication strategies is important in shaping long-term conservation behaviour. Thus, to ensure and sustain continuation after tree-growing support programs, there is a need for tree-growing support programs to develop and implement effective information, education, and communication strategies.

The results showed that farmers' attitude and perception is crucial in determining the behavioural persistence of tree-growing farmers in the Mogazang landscape. The perception of successes in tree-growing practices appeared to be a driving factor for farmers to continue in their tree-growing practice after support programs. This finding corroborates the findings of other studies. In Australia for example, Race & Curtis (2013) found that farmers were more likely to continue implementing natural resource management practices they perceived to be successful. Also, in France, farmers that perceived higher quality of life during participation in a support program were more likely to state their intentions to continue with conservation behaviours after the end of support programs (Kuhfuss *et al.,* 2016). The results related to attitude and perception, further showed that the farmers in the Mogazang landscape continued to implement tree-growing practices on their farms because farmers had the capacity to comfortably respond to the technical needs of integrating and managing trees on their farmlands. In Kenya, Oeba *et al.* (2012) found that the technical capacity of farmers in silvicultural practices was an enabling factor for farmers to continue to retain trees on their farms. Mellon Bedi *et al.* (2022) mentioned following their study in Ghana that the provision of support services, for example through extension services is important for farmers continuous learning and improvement. This is related to the results of Oeba *et al.* (2012) which indicated that extension services had a positive significant correlation with the technical capacity of farmers that retained trees on their farms. The positive significant correlation between farmers' attitudes, influenced by success stories and farmers attitudes influenced by acquired capacity and knowledge implies that farmers were able to acquire sufficient knowledge and skills during the support programs. This indicates the importance of extension services in supporting farmers in terms of training and ensuring that experimental tree-growing practices undertaken with farmers succeed during the support program period. Furthermore, the positive significant correlation between farmers' attitudes influenced by farmers' capacity and knowledge and farmers sustain motivation to continue tree-growing, suggests the importance of ensuring that

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farmers acquire sufficient technical capacity during support programs. In this regard, efforts must be made to use appropriate training techniques that will enable farmers to learn, and use acquired skills in their farm practices. The more farmers are involved in tree-growing as a farming practice, the higher will be their technical capacity. This is shown by the positive significant correlation results between the capacity and knowledge of farmers to manage tree-growing and the tree-growing habits.

The results showed that farmers' capacity to stay motivated, contributed to their decision to continue to grow trees. Motivation in this case was internal i.e., the financial and livelihood-related benefits that farmers expected from tree-growing. The positive significant correlation between farmers' motivation and financial profitability implies that the more farmers perceive financial benefit flows from their tree-growing investments, the more they stay motivated to carry on with their tree-growing practice. This concurs with a study carried out on the determinants of farmers' tree retention capacity in Kenya which showed that farmers' motivation was driven by the different benefits they received from trees on their farms. This contributed to tree retention after the support program (Oeba *et al.,* 2012). Another study on the restoration of degraded semi-arid land in Kenya, reported that the motivation of livestock farmers to continue to implement improved land use practices was driven by income and other related benefit flows (Mureithi *et al.*, 2014).

Results of the analysis showed that tree growing habits of the interviewed farmers in the Mogazang landscape influenced their tree-growing behavioural persistence. Farmers indicated that tree-growing has been part and parcel of their land use practice before support programs. Habits have been seen to be pertinent for influencing environmental behaviours such as waste management behaviour and energy conservation behaviour (Klöckner, 2013). Findings from a study in Nebraska, United States of America showed that land users who had implemented conservation tillage practices in the past were more likely to adopt the behaviour again and stressed that habits were responsible for this outcome (Sheeder & Lynne, 2011).

The positive significant correlation between habit formation and capacity of farmers to mobilise resources (time, labour for example) to carter for tree-growing, implies that farmers consider tree-growing as part of their land use practice. Thus, minimum resources are always allocated for tree-growing. Furthermore, the positive significant correlation between the tree- growing habits of the farmers and the influence of the behaviour of other farmers growing trees, indicates

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that farmer-to-farmer networking or relationship is important to strengthen farmers tree-growing behavioural persistence (Amare & Darr, 2020).

The results showed that farmers continued tree-growing after the support program because they perceived tree-growing as a profitable practice. This is in line with the study of Kuhfuss *et al.* (2016), which indicated that farmers' persistence intentions were high when their farm practices were able to generate better sale value for farm products.

Tree-growing as common practice or norm in the communities played an important role to drive farmers to continue tree-growing. Information about other land users' persistence behaviours affects the intention to persist of other farmers following a support program. Moreover, land users who perceived the social acceptance of their conservation behaviours are more likely to state their intentions to continue after a program ends (Kuhfuss *et al.*, 2016). In studies on the determinants of farmers' choices to remain or abandon agri-environmental schemes in Italy, results showed that the influence of other farmers, social pressure, described as neighbourhood effect increased the probability of farmers to remain as part of the schemes (Defrancesco *et al.*, 2008; Gato *et al.*, 2019).

6.4 CONCLUSION

This study aimed primarily to analyse the factors that drive the behavioural persistence of tree-growing farmers following the end of tree-growing support programs. First, the study examined whether during the inception phase of support programs, farmers are well informed and drilled on their responsibility to continue tree-growing post-support programs. Second, the study analysed the role played by farmer-related characteristics to influence their decisions to continue tree-growing after the end of support programs.

The results have shown that during the inception phase of the support programs, insufficient effort was made to ensure continuation after the support programs. Emphasis was made on achieving the objectives of "tree planting" as opposed to "tree-growing" that requires planted trees to survive with the capacity to contribute to the objectives they were planted.
The results also indicated that the positive attitude and perception of farmers, constant motivation, financial profitability, and influence from other tree growers and community are all factors that influence farmers' decision to continue in tree-growing after support programs end. These were factors that are directly related to farmers' characteristics, and therefore need to be assessed during the design, inception and implementation of tree-growing support programs.

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With these factors taken into consideration and enhanced, there is a high probability that tree-growing will experience continuation after the end of support programs.

By focusing the attention on the continuation rather than the beginning of tree-growing, this study has enriched a still growing body of literature and offered a contribution to a topic that deserves more attention, given the importance of tree-growing in the land and forest restoration agenda globally and in Cameroon in particular. Furthermore, the inquiry from tree-growing support programs activity areas in the Sudano-Sahelian region of Cameroon has generated information that will contribute to the understanding of factors that are important to drive long-term involvement and success in restoration activities at scale in Cameroon.

Despite these interesting results that are relevant for designing and implementing tree-growing support programs, the study has some limitations that could serve as an opportunity for further research. First, the study did not consider the time-dynamic perspective of farmers' decision to continue to grow trees that can shift over time, adapting to the changing social context where farmers' values can be modified and negotiated by social interactions. Thus, undertaken a study on farmers' tree-growing behavioural persistence after a long period of time following the end of a support program, can produce interesting results. This is because time-dynamics have implications on social and policy action on the one hand, and on the other hand, changes in policy and social context can also influence farmers' decision making in the long-term. Second, the study is limited to a specific geographical setting. This specificity was important since landscape driven policies can be well understood following a placed based perspective.

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CHAPTER 7

Learning from the past to guide the future: A SWOT-AHP analysis of tree-based land restoration endeavours in the Northern Sahel Region of Cameroon

ABSTRACT

Cameroon and other African countries have made huge commitments to restore millions of hectares of degraded lands for biodiversity, climate change and livelihood support. Experiences from past endeavours are relevant for the success of future land restoration policies and programs. This study analyses restoration efforts in the Northern Sahel region of Cameroon using a combination of SWOT analysis and the Analytical Hierarchical Process approach through a participatory assessment process with key informants from three stakeholder groups – representatives of the ministries of the environment and forestry, representatives of communities, representatives of local NGOs. The results show that key informants from the stakeholder groups involved in the study perceive the positive attributes of restoration efforts to overshadow the negative aspects. Moreover, *source of additional income for families* received the overall highest factor score ranking for strength. *Tenure insecurity* is the weakness with the highest score and the overall priority score for weaknesses was highest for key informants from local NGOs. On the other hand, *improving livelihoods and natural resource base of communities* received the highest overall factor for opportunities, while *inadequate supply of quality inputs* for restoration was perceived as the most critical threat to land restoration efforts in the northern Sahel Region of Cameroon. Different views were observed in the results. This indicates that involving all stakeholders in the design, implementation and monitoring of restoration initiatives is relevant since it will take into consideration different views and address realities on the ground. This is important for restoration initiatives that will respond to local needs and national and global environmental commitments.

Keywords: land degradation, restoration efforts, SWOT-AHP, Northern Sahel, Cameroon[5]

[5] Chia, E.L., Nsubuga, F.W., Chirwa, P.W. 2023. Learning from the past to guide the future: A SWOT-AHP analysis of tree-based land restoration endeavours in the Northern Sahel region of Cameroon. *International Forestry Review. 125(1), pp.15-26. DOI: https://doi.org/10.1505/146554823836838754*.

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7.0 INTRODUCTION

Land and its related resources play a critical role in national development plans and retains the role as a fundamental basis for global prosperity. Land supports food growth, provides fuel, fibres, and other related environmental services (UNEP, 2021). The capacity of land to meet all these demands is being constrained by population growth, land degradation and desertification, climate change. Land degradation manifest itself in a persistent reduction of biological productivity driven by the overexploitation of land resources (UNCCD, 2012). Through several international agreements, statements and goals, the world has recognized the importance of land and the constant threats that land and its related resources are experiencing. These international commitments have been expressed via different concepts, institutional and governance arrangements. For example: (1) sustainable land management (Djenontin *et al.,* 2018), (2) Forest and Landscape Restoration (FLR) expressed through the Bonn Challenge and the Africa 100 (AFR100) initiatives (Chazdon *et al.,* 2017, Suding *et al.,* 2015), (3) Land Degradation Neutrality (LDN) of the Convention to Combat Desertification (Jørgensen, 2013), (4) The Convention on Biodiversity new biodiversity framework that guides global actions to preserve and protect nature and its essential services to people through 2030 (CBD, 2021). Ecosystem degradation which includes land degradation is already affecting the well-being of an estimated 3.2 billion people, which is 40 percent of the world's population (UNEP, 2021).

Taking FLR as a case, developing countries have made ambitious restoration goals, backed by significant commitments (Djenontin *et al.,* 2018). However, moving from commitments to successful implementation is challenging, and requires a broad understanding and development of the social, economic, and environmental knowledge base (Chazdon *et al.,* 2017). FLR is a "planned process that aims to regain ecological integrity and enhance human wellbeing in deforested and degraded landscapes" (Mansourian & Vallauri, 2005). van Oosten *et al.* (2014) further presents FLR as an integrated approach towards managing land to achieve social, economic, and environmental objectives in areas where agriculture, livestock, mining, and other productive land uses compete with environmental and biodiversity conservation interests. The restoration of ecosystem functionality is important from both socioeconomic and environmental perspectives. First, it can enhance the contribution of natural resources to rural poverty reduction, increase the productive capacity and commercial viability of existing land-use systems, and second, it can improve ecosystem services, ensure greater habitat connectivity, and enhance biodiversity conservation (Maginnis & Jackson, 2003).

