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The Role of Agroforestery on House Hold Income of Rural Communities the Case Soddo Zuria Woreda; South Ehiopia

By Bruk Molla
Addis Ababa University

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I. Introduction

Agroforestry is a system of natural resources management that integrates trees on farms and in the agricultural landscape to diversify and sustain production. Agroforestry is a collective name for land-use system and technologies where woody perennials (trees, shrubs, herbs bamboo etc.) are deliberately used on the same unit of land management as agricultural crops/ or animals in some form of spatial arrangement or temporal sequence (BBS, 2006).

The World Bank estimates that over 1.2 billion people derive their livelihoods from agroforestry systems (World Bank, FAO and IFAD 2009). Agroforestry is recognized worldwide as a sustainable system characterized by the production of multiple species narrowly arranged in several overlapping canopy layers and in association with livestock (Peyre, 2006). Agroforestry is also a collective system of production throughout Africa (Zomer,). For example, in Kenya and Uganda, the proportion of households in which women managed fodder shrubs was over 80% (Franzel et al. 2002a; Nyeko et al. 2004).

Agroforestry farming system plays an vital role for the whole world poor societies especially for women since the majority of the worlds poor are women who accounted over half of the worlds poor live in rural areas and depends heavily on natural resources for survival. They have also faced little or no access to resources such as land, credit, less access in information, scarcity of improved variety, and extension service (UNDP, 2006).

A change from the present or default agricultural system towards an agroforestry system that combines sustainable crop yields with the potential to remove greenhouse gas emissions as well as additional ecosystem services that are provided in the agroforestry systems as opposed to monoculture systems could potentially be financially attractive option for farmers, land-owners, and governments. The results below highlight for different scenarios, whether agroforestry systems are economically attractive. From a REDD+ perspective, agroforestry can be regarded as one of the five REDD+ activities considered under the UN Framework Convention on Climate Change (UNFCCC), namely 'enhancement of forest carbon stocks.'

Despite its apparent ubiquity, farmland agroforestry has been poorly defined in the scientific literature. Existing classification schemes distinguish agroforestry practices primarily by the spatial arrangement of trees (Sinclair 1999), or by the predominant features of the tree components (Schoene et al. 2007). The systems environmental adaptability or socio-economic performance and management intensity serve as further dimensions to classify such systems (Nair 1993). However, these classification schemes only weakly discriminate between the deliberate retaining of naturally occurring trees on cropland and other practices of the tree growing on farms, such as planting of eucalyptus trees on plot contours as a woodlot or the retaining of naturally regenerated Croton macrostachyus around homesteads. In the absence of a clear definition, various terms have been used in the scientific literature to refer to this practice, such as 'multipurpose trees on farms' (Nair 1991), 'farmer-managed natural regeneration' (Haglund et al. 2011), 'agroforestry parkland systems' (Bayala et, 2011) and 'silvoarable agroforestry' (Graves et al. 2017) to name but few.

The conceptual ambiguity can potentially affect an accurate assessment of these systems.

Given that the environmental effects, economic costs, and benefits as well as the socio-cultural implications of the various agroforestry practices are

Author: Dilla College of Teachers Education Department of Civics and Ethical studies PhD fellow in Addis Ababa University Addis Ababa, Ethiopia. e-mail: brukmo2008@yahoo.com

determined by their particular characteristics and hence may differ between the locations, more precise differentiation and detailed understanding of these practices is needed (Tolunay et al. 2007).

In Ethiopia, smallholders practice various agroforestry practices depending on the socioeconomic and biophysical conditions which, have livelihood implications (Abiyu et al. 2016). The deliberate retaining of naturally occurring trees on farmlands is a common land use practice carried out by these smallholders for monetary, material, environmental, and cultural uses (Jamala et al. 2013; Iiyama et al. 2017).

However, the practice of farmland agroforestry is declining in many agricultural landscapes in Ethiopia due to increase in fuel wood demand and degradation of nearby forests (Onyekwelu et al 2015), agricultural intensification, the increasing popularity of exotic tree species which generate larger economic benefits for farmers (Teshome 2009), and the fact that land proclamations do not specify clear instructions for farmers on how to manage and conserve indigenous trees.

