# CHAPTER ONE

# INTRODUCTION

## Background

Tubah Subdivision in the Northwest Region of Cameroon is predominantly agrarian, with smallholder farming serving as the backbone of livelihoods. Agriculture engages roughly 70% of the national labor force, and in Tubah many households practice agroforestry; the integration of trees with crops and/or livestock on the same land. Agroforestry has been promoted in this region as a sustainable land-use strategy to combat soil degradation and biodiversity loss caused by practices like monoculture and slash-and-burn farming. It offers numerous ecological and economic benefits, including improved soil fertility, erosion control, carbon sequestration, and diversified farm output. These benefits have made agroforestry a cornerstone of climate-smart agriculture in Tubah, helping farmers restore degraded lands while sustaining their livelihoods.

Despite its advantages, agroforestry is highly labor-intensive. Maintaining trees alongside crops demands continuous labor for activities such as planting, pruning, weeding, and harvesting across multiple species and seasons. Smallholder farmers in Tubah rely primarily on family laborto meet these demands. Household members including men, women, and often children – provide the bulk of farm work, as hiring external labor is costly and mechanization is limited. In these traditional systems, gender dynamics play a significant role in labor allocation. Women typically bear a disproportionate share of both farm work and domestic duties. For example, women are often responsible for labor-intensive tasks like weeding, planting, and post-harvest processing, in addition to childcare and household chores, whereas men tend to engage in periodic heavy tasks such as land clearing. This gender-based division of labor, rooted in cultural norms, does not always optimize the use of human resources on the farm. Empirical studies in Cameroon have observed that such traditional labor patterns can lead to inefficiencies – for instance, overburdened women may not have sufficient time for all tasks, and critical farm operations can be delayed or under-resourced.

Furthermore, smallholders face seasonal labor bottlenecks: during peak planting and harvest times, labor demand exceeds supply, yet hiring seasonal workers is often not feasible due to cash constraints and rural out-migration of youth. These issues contribute to notable gaps between potential and actual productivity in Tubah’s agroforestry systems. Adding to these difficulties is the ongoing Anglophone crisis, which has significantly affected rural labor availability in the Northwest Region. Insecurity, displacement, and restricted movement due to sociopolitical unrest have caused widespread disruptions to farming activities and further constrained the supply of farm labor. Many able-bodied individuals have either fled the region or are unable to access farmland safely, compounding pre-existing labor shortages and inefficiencies.

## Problem Statement

Labor inefficiency has emerged as a key challenge undermining the sustainability and productivity of smallholder agroforestry in Tubah. Recent empirical evidence indicates that farmers, on average, operate at only about 80.5% labor efficiency. In other words, roughly one-fifth of their labor potential is lost to inefficiency, suggesting that outputs could be increased significantly if labor were used optimally. This baseline labor efficiency score of 0.805 (in a 0–1 efficiency range) was reported as an initial benchmark for Tubah’s agroforestry households.

The inefficiencies stem from several interrelated factors. First, the intra-household division of labor is skewed, women and girls shoulder a heavier burden of farm labor and domestic work relative to men. Such gender disparities mean that a substantial portion of the workforce (women) may be overextended, while the available labor from other members (men or youth) might be under-utilized in certain tasks due to traditional role norms. This mismatch can lead to tasks not being done at the right time or with the necessary attention, lowering overall farm performance. Second, mechanization and labor-saving technologies are extremely limited in these smallholder systems. Farmers typically cannot afford machinery, and services like tractor hire are scarce or too expensive, so even arduous tasks must be done manually. The lack of mechanization keeps labor productivity low and makes the timeliness of operations highly dependent on human labor availability. Third, Tubah’s farmers suffer from seasonal labor shortages and constrained labor markets. During peak periods (planting, harvesting), family labor alone often cannot meet the demand. Hiring additional farmhands is challenging due to both financial constraints and labor supply issues, many able-bodied rural youth have migrated to cities or alternative livelihoods, and those available charge high wages that smallholders struggle to pay. The Anglophone crisis has further exacerbated this situation by increasing the displacement of rural populations and restricting access to farms, thereby worsening labor shortages, increasing risks to farm productivity, and threatening household food security.

The result is that critical farm activities may be delayed or scaled back, directly impacting yields. Moreover, any shocks such as an illness in the family can drastically reduce available labor and further impair farm operations.

In summary, the problem is that smallholder agroforestry farmers in Tubah are not utilizing labor efficiently under current conditions. This inefficiency is characterized by an imbalance in labor allocation within households, the absence of labor-saving tools, inadequate arrangements to mobilize extra labor when needed, and compounded insecurity from the ongoing conflict. Addressing this problem is vital, as labor is the driving force behind all other production inputs on these farms – inefficiencies here cascade into lower productivity, income, and resilience for the households .

## Objectives of the Study

### General Objective:

To evaluate the potential of optimizing labor use efficiency among smallholder agroforestry farmers in Tubah Subdivision, Cameroon, through a decision analysis of two cooperative-led interventions.

### Specific Objectives:

1. To simulate the impacts of cooperative-driven mechanization on labor efficiency in agroforestry farms.

2. To assess the effects of cooperative-based gender-balanced labor pooling on household labor productivity.

3. To compare the modeled outcomes of both interventions against a baseline scenario using decision analysis.

4. To identify the most cost-effective and context-appropriate strategy for improving labor use efficiency.

## Significance of the Study

This study is significant because it applies a decision analysis approach to explore practical solutions for improving labor use efficiency in smallholder agroforestry systems in Tubah. It addresses one of the most pressing barriers to productivitby assessing the feasiy bility and projected outcomes of two targeted cooperative-led interventions: mechanization and gender-balanced labor pooling.

The study’s use of simulation modeling enables the exploration of intervention impacts in a controlled, evidence-based framework, making it a valuable decision-support tool for agricultural planners, cooperatives, and development organizations. Furthermore, by contextualizing the analysis within an area affected by the Anglophone crisis, the research offers insights into labor optimization in conflict-affected rural economies.

Findings from this study will inform policy and programming aimed at enhancing sustainable livelihoods, promoting inclusive labor practices, and improving the resilience of agroforestry systems under both ecological and socio-political stress. It contributes to Sustainable Development Goals (SDGs) 1, 2, 5, 8, and 13, and strengthens the knowledge base for designing cooperative-led, gender-equitable, and climate-smart agricultural interventions.