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FLR is context-specific with no one-size-fits all approach, driven by different objectives, policy, institutional and governance frameworks. The successful implementation of FLR needs to be informed by experiences and lessons from past restoration or related restoration schemes (Fagan *et al.*, 2020; Höhl *et al.*, 2020). In a literature review targeting FLR in Sub Saharan Africa, Djenontin *et al.* (2018) identified three categories of interacting factors that influenced the outcome of FLR efforts. These factors are conceptualized in terms of their features, intensity, and scale. First, household level factors related to socioeconomic, cultural, financial, and biophysical aspects (Adimassu *et al.*, 2012; Nigussie *et al.*, 2017; De Graaff *et al.*, 2008; Ajayi *et al.*, 2007). Second, factors related to design and implementation challenges at the level of projects and programs. For example, the need to define clear and context- specific objectives (Bullock *et al.*, 2011), techniques (Galabuzi *et al.*, 2014; Kimiti *et al.* 2017), local participation (Galabuzi *et al.*, 2014) and capacity building (Badjana *et al.*, 2017). Third, governance, institutional and policy related factors (McLain *et al.*, 2017; Lovo, 2016). These context-specific assessments and analysis are important, given that landscape-based policies are well understood only from a place-based perspective (Zasada *et al.*, 2017).

Cameroon is experiencing serious land and forest degradation throughout the national territory, with variations from one agro-ecological zone to another. The country has made international commitments to restore about 12 million hectares of degraded landscapes in the context of the Bonn Challenge, the New York Declaration on Forests and the AFR100 Initiative (MINFOF-MINEPDED, 2020). However, before the emergence of the new restoration movement under the different FLR initiatives, Cameroon has been involved in land restoration for more than two decades in the framework of the fight against desertification in the northern Sahel regions. Lessons from these past experiences are relevant to shape the outcome of ongoing restoration plans in Cameroon. Thus, the objective of this study is to assess the Strengths, Weaknesses, Opportunities and Threats (SWOT) of past land restoration endeavours, to generate information for decision makers, project and program managers, investors, and rural communities as they develop plans, programs, and projects for restoration interventions in Cameroon. The investigation is done using a combination of SWOT analysis and the Analytical Hierarchical Process (AHP) approach, through a participatory process involving the representatives of three major stakeholder groups that have been involved in land restoration efforts in the Far North Region of Cameroon. The scoring and prioritization will permit to understand where attention should be given in terms of enhancing the design and implementation of restoration policies and programs. This is crucial in a context where the government is limited in terms of resources

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and capacity. Furthermore, the results will contribute to the growing literature and debates on landscape restoration and management at the sub-national, national, and global levels.

The Government of Cameroon developed the National Action Plan to Combat Desertification in 2007 with the overall objective to reverse the trends of desertification and land degradation and to combat poverty and promote sustainable development. The Far North Region has been a project implementation area for the government-funded "Green Sahel" Project since 2008 through the Ministry of the Environment, Nature Protection and Sustainable Development (MINEPDED). The project has been implementing activities in the six divisions of the region targeting degraded lands and areas affected by desertification with the intentions to increase soil fertility, improve the living conditions and the production base of the local population. Furthermore, the government through the Ministry of Forestry and Wildlife (MINFOF), has also been involved in the fight against desertification and climate change through the stabilization and enrichment of vegetation cover as part of the National Reforestation Program. Created in 2006, this initiative has been providing support to councils, NGOs, associations, and chiefdoms interested in reforestation and afforestation in the Far North Region of Cameroon. Before the external interventions that have been greatly linked to reforestation, afforestation and natural regeneration, local communities have been involved in a wide range of traditional land management techniques (Gnyonkeu *et al*., 2016). These experiences are relevant to guide future tree-based land restoration initiatives.

The Far North Region was targeted to gather these experiences because it is the priority area to implement the ongoing international land restoration initiatives such as the FLR Bonn Challenge/AFR100 initiative (MINFOF-MINEPDED 2020), the Great Green Wall of Sahel and Sahara Initiative (GGWSSI) (MINEPDED 2020), the Land Degradation Neutrality (LDN) initiative and the initiative to reduce forestry emissions/enhance removals (MINEPED, 2018).

7.1 METHODOLOGY

7.1.1 Study area

The study was carried out in the Far North Region of Cameroon. The six divisions of the Far North Region cover a surface area of 34,263 km^2 with a total population size and density of 3,111,192 inhabitants and 91 inhabitants/$km^{2,}$ respectively. The population is dependent on

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agriculture and livestock activities both for subsistence and cash purposes (Tunk *et al.*, 2016). Wood fuel is the major source of household cooking energy with a demand that excessively surpasses supply (Charpin & Richter, 2014). The increasing demand for space for agro-pastoral activities and wood energy are the major drivers of land use change and degradation in the region (MINEPDED, 2018). The degraded land in the region is estimated at about 3 316 770 ha (MINFOF-MINEPDED 2020). The situation of natural resource dependence in the region calls for multiple land management approaches, especially in the current changing climatic conditions.

7.1.2 SWOT-AHP methodology

The assessment of the opinions and priorities of stakeholders was carried out using a combination of SWOT and AHP approaches. It is a method that has been underscored as important in strategic planning because it provides occasions to diagnose in detail to identify vital factors that determine the success and failures of a strategy or program (Vonk *et al.*, 2007, Oladele & Sakagami, 2004). A SWOT analysis identifies the internal and external attributes that can help in making informed decisions about a given project, program and/or organisation. For example, SWOT has been used to critically analyse solar energy sources which culminated to the identification of the potentials and prospects for the development of renewable energy in Romania (Lupu *et al.*, 2016). However, SWOT provides no mechanism to rank the significance of one factor versus another within any list, as a result, it's difficult to determine the weight of any one factor's true impact on an objective (Nordmeyer, 2019). Thus, combining with another approach such as the AHP that gives the opportunity to score, rank and prioritize between factors is relevant. In this case, an assessment will capture and rank different views, thus facilitating decision making.

The AHP is a multi-criteria decision-making technique used in diagnosing environmental decision problems, which typically involve multiple objectives, criteria, and decision-makers. It is suitable because decision-making in environmental projects can be complex and intractable, principally because of the inherent trade-offs between social, political, ecological, and economic factors (Hermans *et al.*, 2007; Herch, 2006; Kiker *et al.*, 2005). The AHP helps in identifying and evaluating the relative importance of factors from the perception of stakeholders (Luthra *et al.*, 2016; Luthra *et al.*, 2013; Saaty, 1993; Saaty, 1980). It has been used in the assessment of different natural resource management systems. For example, in assessing forest certification schemes (Kurttila *et al.*, 2000); joint forest management systems

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(Etongo *et al.*, 2018); stakeholders' preferences in regional forest planning (Ananda & Herath, 2003). This study adapts the three steps SWOT-AHP approach as the case in Kurttila *et al.* (2000) and Etongo *et al.* 2018; (1) identification and classification of SWOT factors generated through a reflection workshop (2) identification of stakeholder groups (3) AHP evaluation of SWOT factors by the stakeholder groups.

(i) Identification and classification of SWOT factors

The factors were identified based on the experience of tree growing restoration practices in the Far North Region, considered as a process (interventions into a complex social-ecological system with full participation of stakeholders) where outcomes are expected (socio-economic and ecological benefits). An extensive list of SWOT factors related to tree growing land restoration efforts in the Far North Region was generated from monitoring and evaluation reports, discussions with community informants during a reconnaissance field visit and from a brainstorming exercise in a workshop organized in Maroua, the regional capital of the FarNorth Region in September 2021. The workshop was attended by 17 stakeholders invited from the administration (senior staffs of the regional and divisional delegations of the forestry and environment ministries), project proponents (the German Technical Cooperation for example) and Non-Governmental Organizations (NGOs) involved in restoration initiatives in the region. The workshop was part of the activities of the restoration planning process, organised by restoration project proponents in the Far North Region.

During the workshop, the SWOT factors were reviewed and listed into groups in a plenary. The SWOT factors were further reviewed and revised to 16 factors and following inputs from stakeholders in breakout groups and a plenary session, four factors were placed in each SWOT category (Table 7.1). Keeping many SWOT factors is beneficial, however, the number of pair-wise comparison in AHP grows exponentially as the factors increase. To this regard, each SWOT category was limited to four key factors to keep the pair-wise comparison at a manageable level. For SWOT factors that required clarity, stakeholders further provided characteristics (as shown by the italicized elements in Table 7.1) to help define them for proper understanding by stakeholders during the group evaluation process.

TABLE 7.1: Strengths, weaknesses, opportunities and threats factors of tree-growing land restoration efforts in the Far North Region of Cameroon.

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Strength's category	**Opportunities category**
S1 Source of additional income for some families - *Employment opportunities*	**O1** Improve livelihoods and natural resource base of communities
S2 Increasing involvement of local stakeholders - *Local communities around restoration sites* - *Local councils* - *Local administrative authorities*	**O2** Increasing awareness of the importance of land restoration
S3 Increasing need for social-ecological resilience - *Continuous decline in household natural resource base*	**O3** Improve enabling environment for restoration - *Decentralization* - *Increasing availability of technical services to accompany restoration efforts*
S4 Utilization of energy efficient technology - *Utilization of improved cook stoves*	**O4** Increasing political will and donor interest on restoration - *Increasing financial commitments for restoration*
Weaknesses category	**Threats category**
W1 Inadequate capacity - *Inadequate capacity to manage restored sites* - *Poor execution of tree-planting tasks by communities* - *Inadequate technical capacity at the council/community level* - *Premature transfer of responsibilities to councils*	T1 Non respect of the tree planting calendar - *Late disbursement of funds* - *Late start of restoration activities* - *Late and poor payment of laborers* - *Late supply of inputs* - *Poor evaluation of the cost of restoration*
W2 Lack of appropriate monitoring and evaluation system - *Inadequate scientific baseline data for Monitoring and evaluation* - *Lack of information on success rates* - *Difficulty to monitor and protect large restoration areas*	T2 Disperse and incoherent restoration initiatives at very small scales (NGOs, financial and technical partners, administration)

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W3 Lack of effective engagement/participation of some communities *- Appears to be a top-down approach* *- Lack of interest from some communities and councils* *- lack of clarity on communities' motivation to engage in restoration*	T3 Impacts of climate variation and change in the Sahel
W4 Tenure insecurity *- Confusion between customary and statutory land tenure systems*	**T4** Inadequate supply of quality inputs for restoration *- Non-respect of the choice of species of beneficiaries* *- Low quality plants and other planting materials*

(ii) Identification of stakeholder groups

Three stakeholder groups comprised of fifteen resource persons involved in land restoration in the region were identified for the assessment. Community representatives (5), representatives of local based NGOs (5), and the representatives of administrations (forestry and environment) involved in land restoration actions in the region (5) were involved. The stakeholder groups and their representatives were chosen based on the advice of the restoration project management team of the German technical cooperation restoration support program. The team has been involved in tree growing restoration and related practices for a decade in the region and their selection was based on the track record of participation in tree growing restoration practices and availability to participate in the evaluation workshop. Furthermore, informal enquiries were made with key informants to gain information on the representatives that were proposed by the project team. The selection of the five representatives from the community that included two women was further guided by the ability of the persons to understand and express community level views on land restoration. The five-resource people (that included one lady) from the NGO group comprised of representatives of NGOs that have been involved in land restoration initiatives in the region. The resource persons from the administration comprised of 2, 2 and 1, regional level, divisional level, and local level staff, respectively.