Accordingly, agro forestry land management has been practiced in Ethiopia since time immemorial by villagers on farmlands. Home garden agro forestry in SNNPRS is characterized by the unique combination of two main native perennials, Enset (Ensete ventricosum) and Coffee (Coffee arabica) which grow in association with food crops, various trees and livestock in a multilayer story agro forestry system (Tesfaye et al., 2010).

a) Statement of the problem

Motiur et al. (2005) indicated that agroforestry is the combination of multi-components including plants, animals, and human habitats in the tiny pieces of land. Plant includes trees, shrubs, and herbs, growing in or adjacent to the homestead. All of these are planted and maintained by household members especially by female members with the view of household consumption; they have considerable ornamental value and provide shade to people and animals. It aims at meeting the basic needs of a small family having less holding and very slight capacity for investment. The form of agroforestry is very extensive and denoted by very corporate terms using, homestead agro forestry, mixed-garden horticulture, home garden and, homestead forest (Motiur et al. 2005). Moreover, homestead agroforestry can be capable maintaining sound ecological basis for increased crop and animal productivity, more dependable economic returns, and greater diversity in social benefits on a sustained basis. Ethiopia home gardens offer a practical response to the following challenges: massive degradation and depletion of forest resources; the rural energy crisis; optimum utilization of already scarce land and environmental improvement and landscape enhancement (N, 2001)).

Increasing population pressure and subdivision of farms have led to the fragmentation of land, a decline in the area under coffee and enset (Tsegaye and Struik 2001; Abebe 2005) and gradual replacement of the age-old diverse system. A major change is the expansion of a mono-cropping system of khat (Catha edulis Forsk) at the expense of enset-coffee home gardens (Tsegaye and Struik 2001; Abebe et al. 2010). Khat is grown for its economically important leaves and tender twigs, which are chewed for their stimulating effect. Due to the decline in enset cultivation, many households have become more dependent on the food market (Amede and Diro 2005). Market dependency on family food is further exacerbated by decreasing farm area and productivity of food crops (Amede et al. 2001). In countries like Ethiopia, where smallholder farmers have no access to insurance, market dependency increases the vulnerability to economic or environmental shocks. The replacement of enset has also induced a shortage of livestock feed with direct repercussions on herd size, herd composition, livestock production and hence, the nutrition quality of human diets (Tsegaye and Struik 2001).

Most studies on the home gardens of southern Ethiopia claimed that expansion of khat has resulted in homogenization of the structure and composition of the traditional land-use systems (Abebe et al. 2010; Dessie and Kinlund 2008). Yet, little is known about the rate at which those systems have shifted to monocroppin systems, how that differs across the region, and which factors could explain it.

(Herrero et al. 2009; Ebanyat et al. 2010) suggest trends in institutional support, resource endowment, prices, social conditions and technology as drivers of farming system change, but these have not yet been investigated for the particular case of home gardens in southern Ethiopia.

Similar to many other areas in sub-Saharan Africa, SNNPRS is characterized by a great diversity in farms and farming systems, even though they are grouped under the common term home gardens. Recognizing this variability within and among farming systems and localities is the first step in the design of new technologies to improve agricultural production (Giller et al. 2011; Descheemaeker et al. 2016).

Agroforestry is central in rural livelihoods and national economies and compared to annual crop or livestock systems, it is known to be resilient to climate and market shocks (Tscharnke et al. 2011; Kerr 2012; Nguyen et al. 2013), ensuring ecosystem benefits such as carbon storage, soil improvement and biodiversity conservation in addition to food and fibre. It can be a viable way of ensuring sustained flow of tree-based ecosystem services as demand for agricultural production expands with the growing population.

So the main concern of this paper is to describe how much agroforestry plays in diversifying the house

hold income of rural community where the practice is diminishing from time to time mainly due to population pressure, deforestation of the area, land use land cover change, erosion and salinity of the area because of the slope.

b) Objectives of the study

i. *General Objective*

The General Objectives of this study is to assess the role of agro forestry on household income in rural community the case of Kokate Marachare Kebel, Soddo Woreda.

ii. *Specific Objectives of the study*

- To identify the role of agro forestry practices in household income
- To identify the foremost roles agro forestry in increasing house hold income of a rural community
- To describe problems linked with diversification of income through agroforestry

iii. *Research Question*

1. To what extent does agroforestry is practiced in the rural community of soddo, woreda
2. What are the major roles of agroforestry in the household income of rural community in soddo, woreda?