(iii) AHP evaluation of SWOT factors

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This was done following three steps:

1. Formulation of the pair wise comparisons: Based on the SWOT factors (Table 7.1) pairwise comparison was conducted in the three stakeholder groups separately, using a nine-point Saaty's scale (Table 7.2). During the pairwise comparison, members of stakeholder groups were asked to deliberate and evaluate the SWOT factors within each SWOT category and indicate if one factor is more important than the other or both factors are equally important using the 1 to 9 scaling system (Table 3). Stakeholder groups were further asked to compare between SWOT groups. Group members were allowed to deliberate and come to a consensus to choose a relative weight. For example, in comparing strength 1 (S1) and strength 2 (S2), if a group tick 6 on the right, it implies the strength factor "Strong involvement of local stakeholders" is six times more important than the strength factor "Source of additional income for some families" (Table 7.2). The discussions in the three groups were accompanied by a group facilitator who also played the role of group secretary responsible for taking down notes during the deliberations.

TABLE 7.2:Scales for pairwise comparison (adapted from Saaty, 1980)

Intensity of importance	**Definition and explanation for assessment**
1	Equally important – two factors are of equal importance
3	Moderately important – one factor is slightly important than the other
5	Strongly important – one factor is strongly important than the other
7	Very strongly important - one factor is very strongly important than the other
9	Extremely important - one factor is extremely important than the other
2,4,6,8	These intensities can be used to express intermediate values

2. Comparison of relative weights, Eigen values and Eigen vectors: the pair wise comparison matrices were operated to determine the Eigen values and Eigen vectors. The Eigen values and Eigen vectors were further analysed to calculate the relative importance weights of the factors. The comparison was done within SWOT groups,

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between the strength factors for example, and between the SWOT groups, relative weights between the Strength and the Weakness groups for example.

3. Evaluation of the consistency ratio (CR): The CR for each size of a matrix measures the degree of departure from pure inconsistency. It is the ratio of a consistency index to the mean consistency index from a large sample of randomly generated matrices (Saaty 1997, Saaty 1993). The degree of the consistency ratio (CR) was computed to ensure the consistency of pairwise comparison using the following mathematical expression:

$$CR = \frac{CI}{RI}$$ where the consistency index is denoted by $CI = (\lambda_{max} - n)/(n-1)$,

RI is the random consistency index, which depends on the value of n. The value of CR should be less than 0.10 to have a better level of consistency. Steps 2 and 3 were operated using Microsoft Excel 2021.

TABLE 7.3:Example of the pair-wise ranking table based on the strength factors i.e., compare strength 1 (S1) and strength 2 (S2) and tick the appropriate box

Factors	◄									►						
	9	8	7	6	5	4	3	2	1	2	3	4	5	6	7	8
S1Source of additional income for some families																
S1 Source of additional income for some families																
S1 Source of additional income for some families																
S2 Increasing involvement of local stakeholders																
S3 Increasing need for social-ecological resilience																

7.2 RESULTS

The results of the analysis are interpreted according to relative weights that represent the level of importance of one factor over another within a group (column two to four in Table 7.4) and

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between groups (Table 7.5). The factors are represented in phrases with the assumption that they have implications for the outcome of restoration in terms of the design and implementation of policies and projects. Because the overall priority scores sum up to one, each priority score can be interpreted as the weight of each factor for assessing the SWOT of tree-based restoration efforts. Moreover, the scores of the strength and opportunity factors can be interpreted as positive while the weakness and threats scores as negatives. In terms of relative importance within a SWOT category, a score of 0.629 in column two (Table 7.4), for example, indicates that the representatives of the administration perceive that the *increasing involvement of local stakeholders* alone accounts for 63% of the total strength of tree-based restoration initiatives.

The interpretation of the overall priority scores can be done in a similar way, for example, overall priority scores of 0.38 and 0.35 for the representatives of the administration, suggest that strengths and opportunities factors of tree-based restoration account for 38% and 35% SWOT factors respectively (Table 7.5).

7.2.1 Perceptions from the representatives of the administration

The analysis of the within group factors of the representatives of the administration shows that *Increasing involvement of local stakeholders* is the most important strength with a priority score of 0.629 (Table 7.4). The most important opportunity factor as perceived by this group is *the increasing political will and donor interest* on restoration with a priority score of 0.461. Concerning the weaknesses, the most prominent weakness as perceived by the representatives of the administration is *tenure insecurity* with a priority score of 0.488. Lastly, *inadequate supply of inputs that includes the non-respect of the choice of suitable tree species requested by beneficiaries and the low-quality plants and other planting materials* was perceived as a critical threat by this group of stakeholders with a priority score of 0.515. Results from the across group analysis indicated that, the representatives of the administration perceive the strength and opportunity groups to be more important for enhancing restoration as compared to the weakness and threat group. The strength and opportunity groups have an overall priority score of 0.38 and 0.35 respectively, while weakness and threat groups have an overall priority score of 0.13 and 0.14 respectively (Table 7.5).

7.2.2 Perceptions from the representatives *of* local NGOs

The analysis shows that the *source of additional income for families* was perceived as the most important strength by the representatives of the local NGOs with a factor priority score of 0.514

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(Table 7.4). This group of stakeholders perceived the *improved livelihoods and natural resource base of communities* as the most important opportunity factor with a priority score of 0.660. In this group two weakness factors - *lack of effective engagement/participation of some communities and tenure insecurity*, were perceived the same with the same priority score of 0.441. The *impacts of climate variation and change in the Sahel* was perceived by the members of this group as the most important threat to restoration actions in the Far North Region with a priority score of 0.497. Across-group analysis of NGO representatives indicates that the overall priority scores for the SWOT in decreasing order of size for the NGO representatives include opportunities (0.36), strengths (0.33), threats (0.16), weaknesses (0.14) (Table 7.a).

TABLE 7.4:Factor priority scores for the SWOT-AHP analysis per stakeholder group

SWOT GROUPS	**Prioritisation of factors per stakeholder group**		
	Administration	Community	NGO
Strengths			
S1: Source of additional income for families	0.227	0.546	0.514
S2: Increasing involvement of local stakeholders	0.629	0.107	0.105
S3: Increasing need for social-ecological resilience	0.058	0.289	0.189
S4: Utilization of improved energy consumption strategies	0.084	0.056	0.189
Weaknesses			
W1: Inadequate capacity	0.163	0.108	0.071
W2: Lack of appropriate monitoring and evaluation system	0.264	0.047	0.044
W3: Lack of effective engagement/participation of some communities	0.082	0.258	0.441
W4: Tenure insecurity	0.488	0.585	0.441
Opportunities			
O1: Improved livelihoods and natural resource base of communities	0.063	0.700	0.660

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O2: Increasing awareness of the importance of land restoration	0.272	0.131	0.151
O3: Improve enabling environment for restoration	0.202	0.077	0.085
O4: Increasing political will and donor interest on restoration	0.461	0.090	0.101
Threats			
T1: Non-respect of the tree planting calendar	0.140	0.422	0.214
T2: Disperse and incoherent restoration initiatives at very small scales (NGOs, PTF, administration)	0.294	0.050	0.121
T3: Impacts of climate variation and change in the Sahel	0.049	0.131	0.497
T4: Inadequate supply of quality inputs for restoration	0.515	0.395	0.165

7.2.3 Perceptions from the representatives of communities

The within group analysis shows that the representatives of the communities perceived the *source of additional income to families* as the most important strength with a priority score of 0.546 (Table 7.4). The most important opportunity factor perceived by this group is the *improve livelihoods and natural resource base of communities*,' with a priority score of 0.700. The most significant weakness with a priority score of 0.585, was *tenure insecurity*. The most important threat perceived by this group is *the non-respect of the tree planting calendar* with a priority score of 0.422. The across-group analysis of factors by community representatives indicated that strength factors are very influential (overall priority score of 0.47), followed by opportunity factors with an overall priority score of 0.28 (Table 7.5).

TABLE 7.5:Overall priority scores for the SWOT-AHP analysis

SWOT groups	**Overall priority scores**		
	Administration	Community	NGO
S: Strength	0.38	0.47	0.33
W: Weaknesses	0.13	0.12	0.15

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O: Opportunities	0.35	0.28	0.36
T: Threats	0.14	0.14	0.16

7.3 DISCUSSION

The perception of the group representing the administration indicates that the *increasing involvement of local stakeholders, increasing political will and donor interest, tenure insecurity, and inadequate supply of inputs* are the important strength, opportunity, weakness, and threat factors, respectively. The finding on the importance of the strength factor—*Increasing involvement of local stakeholders* in restoration corroborates other findings that emphasize the importance of stakeholder involvement to guarantee the long-term sustainability of restoration initiatives (Chirwa & Mahamane, 2017; Djenontin *et al.*, 2018; Fox & Cundill, 2018). A study in South Africa found that lack of community engagement was a prominent factor among other factors responsible for the degradation of restored urban recreational parks (Shackleton & Njwaxu, 2021).

A study, based on five case studies in Africa (Burkina Faso, two from Ghana, Senegal, Tanzania) found that community and stakeholder involvement is key for restoration projects to achieve their objectives (Walters *et al.*, 2021). Findings from a semi-arid area in Northern Morocco asserts that stakeholder engagement is relevant to enhance social acceptance and support for restoration projects (Derak *et al.*, 2018). All these three studies are in agreement with the findings of this study where the representatives of the administration indicated that the engagement of local communities, local councils and the local environment and forestry administration contributed to the success of some of the restoration initiatives in the Far North Region of Cameroon. However, it is argued that not all restoration initiatives engaging stakeholders are successful (Reyes-Garcia, 2019). This is because other factors also need to be considered in the design and implementation of projects as this study has demonstrated through the weakness and threat factors identified by stakeholders in the Far North region of Cameroon.

On the *increasing political will and donor interest* factor, it can be noted that the restoration agenda is gaining momentum at the national and international levels. At the national level in Cameroon, the government has elaborated a restoration strategic framework that is considered as a guide to implement and achieve the commitments to restore 12 million hectares of degraded lands and forests in Cameroon (MINFOF-MINEPDED, 2020). National commitments to the

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Bonn Challenge, the Paris Accord under the climate change convention, including the United Nations Decade on Ecosystem Restoration (2021-2030) have brought forest and land restoration at the centre of global discussions on ways to ensure that ecosystems can provide the services required to support livelihoods and combat climate change (Bastin *et al.*, 2019; Verdone & Seidl 2017; Griscom *et al.*, 2017). In terms of restoration commitments, most come from developing countries in the global South and funding is also expected to increase in future (Fagan *et al*., 2020). This is an opportunity for developing countries to get ready to explore and benefit from the funding openings that will emerge.

Tenure insecurity was identified as an important weakness factor by all the three stakeholder groups. The strategic framework for landscape restoration in Cameroon stresses that addressing land and tree insecurity issues is crucial for the country to respond to its restoration commitments (MINFOF-MINEPDED, 2020). In the Far north Region of Cameroon, tenure security is decisive for the uptake of tree-based restoration technologies (Peltier *et al.*, 2022). Furthermore, tenure security issues are getting more complex in this region due to the increasing demand for space by different land use practices (livestock, agriculture, forestry), and efforts to reconcile the interests of the different land use actors has been insufficient and slow (Natali, 2018). A recent study in the humid forest region in Cameroon also concludes that tenure insecurity discouraged farmers to invest in tree growing restoration initiatives (Folefack & Darr, 2021). It is argued that tenure security will drive stakeholder engagement, thus encouraging investments and guaranteeing sustainability of restoration initiatives (Chirwa & Mahamane, 2017; McLain *et al*., 2019). McLain *et al.* (2019) further stressed that restoration initiatives that are informed by robust tenure evaluation will enhance the chances of achieving their twin goals of improving ecological functionality and human well-being. Studies in other countries in Africa – Burkina Faso, Tanzania, Ghana, Ethiopia, Sudan supports the view that *tenure insecurity* is a major weakness to farmers' uptake of tree-base practices that are relevant for land restoration (Danquah, 2015; Fahmi *et al.*, 2015, Jha *et al.* 2021; Vallette *et al*., 2019; Anjulo & Mezgubu, 2016). The process of transforming tenure systems is complex and takes time. Thus, tree growing projects need to be conceptualized as longer-term endeavours. However, even under sub-optimal tenure systems, efforts need to be undertaken to negotiate workable restoration solutions among the relevant stakeholders.

According to the stakeholders, the seed germ plasm production and supply systems are incapable to respond to the demands of tree growers in the northern Sahel region of Cameroon

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in terms of quantity, quality, and respect of the tree planting calendar. The representatives of the administration specified that seed production and supply in the northern Sahel is led by private (community-based organisations and individuals) and public systems. They underscored the need to improve these systems in terms of technical support, organisational and entrepreneurship development, and market access. This finding reaffirms the position of the strategic framework for landscape restoration in Cameroon that recommends the need to give a serious attention to seed production and distribution in restoration planning (MINFOF-MINEPDED, 2020). The importance of seedlings (quality and quantity) in restoration is often overlooked when large-scale restoration commitments are being made (Hasse, 2017). A survey of 139 tree restoration projects worldwide, identified widespread problems in relation to the availability and diversity of tree seeds (Jalonen *et al.,* 2018). To avoid failures in restoration investments, the study recommends that countries with restoration commitments should carry out in-depth assessments of seed demand and supply, foster knowledge sharing on seed production and supply, enhance seed quality regulations and improve capacity for compliance (Jalonen *et al.,* 2018). Capacity building support should also target Indigenous and community-based seed supply systems. These systems have potentials to boost seed supply under the restoration agenda (Urzedo *et al.,* 2022).

All the important Strength, Opportunity, Threat factors identified by the representatives of communities are directly linked to the benefits and interests of communities in terms of income, livelihood support opportunities, financial support for tree growing investments. This is an indication that the interest of stakeholders should be at the centre of restoration planning and implementation. A global study on the successes and failures of restoration projects, found that some projects survived because of the tangible benefits that communities reaped from them, while others failed because of the lack of perceived benefits by communities (Höhl *et al*., 2020). Erbaugh *et al.* (2021) emphasised that land restoration that prioritizes local community benefits and their rights to restore and manage restored land, offers a promising option to align local interests and global climate change mitigation, conservation, and Sustainable Development agendas. The government have been providing support to some selected tree growers in the Far northern region and in other parts of Cameroon, in the form of direct cash and planting materials. However, during the group discussions, it appeared strongly that the tree planting calendar is hardly respected when it comes to making the support available to the beneficiaries. This is a crucial issue that must be considered in restoration planning at the national and local levels.

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The representatives of the NGOs identified the *impacts of climate variation and change in the Sahel* Region as the most important threat factor to restoration. This region experiences long dry seasons and short rainy seasons, which are often characterised by heavy floods. There is a need to include climate change impact and adaptation assessments in restoration planning, an aspect that is not taken into consideration in the current landscape restoration strategic framework for Cameroon (MINFOF-MINEPDED, 2020). Climate change impacts are expected to alter forest ecosystem functions and services as well as changes in natural disturbance regimes (for example wildfires, pests) (Mansuy *et al.*, 2020). Warming is already altering the distribution, growing, and timing of biological events such as flowering and insect emergence impacting survival of plants species (IPCC, 2022).

7.4 CONCLUSION

This study draws on the SWOT-AHP approach to examine past tree-based restoration efforts in the Sudano-Sahelian agroecological zone of Cameroon. Based on stakeholder perceptions, the study interprets the scores for strength and opportunity factors as positive to forest-based restoration. To this regard, strength factors such as *source of additional income for families* if taken into consideration will provide solid bases for successful restoration initiatives. Furthermore, opportunity factors such as the *improvement of livelihoods and natural resource base of communities and the increasing political will and donor interest* on restoration were also evident in our results. In this context, restoration can play a vital role in improving livelihoods, including the flow of ecosystem services from the natural resource base. The government and other stakeholders need to prepare to explore and benefit from the restoration funding opportunities that will emerge. This will require that stakeholders be equipped with technical capacities to develop robust and bankable restoration projects.

Differences in perceptions among the three stakeholder groups were observed in some areas of the findings. This indicates the need to bring stakeholders together to share their different views during the planning and implementation of restoration initiatives. According to the findings, the most important strength factor in these groups were the *increasing involvement of local stakeholders* (representatives of the administration), *source of additional income for families* (representatives of communities and NGOs). This shows how the benefits that communities get from restoration influences their perception. In terms of the most important weakness factor, the three stakeholder groups were similar in that they all identified *tenure insecurity* as the most important weakness factor for restoration. This is a strong message to the government to take

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responsibility in terms of providing a favourable enabling environment for the implementation of large-scale restoration initiatives. There must be a shift from the political will rhetoric on restoration commitments to action on the ground. In terms of threats, the three stakeholder groups had different views such as *non-respect of the tree planting calendar* (representatives of communities), *impacts of climate variation and change in the Sahel* (representatives of NGOs), *inadequate supply of quality inputs for restoration* (representatives of the administration). These are all critical factors that stakeholders involved in restoration at the farm level will require support and facilitation and are also relevant for consideration in the restoration planning at the national level. Through a participatory approach based on past experiences this study has identified the good and the bad sides of farm level and policy related supportive lessons for enhancing restoration. The restoration movement in Cameroon needs to consider these realities. A participatory approach that will involve stakeholder consultations in all five agroecological zones of the country should be used when revising the national restoration strategic framework. This will permit the process to capture ecological and socioeconomic specificities that are crucial for ensuring that restoration projects and programs are designed and implemented successfully.

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CHAPTER 8

OVERVIEW AND CONCLUSION

8.0. OVERVIEW

Forest and land restoration is being widely promoted as a solution to the global degradation of forests and lands, and as a contribution to sustainable development through restoring the ecological, social, and economic values and functionalities of degraded landscapes. For the past ten years, much interest and political momentum have been generated at the global level and in Africa around restoration in terms of setting targets and developing initiatives. However, translating these initiatives and targets into actions on the ground remains a challenge (Stanturf *et al.*, 2017; Mansourian & Berrahmouni, 2021). The global and regional objectives need to be interpreted and adapted carefully, to fit realities at the landscape and local levels. There are context-specific questions that need to be answered before the promised millions of hectares of forests and lands are restored. For example, how can local ownership and stakeholder engagement be promoted to ensure that local communities as agents of restoration embrace the approach? How should the governance, institutional and political factors that influence tree-growing and decision-making on land use directly or indirectly be improved (Arvola *et al.*, 2020; Walters *et al.*, 2021)?

Large-scale restoration initiatives are dominantly conceived and implemented through tree-growing. This implies that tree ecosystems constitute an integral part of restored ecosystems in landscapes in different parts of the world. Restoration is often a human endeavour (Suding, 2011) that occurs in a social context where humans as social actors are motivated to restore, having enabling conditions in place (including social, market and ecological), and capacity (Walters *et al.*, 2021). The building of ecosystem goods and services depends partly on human assets i.e., knowledge and capacity, financial resources, technology, that is influenced by human decision-making processes related to governance, institutional settings, and economic drivers. Restoration actions or inactions could be a function of the interests, motivation, expectations, priorities of people involved in making decisions and choices (Díaz *et al.*, 2015; Mastrángelo *et al.*, 2019).

Understanding the factors that drive people's actions to invest in building ecosystem services through restoration in a particular time and spatial scale, is crucial, since the factors that influence views, attitudes, perceptions, motivations, expectations, priorities change over time

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due to changes in the social and political context. Framing studies to understand these diverse factors that interact at the policy, landscape and farm levels is often a challenge. This is an indication that no single factor has enabled large-scale restoration, but rather a combination of factors (Mansourian *et al.*, 2022).

In this regard the study integrated assessments at the policy, landscape, and farm levels to provide a holistic approach and understanding from the perspective of stakeholders on what needs to be done to ensure that tree-growing as a restoration practice is designed and implemented at scale in Cameroon. By examining policy and governance issues, the study highlighted gaps in supportive policy frameworks for enhancing tree-growing in the context of restoration. At the landscape and farm levels, the study highlighted the factors that determined farmers' engagement and persistence in tree-growing restoration initiatives. Furthermore, the participatory multi-criteria approach highlighted diverse aspects of lessons learned from past tree-growing efforts. This can help to avoid misalignments in stakeholders' motivations and interests in the process of proposing appropriate local level tree-growing restoration measures. This is of strategic value to guide the development of sustainable impact-oriented tree-growing restoration projects, programs, and strategies in Cameroon.

8.1 ADDRESSING THE REASEARCH OBJECTIVES

This section summarizes how each research objective has been achieved by highlighting the justification, approach, main results, and discussions.

8.1.1 Assessing the enabling policy and institutional conditions for the uptake of tree-growing practices in the context of the restoration of degraded forests and lands in Cameroon.

Governance and related policy conditions have a role to play in large-scale forest and land restoration efforts. However, these conditions are often lowballed and overshadowed by technical conditions in forest restoration processes. Restoration success has been defined from different perspectives, including as factors related to actors' motivation to restore supported by policies, laws, capacity, and spaces in which to debate restoration decisions (Walters *et al.*, 2021). Understanding stakeholders' perceptions of these conditions is relevant to determine what is needed to drive large-scale forest and land restoration investments. The objective of Chapter 3 was therefore to assess how stakeholders at the policy level perceive the enabling conditions for large-scale tree-growing restoration. This was in view to generating information

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for decision-makers, practitioners, and other related key stakeholders as they develop and fine-tune strategies for large-scale restoration in Cameroon. Furthermore, policies and institutional issues are dynamic, evolving over time in accordance with national, regional, and international circumstances (Mansourian *et al.*, 2014). This requires continuous and periodic assessment. The study explored the viewpoints of stakeholders, including the review of forestry and land use-related strategy and policy documents to gain an understanding of the evolution and capacity of enabling factors to enhance large-scale restoration.

The study found that large-scale tree-growing for restoration objectives in Cameroon requires the improvement of several factors to drive the biophysical potentials expressed in the restoration commitments, to actions on the ground. The enabling tree-growing factors identified a decade ago across Africa (Place *et al.*, 2012) though still considered crucial, have not been improved to the level to support large-scale tree-growing restoration objectives. On the one hand, land and tree tenure insecurity discourage tree-growing investments. This for example, as reported in Bangladesh and Indonesia (Rahman *et al.*, 2017); Nicaragua, Panama, Honduras (Schweizer *et al.*, 2019). On the other hand, land and tree tenure security played a positive role on tree-growing. This was reported in Uganda and Vietnam (Arvola *et al.*, 2020); Madagascar (Mansourian *et al.*, 2014).