The Scope of the Study

The study will limit itself to upper Kokate near to mount Damota agroforestry role in house hold income of rural community in Kokate Marachare.

II. Review of Related Literature

a) Agroforestry management Concepts and approaches

Agroforestry is a system of natural resources management that integrates trees on farms and in the agricultural landscape to diversify and sustain production. The World Bank estimates that over 1.2 billion people derive their livelihoods from agro forestry systems (World Bank, FAO and IFAD 2009).

In line with this (Motiur et al. 2005), indicated that agro forestry is the combination of multi components including plants, animals and human habitats in the tiny pieces of land. Plant includes trees, shrubs, and herbs, growing in or adjacent to the homestead.

All of these are planted and maintained by household member's especially female members with the view to household consumption; they have considerable ornamental value and provide shade to people and animals. It aims at meeting the basis needs of small family having less holding and very little capacity for an investment. The form of agro forestry is very wide and denoted by very common terms using, homestead agro forestry, mixed-garden horticulture, home garden and homestead forest (Motiur et al. 2005).

Home garden Agro forestry Traditional agro forestry land use should be viewed as a household strategy for providing food, fuel wood and fodder that could serve as a model for sustainable forestry and agricultural practices (Badege & Abdu, undated). It has been practiced in Ethiopia since time immemorial by villagers on farm lands. It is recognized worldwide as a sustainable system characterized by the production of multiple species closely arranged in several overlapping canopy layers and in association with livestock (Peyre *et al.*, 2006).

This integrated land use systems are believed to enhance agriculture due to the association between multiple crops and trees on one hand, and various ecological and economic benefits on the other. According to Tesfaye (2005) homegarden agro forestry in SNNPRS is characterized by the unique combination of two native major perennials enset (*Ensete ventricosum),* and coffee (*Coffea arabica*) which grow in association with food crops, various trees and livestock in a multilayer story agro forestry system (Tesfaye *et al.*, 2010; Almaz, 2001)

Home garden agro forestry has supported populations of 500-1000 person per square kilometer in SNNPRS for centuries (CSA, 2011; Tadesse, 2002) and provided food security for many Ethiopians (Tesfaye *et al.*, 2010; Almaz & Niehof, 2004). The main factors that contribute to this stability according to (Admasu & Struik, 2002) are the diversity of the system and the ability of the main staple food in south west Ethiopia, enset to produce a relatively large amount of food per unit area. Trees, crops and livestock are identified as main components of ecosystem stability in the home garden agro forestry, which is related to the three scientific disciplines of agronomy, forestry and animal husbandry (Tesfaye, 2005).

The presence of trees in home garden agro forestry gives multiple services of timber, firewood, food and fodder Kumer and Nair (2004) and it is important for improving the ecosystem and improving its nutrient cycle through litter fall and decomposition. The livestock component in the system provides food for the household, and the manure is important for improving soil organic matter and fertility.

Presently, tree growing on farm is considered as a promising farming strategy to adapt to climate change and contributing to mitigate global warming by their potential of absorbing atmospheric carbon dioxide (World Agro forestry, 2009). Nyong *et al.* (2007) also emphasizes the importance of agro forestry land use in climate change mitigation through carbon sequestration.

b) Significance of Agro forestry Management

i. *Use of Fodder Shrubs to Boost Milk Production*

Most livestock in Africa are found in mixed smallholder farms characterized by their small size, limited production resources and low income levels. The shortage of fodder coupled with the low quality of feed is the greatest constraint to improving livestock productivity and reproductive performance, especially during the dry season (Winrock International 1992).

Despite demonstrated advantage of the use of herbaceous legumes as high quality fodder, their use has not been widely adopted by small-scale farmers. The low adoption has been partly attributed to the scarcity and high cost of the legume seed (Paterson et al. 1998). In contrast, there has been considerable adoption of fodder shrubs in the highlands of East Africa to provide the much-needed protein to dairy cows (Franzel and Wambugu 2007; Wambugu et al. 2011).

ii. *Soil Fertility Improvement*

One of the most serious constraints to the sustainability of agriculture in sub-Saharan Africa is declining soil fertility. In the past, African farmers managed soil fertility on their farms by fallowing their land. As population increased, fallowing of land declined, with many farmers adopting intensified land use practices that required fertilizers to replenish nutrients. Many African states subsidized fertilizer prices to stimulate fertilizer application, but these subsidies were later removed. The removal of such subsidies, due to structural adjustment policies (SAPs), has substantially increased costs for many farmers who now cannot afford fertilizers (FAO, 2001).