The study revealed that incentives are crucial in enhancing tree-growing. This implies that developing and implementing a robust tree-growing incentive system is important for enhancing the uptake of tree-growing. Access to markets, direct financial support, land allocation, and supply of inputs are important incentive options that have created tree-growing impacts (Etongo *et al.*, 2015; Rahman *et al.*, 2017).

According to the study, stakeholders strongly recognized the challenges in tree seed production and supply systems. The sector is currently plagued by limited financial and technical resources, insufficient organizational capacity, and a lack of entrepreneurship including structured production and distribution systems. The current seed production and distribution are championed by both the public and private sectors, thus, efforts to improve seed production and distribution should target both sectors. The private sector has a major role to play in restoration (Sayer & Boedhihartono, 2018). A public-private partnerships approach can increase support and capacity building for restoration (Chazdon *et al.*, 2020).

The study revealed that research and extension are relevant to upscale tree-growing in Cameroon, although the current capacity of forestry extension is weak to properly support large-

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scale restoration objectives. Ground-breaking research results related to improving tree-growing need to be disseminated to tree-growers in addition to the restructuring of the forestry and research extension system, which is currently hampered by limited financial, technical, organizational, and institutional arrangement capacities. Extension services are important in terms of setting demonstration plots and closely accompanying farmers in terms of providing continuous support to understand which tree species are suitable for their specific land use types, and how to manage and market tree resources (Rahman *et al.,* 2017).

The study showed that there is a need for alternative funding sources to accompany government efforts in financing tree-growing. There are many funding opportunities for tree-growing, through the three Rio Conventions – Climate change, Biodiversity, and Desertification. However, the government needs to make sufficient effort to establish the conditions that will enable interested parties to get exposed and take advantage of these funding opportunities. For example, supporting capacity building, facilitating systems and mechanisms (e.g., providing guarantees and reducing transaction cost) that can link buyers of ecosystem services to tree-growing project proponents (Place *et al.,* 2012).

The results showed that the factors identified are relevant to the problems and solutions of forest and land degradation. However, the capacity of these factors to drive the large-scale restoration of degraded forests and lands is weak. Stakeholders having similar perceptions regarding the enabling factors is a clear indication that policy change can be achieved, though a strong political will is needed.

8.1.2 Assessing the effectiveness of tree growing incentives in the context of forest and land restoration in Cameroon.

Incentives as policy instruments are seen as vital to enhancing stakeholder participation and upscaling of tree-growing forests and land restoration actions. Incentives influence land use change decisions which affect the flow of multiple ecosystem goods and services (Bryan, 2013; Ruseva *et al.,* 2015). In market-based approaches to environmental protection, incentives are applied to influence the behaviour of land use change agents (Djenontin *et al.,* 2018). They can contribute to maintaining stakeholders' interest and continuous commitment over a long period of time (Stanturf *et al.,* 2019). Incentives are seen as relevant to motivate agents that are responsible for protecting and restoring ecological integrity (Wainaina *et al.,* 2020).

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Studies on the effectiveness of incentives on tree-growing are scarce, and where it exists it is often difficult to clearly identify a direct relationship between incentives offered and the behavioural response of tree growers (WRI, 2021; Wainaina *et al.*, 2020). Thus, more research is needed to identify some of the challenges surrounding the design and implementation of incentive schemes to generate knowledge that will improve the effectiveness and efficiency of tree-growing incentives in the context of restoration. Incentive schemes may vary from one country to the other in terms of design, implementation and other tree-growing enabling factors. Thus, country case studies are relevant, and their results can be useful to other countries. In Chapter 4, Cameroon is used as a case study to examine and highlight the challenges that need to be tackled for incentives to contribute effectively to tree-based restoration interventions. Through the lens of the policy effectiveness framework, the study examined the effectiveness of the national reforestation program tree-growing incentives through stakeholder opinions and the review of policy and program documents.

From a policy instrument perspective, the study revealed that the incentive scheme as a policy intervention instrument has not been effective. The findings suggested that for an incentive scheme to succeed, the operationalisation of the design principles and provisions must be respected. The process to select beneficiaries must be transparent and participatory. In this way, the selection of beneficiaries that are motivated, willing to engage in tree-growing, including behavioural change over a long period of time will be ensured.

The study revealed a disconnection between the period when incentives are made available to beneficiaries and the tree-growing calendar. This has been resulting in poor management and misuse of resources. Thus, to ensure proper management of resources provided through the incentives, the period that subventions are released to beneficiaries must align with the tree planting season in relation to the acquisition of planting materials and other tasks related to tree planting and maintenance. Due to the season-sensitive nature of tree-growing, tree-growing incentive schemes should be detached from the traditional forestry administration to create a system and/or institution that will be able to support the mobilisation and disbursement of resources on a timely basis.

The study revealed that due to limited government resources made available to support tree-growing, the size or amount of the incentives allocated is seen as small to create the desired impact. Thus, in a context of limited resources, there is a need to prioritize tree-growing actions that target strategic areas that have the potential to deliver results. Recognising the goals and

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the spatial allocation of those areas at the strategic and operational levels is important to optimise the impact of limited public resources (WRI, 2021). The allocation of limited financial resources should take into consideration the rapport between costs and efficiency in areas with the highest impact, in addition to environmental, social, and economic benefits (WRI, 2021).

The study revealed weaknesses and inefficiency in the monitoring and evaluation system of the incentive program. An incentive scheme should be built on a proper and efficient participatory, transparent, and accountable monitoring system (Ruseva *et al.*, 2015). The process should be participatory where stakeholders agree and establish baseline conditions, choose indicators (both biophysical and socioeconomic), and compare progress concerning specific goals at the project and national levels. A robust monitoring system in place will safe against the misuse of incentives and will enable the identification of what works and what does not work for improvement of the incentive scheme (WRI, 2021).

The investigation also revealed the need for adequate communication and collaboration between the central services and local forestry administration on the how, to whom, when and where tree-growing subventions have been allocated. This will make it easy for the local forestry administration to integrate their role in the incentive implementation process into their workplans. Furthermore, adequate financial and technical resources are required to ensure the effective monitoring of the impacts of incentive schemes (WR, 2021).

This study has demonstrated that the public incentive program that is serving as the lone model in Cameroon has not been effective from a policy instrument perspective. There is a need to improve the scheme or future schemes, including the testing of other models from different tropical countries. In this regard, it will be good to initiate, build and implement pilot initiatives that include rigorous monitoring where evidence and lessons learned can be collected and disseminated.

8.1.3 Assessing the determinants of tree-growing decision-making among farmers.

The environmental science and policy of ecosystem degradation and restoration have underscored the importance of trees. Degraded ecosystems intensify the effects of climate change and severely threaten the ecological functions that are vital to building prosperous and resilient economies at the community level (Mansourian & Berrahmouni, 2021). In degraded lands, adding trees enhances the supply of ecosystems goods and services such as improved soil productivity, soil erosion control, shade and fodder, supply of timber and non-timber products, water supply, and increase in biodiversity (Besseau *et al.*, 2018; Stanturf *et al.*, 2017).

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Farmers on the one hand are the most affected by land degradation, and on the other hand they are the key agents of restoring degraded lands. Understanding the factors that determine farmers' motivations to be involve in tree-growing restoration practices is essential, as restoration is fundamentally about people (Mansourian, 2021). The main objective of Chapter 5 was to assess the factors influencing farmers' decision to grow trees in their farms in the study area and to draw conclusions that might help policy makers, project developers, and managers in the design and implementation of large-scale restoration intervention strategies and programs.

The study showed that biophysical factors related to vegetation cover and biodiversity, the need to improve soil fertility and combat soil erosion, and farm sizes contributed to influencing farmers, decision to integrate trees into their farms. This indicates that biophysical factors are key parameters that need to be considered during the design and implementation of tree-growing interventions. Furthermore, the findings of the study revealed that climatic, socioeconomic, and institutional related factors also influenced farmers' decision to plant trees or not.

The study showed that the factors that influenced farmers' decision to plant trees are interrelated, indicating that a well-designed tree-growing activity, if successful would respond to the multiple needs of farmers. The multiple factors that influenced farmers' tree-growing decision is an indication that farmers are aware of the importance of trees and the types of support they need to carry out tree-growing investments at scale. Furthermore, enhancing local social networks in future tree-growing projects is crucial to mobilisation of resources relevant to tree-growing investments, farmers' engagement, and ownership.

8.1.4 Assessing the behavioural persistence of tree-growing farmers following the end of tree- growing support programs.

Stakeholders' adoption of tree-growing practices for restoration and participation in voluntary support programs have been studied (Wainaina *et al.*, 2020; Djenotin, *et al.*, 2018; Höhl, *et al.*, 2020, including Chapter 5 of this study). However, research on the reasons why stakeholders will continue in restoration practices after restoration support programs end is poorly represented in the literature. Thus, there is a need for empirical evidence on why restoration agents continue their restoration behaviour when support programs stop (Swann, 2016). This is seen as a serious concern given that most conservation successes and benefits depend on sustained behavioural change (Reimer *et al.*, 2014; Gatto *et al.*, 2019; Defrancesco *et al.*, 2022).

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The behavioural changes or sustained behaviour that is expected is termed "persistence" as it is a continuation of a course of action or behaviour (Dayer *et al.*, 2018). The concept of persistence has been used to study the post-program behaviour of beneficiaries in support programs in the energy (Frey & Rogers, 2014) and agriculture sectors (Dunn *et al.*, 2016). In conservation and restoration programs, what remains less known is why persistence (Dayer *et al.*, 2018; Gatto *et al.*, 2019)? This study contributes to filling this gap by using the tree-growing restoration experiences in the Sudano-Sahelian Region of Cameroon as a case study. Therefore, Chapter 6 had as its objective to examine the factors that drive the behavioural persistence of tree-growing farmers following the end of tree-growing support programs. The study employed the persistence behaviour concept to analyse data generated through semi-structured interviews of tree-growing farmers in the Mogazang landscape, through key informant interviews, and the content analysis of program documents in the Northern Region of Cameroon.

The study revealed that tree growing support programs contribute very little to enhance the behavioural persistence of tree-growing farmers. The long-term necessities of tree-growing should be taken into consideration during the planning phase of interventions; thus, farmers are prepared in terms of continuation after support programs end. Communication and providing information are key to building persistent and behaviour-driven attitudes (Pierro *et al.*, 2012). This requires the development and implementation of communication and sensitisation strategies to prepare farmers for the need to take responsibility for tree-growing activities after programs end. Thus, to ensure and sustain continuation after tree-growing support programs, there is a need for tree-growing support programs to put in place effective information, education, and communication strategies capable of shaping long-term conservation behaviour (Asensio & Delmas, 2016).

The study revealed that farmers' attitude and perception are important in driving the behavioural persistence of tree-growing farmers. Farmers are more likely to continue implementing natural resource management practices they perceived to be successful and impacting on their life (Race & Curtis, 2015). Farmers that have the right attitude and perception of their technical ability to handle silvicultural practices will continue to retain trees on their farms (Oeba *et al.*, 2012). In this context the role of extension services is important for farmers' learning improvement (Mellon Bedi *et al.*, 2022).

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The study also showed that farmers' motivation, contributed to their decision to continue to grow trees. Farmers' motivations were driven by the different benefits they got from trees on their farms such as income and other related benefit flows (Oeba *et al.*, 2012; Mureithi *et al.*, 2014). The tree growing habits of the farmers contributed to influencing their tree-growing behavioural persistence. Habits are relevant for influencing behaviours and farmers who are used to implementing farm practices in the past were more likely to adopt the behaviour again (Klöckner, 2013; Sheeder & Lynne, 2011). Furthermore, the study showed that farmers continued tree-growing after the support program because they perceived tree-growing as a profitable practice. Thus, better sale value for farm products will drive persistence intentions of farmers (Kuhfuss *et al.*, 2016),

The study showed that tree-growing as a common practice or norm in communities plays an important role in driving farmers to continue tree-growing. The influence of other farmers, social pressure, is important to increase the probability that farmers remain part of the farming system (Defrancesco *et al.*, 2008; Gato *et al.*, 2019).

The study revealed that farmers' decision to continue restoration practices on their farm plots after the end of support programs is influenced by a mix of factors, among which positive attitude and perception of farmers, constant motivation, financial profitability, community influence, played an important role. These are factors that need to be taken into consideration when assessing the feasibility, including the designing and implementation of planned tree-growing restoration support programs and related policies in Cameroon and other countries.

8.1.5 Examining the factors that contribute to the failure or success of tree growing land restoration efforts at the local level.

Forest and land restoration actions are context specific with no one-size fits all approach, driven by different objectives, policy, institutional and governance frameworks. The successful implementation of forest and land restoration needs to be informed by experiences and lessons from past restoration or related restoration efforts (Fagan *et al.*, 2020; Höhl *et al.*, 2020). The outcome of forest and land restoration efforts is influenced by a mix of factors related to local participation, capacity building, setting goals, design and implementation, technical capacity, governance, institutional and policy related factors (Djenontin *et al.*, 2018; McLain *et al.*, 2017). Analysing these factors from a specific context is important, given that landscape-based policies and strategies are well understood only from a place-based perspective (Zasada *et al.*,

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2017). Thus, Chapter 7 had as its objective to assess the Strengths, Weaknesses, Opportunities and Threats (SWOT) of past land restoration endeavours, to generate information for decision makers, project and program managers, investors, and rural communities as they develop plans, programs, and projects for restoration interventions in Cameroon. This was based on a SWOT analysis and the Analytical Hierarchical Process approach. The assessment process was participatory, involving key informants from three stakeholder groups (representatives of the administration, representatives of communities, representatives of local NGOs) that have been part of restoration efforts in the studied region.

The study revealed that key informants from the stakeholder groups perceived the positive attributes of restoration efforts to overshadow the negative aspects. The group representing the administration indicated that the increasing involvement of local stakeholders, increasing political will and donor interest, tenure insecurity, and inadequate supply of inputs are the important strength, opportunity, weakness, and threat factors, respectively, that need to be taken into consideration in restoration strategies, programs, and projects. Stakeholder engagement is relevant to enhance social acceptance and support for restoration projects (Derak *et al.*, 2018). Forest and land restoration are at the centre of global discussions on ways to ensure that ecosystems can provide the services required to support livelihoods and combat climate change (Bastin *et al.*, 2019). Tenure security will drive stakeholder engagement, thus encouraging investments and guaranteeing sustainability of restoration initiatives (McLain *et al.*, 2019). The seed germplasm production and supply systems need to be revamped to respond to the demands of tree growers in terms of quantity, quality, and distribution in alignment with the tree planting calendar.

The study revealed that the interest of stakeholders should be at the centre of restoration planning and implementation in relation to the benefits and interests of communities in terms of income, livelihood support opportunities, and financial support for tree-growing investments. Restoration projects have succeeded due to the tangible benefits that communities reaped from them, while others failed because of the lack of perceived benefits by communities (Höhl *et al.*, 2020).

The study has suggested the importance of considering climate change impact and adaptation assessments in restoration planning. Climate change impacts are expected to alter forest ecosystem functions and services as well as changes in natural disturbance regimes (for example wildfires, and pests) (Mansuy *et al.*, 2020). Warming is already altering the

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distribution, growing, and timing of biological events such as flowering and insect emergence impacting the survival of plant species (IPCC, 2022).

The study has shown the importance of having different views on a particular problem area. This indicates that involving all stakeholders in the design, implementation and monitoring of restoration initiatives is relevant since it will take into consideration different views and address realities on the ground. This is important for restoration initiatives that will respond to local needs, national and global environmental commitments.

8.2 LINKING THE CONCEPTUAL FRAMEWORK TO THE STUDY RESULTS

This case study draws on a conceptual framework that integrates the "Human dimensions" framework into the IPBES framework. According to the IPBES framework the building of ecosystem services is a function of ecological and human assets. The IPBES framework recognises the role that humans play in building ecosystem goods and services. The "Human dimensions" framework was integrated in the IPBES to strengthen the human assets function of the framework. The human dimension underscores the role of people and society in building and managing ecosystem services. Human driven factors can cause action or inaction in the process of people and society building ecosystem services (for example, resources and actions for restoration). The study had as objective to generate evidence around the human driven factors related to policy, institutional, governance; incentives; socioeconomic and cultural factors; views, attitudes, perceptions, motivation, interest; expectations and benefits. This study made attempts to assess these factors, their importance, relationships, strengths, gaps, weaknesses, and proposed ways for improvement to ensure that the contribution of people and society to ecosystem building can be well designed and implemented. This was done using Cameroon as a case study and tree-growing restoration practices as the ecosystem building processes and actions.

The findings responded to the guidance of the conceptual framework coined around 5 Chapters. First, it demonstrated the relevance of the factors that drive human involvement in restoration in both the short and long-term, and second, how these factors can be improved to help the design of effective restoration projects, programs, and strategies. These factors interact at different levels – national, landscape and farm levels. To improve human actions in restoration there is a need to improve the policy and governance enabling factors related to land and tree tenure, incentives, seed production and supply, research and extension, strategic and sectoral

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alignment, and the opportunities to valorise tree growing environmental services. In the context of tree-growing restoration, incentives are seen as relevant for encouraging behaviour change towards restoration. However, for incentives schemes to achieve the expected human behaviour change, they should be designed and operationalised within a framework of accountability, transparency, participation, monitoring and performance evaluation, collaboration, and coordination. Restoration is a long-term process in which the success depends on sustained human behaviour change. At the farm level, to design and implement projects and programs that will sustain human behaviour change, there is a need to take into consideration the positive attitude and perception of farmers, constant motivation, financial profitability, community influence in the design and implementation. Future restoration endeavours should learn from past efforts where the interest of farmers as social actors should be at the centre of restoration project and program design in terms of income, tenure security, livelihood support systems and adequate supply of quality inputs for restoration. These factors, when combined will contribute to enhance human actions that will move ecosystems from a degraded state to a restored state as required by the restoration agenda of the government of Cameroon.

The conceptual framework has guided the generation of information that is relevant to provide orientation to the design of policies and strategies. However, building ecosystem services through restoration is about concrete actions. Thus, the key variables of the framework can be further investigated in terms of depth and geographical scale. First, each of the enabling policy and governance factors identified in Chapter 3 needs to be investigated in detail. This will permit the generation of technical facts that will help to guide the political will to improve the enabling conditions. Second, for Chapter 6, the study did not consider the time-dynamic perspective of farmers' decision to continue to grow trees that can shift over time, adapting to the changing social context where farmers values can be modified and negotiated by social interactions. Thus, undertaking a study on farmers tree-growing behavioural persistence after a long period of time following the end of a support program, can produce interesting results since time-dynamics have implications on policy design on the one hand, and on the other hand, changes in policy and social context can also influence farmers' decision-making in the long-term. Third, Chapters 5, 6, 7 of the study are limited to a specific geographical setting with a sample size and technique that is not representative. Thus, it is important to undertake further investigation using a geographical coverage, sample technique and size to ensure that findings from the study can be generalised. Fourth, past tree-growing restoration experience indicates

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that socioeconomic factors are crucial for restoration success. Urgent studies are needed, that isolate these factors and to measure their contribution to restoration outcomes.

8.3 CONTRIBUTION OF THE STUDY AND LIMITATIONS

8.3.1 Contribution to forest and land restoration research

Even though factors favouring restoration success have been explored in the literature, some countries having potentials for restoration, have insufficient information in the literature. Thus, the novelty of this work is based on Cohen (2017), that indicates the relevance of demonstrating an established phenomenon in a different context in relation to temporal and geographical setting. In terms of the temporal setting, this study emerges in a period where the role of tree-growing and restoration in providing solutions to local and global development and environmental problems have been underscored in recent years. Therefore, policies, strategies and actions need to evolve to accompany these changing roles. In terms of the geographical setting, literature on the social context of restoration is very weak and needs further and sound documentation in Cameroon. This will inform the design of strategies, policies, and practices, and contribute to the existing scholarly works on restoration in general.

The analysis of subjectivity has provided a bases to understand how to enhance motivations, and actions of restoration stakeholders towards the upscaling of tree-growing forests and lands restoration endeavours. The study has combined several social research methods that has permitted to identify prevailing views and uncover people's subjectivity in their efforts to restore degraded forests and lands.

8.3.2 Policy implication of the study on forest and land restoration efforts

This study has generated important insights for policy making in the context of forest and land restoration. The findings that policy and governance related conditions are relevant to facilitate large-scale forest and land restoration is an indication that the policy and strategy framework for forest and land restoration need to consider and include concrete approaches to improve on the policy and governance conditions. As proposed by Mansourian *et al.* (2022) a supportive policy framework that consider governance and economic success factors will contribute to large-scale restoration efforts. The findings indicate that tree-growing incentives as a policy instrument has been designed and implemented in a context of weak governance features such as accountability, transparency, monitoring and performance evaluation and collaboration. This calls for the need to consider good governance factors when designing restoration incentive

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schemes as indicated in the forest and landscape restoration strategic framework (MINFOF-MINEPDED, 2020). The findings showed that farmers' engagement and persistence in restoration is influenced by a combination of biophysical, socio-economic, cultural, and financial related factors, whose appreciation depends on farmers' perception, attitude, interest and motivation. These are factors that need to be considered when elaborating a stakeholder engagement strategy in the framework of forest and land restoration programs and projects. Höhl *et al.* (2020) state that the success and failures of restoration projects depend on how the needs and the goals of stakeholders are taken into consideration in project planning and implementation. The findings showed evidence on lessons and experiences of tree-growing restoration efforts from different stakeholder perspectives in relation to key attributes such as income and livelihood support, tenure security, input supply and climate variability. The findings generated from different stakeholder viewpoints calls for broad and participatory stakeholder consultation process during the design and implementation of tree-growing restoration policies, programs and projects.

8.3.3 Study limitations

This study has some limitations. The study employed a case study approach in which data were collected in a particular period, from a small sample in study sites that were purposively selected. This limited the inquiries only to the Far North Region for Chapters 5, 6 (Mogazang landscape) and Chapter 7. In this regard, findings from these chapters of the study cannot be generalised to other areas of the country having restoration potentials. Due to limited time and funding including the COVID 19 crisis, the sample size and technique were not sufficient to provide bases for robust statistical analysis. Unfortunately, the study was not able to investigate the cause-and-effect relationship between some key variables, because the data set was not normally distributed following the Shapiro-Wilk test for normality that was performed.