This has exacerbated the problem of declining soil fertility, leading to reduced crop productivity (Sanchez et al. 1997). To address these challenges, scientists have in the past two decades experimented on low cost agro forestry options for soil fertility replenishment. Three of the most promising options are the use of improved tree fallows, biomass transfer and mixed intercropping (Niang et al. 1996; Sanchez et al. 1997; Ajayi et al. 2001; Thangata and Alavalapati 2003; Kiptot 2008).

Improved tree fallows are the deliberate planting of fast growing leguminous trees or shrubs in rotation with crops. Biomass transfer is a technology where biomass from shrubs/trees grown on or off the farm, is cut and incorporated in the soil as green manure when planting crops. Mixed intercropping involves planting nitrogen-fixing trees that can tolerate continuous and heavy pruning, in a regular pattern with crops such as maize. By providing nutrients to crops, these technologies can potentially help farmers improve their soils and incomes, thereby improving food security.

iii. *Indigenous Fruit and Vegetable Production and Processing*

Food insecurity, poverty and malnutrition are some of the major challenges that face sub-Saharan Africa. In Nigeria for example, 70% of the population lives below the poverty line (Bird and Dickson 2005), while in Cameroon the figure is 40%, rising to 55% in the forest region (Schreckenberg et al. 2006). In addition to poverty, Africa is facing a serious problem of not being able to feed its people (FAO 2006). As a matter of fact, it is estimated that 60–80% of rural households in Malawi, Zambia and Mozambique run out of food for as long as 3–4 months per year (Akinnifesi et al. 2004).

Those most at risk are women and children. Through the ages, most of these people have relied on wild plants for food during periods of famine. In addition, they provide other products such as medicine, spices, and livestock feed. In a survey conducted in Malawi, Zambia and Zimbabwe, 26–50% of households confirmed to have reduced vulnerability by collecting indigenous fruits from wild plants (Akinnifesi et al. 2006).

Several studies have acknowledged the fact that indigenous fruits are rich in nutrients in addition to having the potential to generate income to many rural households. In Zimbabwe, for example, wild fruit trees represent about 20% of the total woodland resource use by rural households (Campbell et al. 1997) with women and children being the main beneficiaries. They collect, consume in both fresh and processed form, sell and use the proceeds to buy food and other household goods (Ramathani 2002).

c) Measures to Protect Agro forestry

Many countries in Africa are presently facing severe shortages of fuel wood, poles for construction and many other forest products due to increasing human and livestock populations that have led to massive deforestation and land degradation. In Kenya, for instance, the area under plantation forests is expected to decrease from 164,000 to 80,000 ha by the year 2020 (KEFRI 1999).

It is further estimated that if the current utilization and demographic factors remain unchanged, then the demand of wood and non-wood forest products is going to outstrip the supply by very big margins. This deficit is likely to manifest itself mainly in fuel wood, a burden that will be borne by women.

To overcome this problem, many development agencies in sub-Saharan Africa have been promoting planting of woodlots, an agro forestry technology which aims at improving fuel wood supply and poles to rural communities, income generation and alleviating environmental degradation.

A woodlot refers to planting of trees in sole stands on farm to provide wood for fuel and construction poles (Otsyina et al. 1999). For the past two decades, woodlots have been promoted in rural areas

of Africa as a means of improving wood fuel supply and poles in rural communities. A number of countries such as South Africa (Ham 2000), Tanzania (Shanks 1990) and Ethiopia (Jagger and Pender 2005) initially promoted communal woodlots, but due to labour constraints and lack of autonomy many farmers prefer individual woodlots planted on their own parcels of land. In recent years, many non-governmental organizations (NGOs) have been encouraging farmers to plant woodlots through agro forestry so that they can be self sufficient in wood product requirements.