8.4 CONCLUDING REMARKS

This study has assessed the policies and practices of the restoration of degraded forest and lands in Cameroon with a focus on the factors that drive human actions in restoration processes, drawing from the human dimension concept and the concept of people's contribution to the process to build ecosystem services.

The study has been able to provide an understanding of the gaps and ways of improving the factors responsible for driving human actions in restoration processes. This is relevant to

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operationalize the restoration strategy and action plan and long-term restoration success in Cameroon. The insights on the social complexity in relation to the enabling conditions, drivers and determinants of adoption and behaviour persistence, provides a basis for efficient and effective build-up towards sustainable large-scale restoration of degraded forests and lands. Furthermore, insights on the opinions, viewpoints, and perspectives among stakeholders in relation to strengths, weaknesses, threats, interest, priorities, and expectations, in order to capture areas of divergence and convergence is very important for strategic planning to meet goals and improve restoration actions.

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APPENDIX 1: DATA COLLECTION QUESTIONS

Questionnaire Objective 1

The aim of this survey is to collect information that will contribute to improving policy level enabling conditions for the uptake of tree growing in the context of the restoration of degraded forests and lands in Cameroon. All responses gathered will be kept confidential and no single person will be identified from the results. Your feedback will be used to enhance the operationalisation of the forest landscape restoration process in Cameroon. We very much appreciate your contribution!

PARTICIPANT CONSENT

I, the undersigned, have read and have fully explained the participant information leaflet, which explains the nature, process, risks, discomforts and benefits of the study to the participant whom I have asked to participate in the study.

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The participant indicates that s/he understands that the results of the study, including personal details regarding the interview will be anonymously processed into a research report. The participant indicates that s/he has had time to ask questions and has no objection to participate in the interview. S/he understands that there is no penalty should s/he wish to discontinue with the study and his/her withdrawal will not affect any treatment in any way. I hereby certify that the respondent has provided his consent to participate in this study.

Participant's Name .....…….. (Please print)

Person seeking consent .....….....(Please print)

Signature .....…….....Date.....

Witness's name .....…….....(Please print)

Signature .....……Date….....

Questionnaire no:		
Section 1 Identification		
S1Q1	Name of Respondent: Sex:	
S1Q2	Name of organisation	
S1Q3	Type of organization: ( ) Administration ( ) Forestry Service/Agency ( ) research and academia ( ) Financial/technical partner ( ) CSO/NGO ( ) Independent Consultant	
Section 2 Land and tree tenure		
S2Q1	How relevant is land and tree tenure for the uptake of tree growing in the context of degraded forests and land restoration? *1=Very relevant, 2=Relevant, 3= Don't Know 4=Not relevant, 5= Not very relevant*	
S2Q2	Land and tree tenure conditions are sufficient to enhance large scale tree growing in the context of land of the restoration of degraded lands and forests. *What is your opinion on this statement? Please select one response.*	

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	1=Strongly disagree 2=Disagree 3=Neither agree/nor disagree 4=Agree 5= Strongly agree	
S2Q3	Which aspects related to land and tree tenure should be improved? - -	
Section 3 Incentives (direct and indirect)		
S3Q1	How relevant are direct incentives (direct subventions) for the uptake of tree growing in the context of the restoration of degraded forests and lands? *1=Very relevant, 2=Relevant, 3= Don't Know 4=Not relevant, 5= Not very relevant*	
S3Q2	List the types of direct tree growing incentives you know about in Cameroon? - - -	
S3Q3	Tree growing incentives are capable of enhancing large scale tree growing in the context of land of the restoration of degraded lands and forests. *What is your opinion on this statement? Please select one response. 1=Strongly disagree 2=Disagree 3=Neither agree/nor disagree 4=Agree 5= Strongly agree*	
S3Q4	If (strongly) disagree, what aspects of these incentives can be improved? - - -	
S3Q5	What other types of direct incentives do you think can be introduced? - - -	
S3Q6	How relevant are indirect incentives (markets for tree products) for the uptake of tree growing in the context of the restoration of degraded forests and lands? *1=Very relevant, 2=Relevant, 3= Don't Know, 4=Not relevant, 5= Not very relevant*	
S3Q7	List the types of indirect tree growing incentives you know about in Cameroon? - -	

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	-	
Section 4 Tree seed/germ plasm supply systems		
S4Q1	How relevant are Seed/germ plasm supply systems for upscaling tree growing in the context of the restoration of degraded forests and lands? *1=Very relevant, 2=Relevant, 3= Don't Know, 4=Not relevant, 5= Not very relevant*	
S4Q2	List the types of tree seed/germ plasm supply systems you know about in Cameroon? Public - - Private - -	
S4Q3	The public tree seed/germ plasm supply system has the capacity to support large scale tree growing in the context of land of the restoration of degraded lands and forests. *What is your opinion on this statement? Please select one response. 1=Strongly disagree 2=Disagree 3=Neither agree/nor disagree 4=Agree 5= Strongly agree*	
S4Q4	If (strongly) disagree, what aspects of the public seed/germ plasm supply systems can be improved? - - -	
S4Q5	What is your level of satisfaction on the role that private Seed/germ plasm supply systems are playing concerning tree growing in Cameroon? *1=Very satisfied, 2=Satisfied, 3= Don't Know, 4=Not satisfied, 5= Not very satisfied*	
S4Q6	If (strongly) disagree, what aspects of the private Seed/germ plasm supply systems can be improved? - - -	

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Section 5 Research and extension systems to propagate tree growing knowledge		
S5Q1	How relevant is research and extension system to propagate tree growing knowledge for upscaling tree growing in the context of the restoration of degraded forests and lands? *1=Very relevant, 2=Relevant, 3= Don't Know 4=Not relevant, 5= Not very relevant*	
S5Q2	The tree research and extension system have the capacity to support large scale tree growing in the context of the restoration of degraded lands and forests. *What is your opinion on this statement? Please select one response. 1=Strongly disagree 2=Disagree 3=Neither agree/nor disagree 4=Agree 5= Strongly agree*	
S5Q3	If (strongly) disagree, what aspects of the tree growing research and extension system can be improved? - - -	
Section 6: The articulation of tree growing technology in sectoral policies and strategies (case of on-farm tree growing e.g., agroforestry)		
S6Q1	How relevant it is for tree growing (especially on farm tree growing) to have a clear institutional, policy and strategic anchorage? *1=Very relevant, 2=Relevant, 3= Don't Know, 4=Not relevant, 5= Not very relevant*	
S6Q2	The articulation of tree growing technology in sectoral policies and strategies is appropriate and capable to provide orientations towards large scale tree growing in the context of the restoration of degraded lands and forests. *What is your opinion on this statement? Please select one response. 1=Strongly disagree 2=Disagree 3=Neither agree/nor disagree 4=Agree 5= Strongly agree*	
S6Q3	If (strongly) disagree, what can be done to ensure that tee growing, for example agroforestry is given a clear sectoral anchorage? - - - -	

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Section 7 Opportunities to valorise tree growing environmental services e.g. PES, REDD+		
S7Q1	How relevant are international financial opportunities or economic or market instruments to enhance the uptake of tree growing in the context of the restoration of degraded forests and lands? *1=Very relevant, 2=Relevant, 3= Don't Know, 4=Not relevant, 5= Not very relevant*	
S7Q2	List tree growing initiatives or projects that have received payments or incentives from market or other related mechanisms. - - -	
S7Q3	The efforts to valorise tree growing through opportunities like PES and REDD+ or other market instruments will enhance large scale tree growing in the context of the restoration of degraded lands and forests. *What is your opinion on this statement? Please select one response. 1=Strongly disagree 2=Disagree 3=Neither agree/nor disagree 4=Agree 5= Strongly agree*	
S7Q4	If (strongly) disagree, what aspects can be improved to better valorise tree growing through opportunities like PES and REDD+ or other market instruments? - -	

THANK YOU!

<u>Questionnaire Objective 2</u>

The aim of this survey is to collect information that will contribute to the design and operationalisation of policy instruments (incentives) within the framework of the restoration strategy in Cameroon. All responses gathered will be kept confidential and no single person will be identified from the results. Your feedback will be used to improve the restoration strategy and the action plan. We very much appreciate your contribution!

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PARTICIPANT CONSENT

I, the undersigned, have read and have fully explained the participant information leaflet, which explains the nature, process, risks, discomforts and benefits of the study to the participant whom I have asked to participate in the study.

The participant indicates that s/he understands that the results of the study, including personal details regarding the interview will be anonymously processed into a research report. The participant indicates that s/he has had time to ask questions and has no objection to participate in the interview. S/he understands that there is no penalty should s/he wish to discontinue with the study and his/her withdrawal will not affect any treatment in any way. I hereby certify that the respondent has provided his consent to participate in this study.

Participant's Name .....……..(Please print)

Person seeking consent .....…….....(Please print)

Signature .....…….....Date.....

Witness's name .....……..….....(Please print)

Signature .....……Date.….....

Questionnaire no:		
Section 1 Identification		
S1Q1	Name Sex:	
	Institution: ( ) Administration ( ) Council ( ) OSC ( ) Chiefdom	
S1Q2	Type of incentive scheme: MINEPDED – Sahel Vert ( ) National Reforestation Program ( )	
S1Q3	Role in the incentive scheme: Provider ( ) Recipient ( ) Observer (PTF, independent consultants) ( )	
S1Q4	If provider, what types of incentive (s) did you provide in your scheme (free seedlings, low-cost seedlings, grants, nursery subsidies)?	

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	- -	
S1Q5	If recipient, what type of incentives did you receive from the scheme? - - -	
Section 2	**Procedural effectiveness (design of policy instrument) – principles and provisions**	
S2Q1	Assess the level of adequacy of the eligibility criteria for accessing the incentive? 1=Very adequate, 2=Adequate, 3=Neutral, 4=Not adequate, 5= Not very adequate	
S2Q2	If not (very) adequate, how can the elements of the eligibility criteria for accessing the incentive be improved? - - -	
S2Q3	In your opinion, do you think the eligibility criteria for accessing the incentive are respected? No ( ) Yes ( )	
S2Q4	If no, how can the non-respect of these criteria be avoided?	
S2Q5	In your opinion, are the incentives targeting the suitable recipients? No ( ) Yes ( )	
S2Q6	If no/yes, why?	
S2Q7	What is your opinion about the size of the incentives? Is it sufficient to influence action and performance?	
S2Q8	How suitable is the disbursement calendar in relation to the tree growing calendar? 1=Very suitable, 2=suitable, 3=Neutral, 4=Not suitable, 5=Not very suitable	
S2Q9	If not (very) suitable, how can the calendar be improved?	