Modifications of the woodlot technology include trees along farm boundaries or intercropping with other tree crops. In Kenya, planting of woodlots is widespread in high potential areas of western, central and eastern Kenya. Species commonly planted in western Kenya are Eucalyptus spp. and M. lutea. At the coastal region of Kenya, the species mainly planted in woodlots is Casuarina equstifolia. In western Uganda species commonly planted are Senna spectabilis, M. lutea, Eucalyptus spp. and Melia azederach (Buyinza and Wambede 2008).

d) Agro forestry in Southern Ethiopia

Most studies undertaken about agro forestry in Ethiopia have been in design and productivity aspects (Poschen, 1986; Asfaw and Agren, 2007). Directly concerning diversity and the system properties Negash et al. (2012) undertook a study about the potential of indigenous, multi-strata agro forests for maintaining woody species diversity in the south eastern Rift Valley.

In his work, Kanshie (2002) describes the ecology of Southern Ethiopia and the farmer´s natural resource management. A report about indigenous agro forestry practices and their implications for sustainable land use and natural resources management points to the problem of land limitation and population growth in Gedeo (SLUF, 2006).

However, little emphasis has been placed on socio-economic aspects regarding the farmers' livelihoods and their income. The paper of Negash (2007) investigates indigenous knowledge on the management of trees and their contribution to improve the farmers' livelihoods. In his finding trees are major income sources as fuel wood, poles, timber, fodder and human as well as veterinary medicine.

Findings showed that compared to other land use practices of the study area, vegetable based agro forestry was found to be most promising, which led to being adopted by farmers from other areas. Overall information is inadequate when it comes to how agro forestry contributes to the livelihood growth and how recent growth in population might affect farmer's livelihood.

e) Categorization of home garden agroforestry in Ethiopia

Ethiopia is one of the tropical countries in which home garden agroforestry is ubiquitous in the highlands. Agroforestry is the major component of Ethiopian farming systems. On the basis of the components, Gedeo agroforestry is categorized as the agrosilvo pasture type (Nair 1993) where trees, crops, and animals are part of the system. The three common types of agroforestry practices are home garden, parkland, and woodlot (Aklilu et al. 2015).

In the cereal crop-based farming system, staple food crops such as barley, teff (Eragrostis tef, a small grain), wheat, and maize are grown in the outer farm with trees while vegetable species and fruits are grown in the home garden. This type of agroforestry system is known as parkland agroforestry. Parklands are the traditional agroforestry systems of central and northern Ethiopia where naturally growing, valuable trees are protected and nurtured on cropping and grazing lands. The second type of agroforestry system is perennial-crop based home garden agroforestry systems, in which perennial crops, fruits, spices, vegetables, trees, etc. are grown in the home garden.

The third type of agroforestry system in Ethiopia is woodlot agroforestry. An example of woodlot agroforestry is the bamboo-based agroforestry in the Dawuro zone (Madalcho & Tefera 2016).

f) Ecological benefits of home garden agroforestry

The ecosystem services and ecological benefits of agroforestry are often masked by farmers' mere expectation of maximum yield from the mono crop farm (Shibu 2009). The home garden as a traditional agroforestry system in many regions has shown great value in maintaining high degree of diversity.

In country such as Ethiopia where the deforestation rate is extremely high, agroforests serve as a refuge for many plants and animals. For instance, Negash, Yirdaw & Luukkanen (2011) identified 58 woody species belonging to 49 genera and 30 families on 60 agroforest farms of the Gedeo zone. Similarly, in a study conducted in Gununo Wolayita, 32 woody species belonging to 19 families were recorded (Bajijo & Tadese 2015). A total species of 50 plants of 35 families was recorded (Negash 2013) in a home garden of size 100m2 in the Gedeo zone. In general, the Gedeo agroforestry is endowed with nationally and globally significant biodiversity and genetic resources.

The diversity of plants in the home garden, associated with other organisms, contributes to the formation and maintenance of soil structure and the retention of moisture and nutrient levels and promotes the recycling of nutrients (Verchot et al. 2007). This is particularly important in hillside farming, where agriculture may lead to rapid loss of soil. According to Tadese (2002) for instance, agroforestry land use is

suited to the mountainous Gedeo area, as it protects against erosion. The agroforestry system plays a significant role in soil fertility maintenance. A study by Madalcho & Tefera (2016) in Gununo Wolayita showed that the chemical property of the top soil is significantly high in home garden agroforestry. Its nitrogen content also far exceeds that in other types of agroforestry.

g) Factors affecting agroforestry and income diversification

Agroforestry is influenced by complex sets of socioeconomic, demographic, technological and institutional factors reported that farmer-centered scientific experimentation, agricultural extension service, local institutional capacity and market conditions influence agroforestry. Farmers' experience and cultural diversity were also found to influence conservation of agro- biodiversity's.