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S2Q10	The administration has a mandate to provide technical assistance to beneficiaries. What is your level of satisfaction with the execution of this mandate? 1=Very satisfied, 2=Satisfied, 3=Neutral, 4=Not satisfied, 5= Not very satisfied	
S2Q11	If not (very) satisfied, what can be done to ensure that the technical assistance mandate is executed?	
S2Q12	What is your level of satisfaction with system to prevent the misuse of the subventions by the beneficiaries? 1=Very satisfied, 2=Satisfied, 3=Neutral, 4=Not satisfied, 5= Not very satisfied	
S2Q13	If not (very) satisfied, how can the system be improved?	
S2Q14	What is your level of satisfaction with the monitoring and evaluation system of the subvention scheme? 1=Very satisfied, 2=Satisfied, 3=Neutral, 4=Not satisfied, 5= Not very satisfied	
S2Q15	If not (very) satisfied, how can the system be improved?	
S2Q16	What is your level of satisfaction with the bureaucratic processes of the subvention scheme? 1=Very satisfied, 2=Satisfied, 3=Neutral, 4=Not satisfied, 5= Not very satisfied	
S2Q17	If not (very) satisfied, how can the system be improved?	
Section 3	**Substantive effectiveness (performance)**	
S3Q1	Did the subvention help to motivate tree growing in your organisation? Yes ( ) No ( )	
S3Q2	If yes, how?	
S3Q3	If no, why?	
S3Q4	If incentive was focused on one of the steps in the tree growing cycle, how did you succeed in going over the other 2 steps in the cycle?	
S3Q5	What is your level of satisfaction with the contribution of the incentives to tree growing objectives?	

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	1=Very satisfied, 2=Satisfied, 3=Neutral, 4=Not satisfied, 5= Not very satisfied	
S3Q6	What factors affected the subvention from contributing to the tree growing as expected? - - - -	
S3Q7	What are the challenges in relation to the use of the incentives? - - - -	
S3Q8	How can the incentive mechanism be improved to ensure that incentives achieve their objectives? - - -	
Section 4	**Transactive effectiveness**	
S4Q1	What is your opinion about the transaction cost to operationalise the incentive scheme in relation to the objectives and the expected results? 1=Very cost-efficient 2= Cost-efficient 3=Neutral 4= not cost-efficient 5= Not very cost-efficient	
S4Q2	If not (very) cost-efficient, how can the system be made more cost-efficient?	
S4Q3	What recommendations do you have concerning the management of the incentive delivery system in a cost-efficient way? - - - -	
Section 5	**Normative (purpose) effectiveness**	

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S5Q1	Are you aware of the overall purpose that the incentive scheme was expected to contribute to? Yes ( ) No ( ) If yes, please highlight the overall goal of the incentives?	
S5Q2	If yes, was the overall goal (if any) of the incentive achieved? What are your thoughts related to the achievement of the overall goal of the incentive scheme?	
S5Q3	What is your level of satisfaction with the achievement of the overall purpose of the incentive? 1=Very satisfied, 2=Satisfied, 3=Neutral, 4=Not satisfied, 5= Not very satisfied	
S5Q4	Additional comments - - -	

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Questionnaire objective 3 and 4

The aim of this survey is to collect information that will permit to assess the factors that determine (1) the willingness of farmers to involve in tree-growing (restoration) activities in their farms/plots (2) and whether and why farmers will continue tree growing activities in their farms/plots when the support they are receiving stops. All responses gathered will be kept confidential and no single person will be identifiable from the results. Your feedback will be used to improve the restoration strategy in terms of the science and practice. We very much appreciate your contribution!

PARTICIPANT CONSENT

I, the undersigned, have read and have fully explained the participant information leaflet, which explains the nature, process, risks, discomforts and benefits of the study to the participant whom I have asked to participate in the study.

The participant indicates that s/he understands that the results of the study, including personal details regarding the interview will be anonymously processed into a research report. The participant indicates that s/he has had time to ask questions and has no objection to participate in the interview. S/he understands that there is no penalty should s/he wish to discontinue with the study and his/her withdrawal will not affect any treatment in any way. I hereby certify that the respondent has provided his consent to participate in this study.

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Participant's Name .....……..(Please print)

Person seeking consent .....…….....(Please print)

Signature .....…….....Date.....

Witness's name .....……..….....(Please print)

Signature .....……Date.….....

Identification		
S1Q1	Questionnaire No:	
S1Q2	Name of respondent:	
S1Q3	Village:	
S1Q4	Council area:	
S1Q5	Level of education: ( ) none ( ) primary ( ) secondary	
S1Q6	Size of farm: ( ) 0-1ha ( ) 2-4ha ( ) 5ha above	
S1Q7	Sex: ( ) male ( ) Female	
Biophysical factors		
S2	**Indicate whether you; (1) Strongly disagree (2) Disagree (3) Neither agree/nor disagree (4) Agree (5) Strongly agree to statements below concerning your reasons to involve in tree growing?**	
S2Q1	To increase the vegetation cover of farm/plot/plantation	
S2Q2	To increase soil fertility of farm/plot	
S2Q3	Farm is located on a slopy landscape	
S2Q4	Farm size is small	
Climatic factors		
S3	**What is your position regarding the following statements concerning your reasons to involve in tree growing?**	

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	(1) Strongly disagree (2) Disagree (3) Neither agree/nor disagree (4) Agree (5) Strongly agree	
S3Q1	To improve the microclimate in my farm/village	
S3Q2	To increase biomass/carbon sequestration	
	Social, institutional and governance factors	
S4	**What is your position regarding the following statements concerning your reasons to involve in trees growing? (1) Strongly disagree (2) Disagree (3) Neither agree/nor disagree (4) Agree (5) Strongly agree**	
S4Q1	Security over land tenure	
S4Q2	Awareness and training – access to extension agents	
Economic factors		
S5	**What is your position regarding the following statements concerning your reasons to involve in trees growing? (1) Strongly disagree (2) Disagree (3) Neither agree/nor disagree (4) Agree (5) Strongly agree**	
S5Q1	Accessibility to markets to sell forest resources	
S5Q2	Availability of inputs - labour, planting materials	
S5Q3	Accessibility to information - demand, supply, prices	
S5Q4	Affordable cost	
S5Q5	Income and other related livelihood benefits	
Financial factors		
S6	**What is your position regarding the following statements concerning your reasons to involve in trees growing? (1) Strongly disagree (2) Disagree (3) Neither agree/nor disagree (4) Agree (5) Strongly agree**	
S6Q1	Capital/credit availability	
S6Q2	Availability of direct incentives –cash or non-cash	
S6Q3	What other factors motivated your involvement in tree growing that is not being mentioned here? - -	

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	- - -	
Behaviour of tree growers /farmers after support ends		
S7Q1	Are you aware that that the support you are receiving will come to an end in future? - - How were you informed? - -	
S7Q2	What do you plan to do after subvention stops? Stop tree growing activity ( ) Continue tree growing activity ( ) Don't know ( )	
S7Q3	Why will you stop? - - - -	
	Which of the following reasons will make you to continue in the tree growing practice when subventions stop (you can select more than one)?	
S7Q4	Tree growing practices showed success during support period	
S7Q5	Adequate capacity and control over tree growing practice	
S7Q6	Motivation as a result of internal and external benefits of tree growing i.e., compatible with tree growers' motivations, needs, and goals for their land	
S7Q7	Tree growing habit (for example growing trees before the subvention program)	
S7Q8	Availability of resources (time, knowledge, labour)	
S7Q9	Financial profitability of tree growing	
S7Q10	Influence from the behaviour of other tree growers	
S7Q11	Tree growing is a cultural norm in the community	

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Questionnaire objective 5

The aim of this group evaluation is to contribute to the enhancement of land restoration in Cameroon and the Sahel region in particular, based on the many years of experience of restoration in the Extreme North. The evaluation and all responses gathered will be kept confidential and no single person will be identifiable from the results. Your feedback will be used to improve restoration efforts in Cameroon in terms of the science and practice. We very much appreciate your contribution!

PARTICIPANT CONSENT

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Participant's Name .....……...(Please print)

Person seeking consent .....…….....(Please print)

Signature .....…….....Date.....

Witness's name .....……..….....(Please print)

Signature .....……Date.….....

Instructions

Using the below tables, compare the importance of the different SWOT factors in relation to restoration in the Sahel. To compare between strength factors (S) for example, if the strength "Source of additional income for some families" (S1) is 5 times more important than the strength factor "Strong implication of some local stakeholders" (S2) in restoration actions, we tick the corresponding cell under column 5 of the arrow pointing to the left. Conversely, if "S2"

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is two times more important than "S1", we tick the corresponding cell under column 2 of the arrow pointing to the right. If "S1" and "S2" are of equal importance, we tick the cell corresponding to 1. The group will be accompanied by a facilitator who will double as the secretary.

1. Pairwise ranking for Strength factors

Factors	←									→								**Factors**
	9	8	7	6	5	4	3	2	1	2	3	4	5	6	7	8	9	
S1Source of additional income for some families																		S2 Increasing involvement of local stakeholders
S1 Source of additional income for some families																		S3 Increasing need for social-ecological resilience
S1 Source of additional income for some families																		S4 Utilization of improve energy consumption strategies
S2 Increasing involvement of local stakeholders																		S3 Increasing need for social-ecological resilience
S2 Increasing involvement of local stakeholders																		S4 Utilization of improve energy consumption strategies
S3 Increasing need for social-ecological resilience																		S4 Utilization of improve energy consumption strategies

2. Pairwise ranking for Weaknesses (W) factors

Factors	←		→	**Factors**

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	9	8	7	6	5	4	3	2	1	2	3	4	5	6	7	8	9	
W1 Inadequate capacity																		W2 Lack of appropriate monitoring and evaluation system
W1 Inadequate capacity																		W3 Lack of effective engagement/participation of some communities
W1 Inadequate capacity																		W4 Tenure insecurity
W2 Lack of appropriate monitoring and evaluation system																		W3 Lack of effective engagement/participation of some communities
W2 Lack of appropriate monitoring and evaluation system																		W4 Tenure insecurity
W3 Lack of effective engagement/participation of some communities																		W4 Tenure insecurity

3. Pairwise ranking for Opportunity (O) factors

Factors ◄	9	8	7	6	5	4	3	2	1	2	3	4	5	6	7	8	9	► **Factors**
O1Improve livelihoods and natural resource base of communities																		O2 Increasing awareness of the importance of land restoration
O1Improve livelihoods and																		O3 Improve enabling

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natural resource base of communities																	environment for restoration
O1Improve livelihoods and natural resource base of communities																	O4 Increasing political will and donor interest on restoration
O2 Increasing awareness of the importance of land restoration																	O3 Improve enabling environment for restoration
O2 Increasing awareness of the importance of land restoration																	O4 Increasing political will and donor interest on restoration
O3 Improve enabling environment for restoration																	O4 Increasing political will and donor interest on restoration

4. Pairwise ranking for Threat (T) factors

Factors	◄																**Factors**
	9	8	7	6	5	4	3	2	1	2	3	4	5	6	7	8	9	
T1 Non-respect of tree planting calendar																		T2 Disperse and incoherent restoration initiatives at very small scales (NGOs, PTF, administration)
T1 Non-respect of tree planting calendar																		T3 Impacts of climate variation and change in the Sahel

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T1 Non-respect of tree planting calendar																T4 Inadequate and timely supply of quality inputs for restoration
T2 Disperse and incoherent restoration initiatives at very small scales (NGOs, PTF, administration)																T3 Impacts of climate variation and change in the Sahel
T2 Disperse and incoherent restoration initiatives at very small scales (NGOs, PTF, administration)																T4 Inadequate and timely supply of quality inputs for restoration
T3 Impacts of climate variation and change in the Sahel																T4 Inadequate and timely supply of quality inputs for restoration

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