Social custom, farmers' resource endowment, perception of tenure security, land-use preferences and exposure to mass media were also found to determine agroforestry practice (Lambert and Ozioma 2001) indicated that crop pests, diseases and wildlife associated with the tree-crop interface influence agroforestry adoption.

Multiple motives prompt households and individuals to diversify assets, incomes, and activities. Diversification may be derived by limited risk bearing capacity in the presence of incomplete or weak financial systems that create strong incentives to select a portfolio of activities in order to stabilize income flows and consumption, by constraints in labor and land markets, and by climatic uncertainty (Kassie, 2016 Kassie, G. W. (2016).

The main deriving factors for livelihood diversification include the heterogeneity of labor markets that come from the differences in household culture, location, gender, and technical skills (Davies & Hossain, 1997 Davies, S., & Hossain, N. (1997). Livelihood adaptation, public action and civil society) advocated the existence of livelihood diversification in developing countries due to the low credit access rate across the farm household; and cash to smooth consumption.

Simtowe, Asfaw, (2016) considered many literatures on justifications for farm income diversification and grouped into four broad categories: (i) self-insurance against risk, (ii) an ex-post coping strategy, (iii) inability to specialize due to incomplete input markets and (iv) consumption diversification where there are incomplete output markets.

In Wolayta significant number of rural households engage in diverse income generating activities away from purely crop and livestock production. According to the study, it is increasingly becoming clear that the agricultural sector alone cannot be relied upon as the main activity for rural households as a means of improving livelihood, achieving food security and reducing poverty in the study area. Income diversification is gaining prominent role in rural households' income and food security. Even though, regarding the rural economy in Ethiopia, policy makers give more attention to agricultural sector. Nevertheless, there is growing evidence that the rural sector is much more than just farming.

III. Research Methodology

a) Research Design

This study is intended to assess the role of agroforestry on household income some selected catchment areas of upper kokate of sodo woreda. In order to get realistic information mixed approach will be employed having both qualitative and quantitative in mind.

b) Types of data and the sources

Data will be obtained from. Primary and secondary sources .Primary data from participants will be collected through questionnaire, Focus Group Discussion (FGD) and personal field observation and secondary data will be reports from Agriculture Office, related works and journals will be used as source material for the study.

c) Sample size & Sampling Technique

The study will involve numbers of house hold heads, extension service, workers woreda agriculture & rural of developers upper kokate, marachare kebel.

There are about 326 house- holds in the current arrangement kokate marachare in to four local units or (mender) of which 10% that is 32 house-holds were considered as the sample of the study. Furthermore, 2 extension service workers were used as key informant.

Totally 34 respondents were the sample size of this study.

Questionnaire with close- ended and open-ended question to gather pertinent data from house-holds was collected. The questionnaire was administered to the 32 hh in the study area

Key informant interview was held with 2 extension officers of the kebele so as to substantiate the data collected from house-hold through questionnaire.

d) Data Analysis techniques

Data was analyzed both qualitatively based on the KI interview and personal observation of the study area and quantitatively to triangulated the information from collected questionnaire from the households. Descriptive statistics like percentage and mean were employed to quantitatively analyze the data.

IV. Result and Discussion

a) Demographic Characteristics of the Respondents

Different studies show that the demographic characteristics of an individual have a significant influence on practices and challenges of agro forestry

management often depending on the age, sex and level of education of the individuals in charge. Taking this into consideration, therefore, household age, marital status, family size, level of education and experience of the respondents were shown to indicate the general demographic conditions of the respondents under the selected agroforestry kebele.

b) Age

As the age distribution in Table 4.1 is concerned, majority 50 % of the respondents were within the age category of 46 and above years, followed by 35-45 years 28% and rest 22% of the respondents were between 26-35 (see Table 4.1). This shows that majority of the respondents were adults and aged people which gives them ample experience on the practice of agroforestry and income diversification of households. The least group also have the chance share experience from their family and neighborhood on the implementation of agroforestry to support their livelihood and diversify income.

Table 4.1: Age Distribution

No.	Age Distribution	Age group	No.of Respondents	%
		20-25 year		
		26-35 year	7	22
		35-45 year	9	28
		46- and above	16	50
		Total	32	100.0

c) Marital Status and Family size

As can be inferred from table 4.2 below, of total 32 sample respondents, 71%, 3.1% and 6.25 of them were married, divorced and widowed respectively.

Table 4.2: Marital Status and Family Size of the Respondents

No.	Marital status	No.of Respondents	%
1	Single	-	-
2	Married	29	90.6
3	Divorced	1	3.12
4	Widowed	2	6.25
5	Polygamy		
	Total	32	100
No	**Family Size**	**No of respondents**	**%**
1	1-3 members	6	18.75
2	4-6 members	23	71.87
3	7-9 members	3	9.3
4	Above 10 members	-	-
	Total	32	100

As to the survey results from Table 4.2 above (71%) the family had 4-6 family members while the rest family's 18%, and 9% were registered as 1-3 members, and 7-9 members respectively (see table 4.2).

As can be inferred from the table above the average family size is five which imply there is high population density as the area is mountainous and land is fragmented to agricultural activities on the area in comparison to its carrying capacity.

d) Educational background of respondents

The uptake of new technologies is often influenced by farmers' contact with extension services. Several studies have shown that women have lower access to agricultural extension than men. While the provision of vocational and technical training for women farmer create positive impact on improving technical and managerial skills of homestead agro forestry practices (Katungi et al. 2008).

As to the survey results from Table 4.3, 34.3% of respondents had grade 1-4 25% had education from grade 5-8 28% unable to read and write 6.25% read and write and 6.25 % who had completed high school. From the table it is clear that the majority of respondents fail under primary education but most of them can read and write. As observed during data collection it is clear that the kebele distance to the town and nearby school played role to achieve at least primary education.

Table 4.3: Educational background of respondents

No.	Educational status	No. of Respondents	%
1	Unable to read & write	9	28.1
2	read and write only	2	6.25
3	grade 1-4	11	34.37
4	grade 5-8	8	25
5	high school complete	2	6.25
6	certificate and above	-	-
	Total	326	100.0

For question number 6 about participation on agroforestry to family income diversification all the respondents agree on its importance but all they vary on their practice of agroforestry based on their size of land, labor and income situation of their family. The non -farm activities and agroforestry in general plays key role in family livelihood and income diversification as depicted from the respondents and KII. Almost all the household engage themselves on more than two activities on agroforestry and non -farm activities to diversify and secure their family income.

As table 4.4 reveals, out of the total surveyed 32 women more than two third 90%% of them use mixed farming system as the major components in the home garden agro forestry. While the rest 6.25% were

engaged in enset and coffee, and 3.1% engaged on trees and coffee cultivation (see table 4.4). None of the respondents involved on mono cropping to secure their livelihood from agriculture on the study area.

Based on the survey result, it was possible to conclude that majorities are dependents on mixed farming system of agro forestry practices i.e. integrating crops such as wheat, barley bean avocados and enset with native trees and livestock (See table 4.4). Further KI interview revealed that based on season farmers try to cultivate different crops and trees to diversify their family income. As the kebel is in the hinterland to sodo town seasonal things like cabbage support the livelihoods of the family in addition to dairy products from the livestock's.

Table 4.4: Main Components of the Home garden Agro forestry

No.	Components of Agro forestry Species	No.of Respondents	%
1	Engaged in mixed farming (avocado. trees and livestock)	28	90.65
2	Planting mono-cropping only	-	
3	*Enset* and coffee agro forestry	2	6.25
4	Trees and coffee cultivation	1	3.1
	Total	32	100

e) *Motive to be engaged in agro forestry management and major Agro forestry products*

There are a lot of motives forced the farmers to engage in agroforestry. Studies, for example, Elevitch and Wilknson (1998) have reported that farmers get engaged in agroforestry as it contributes to food security, energy and cash income through selling of tree products.

The primary reason or motive to be engaged in agro forestry management activities is presented in Table 4.5. As the table revealed, the overwhelming majority 68.75% were engaged in the agro forestry activity is to meet family food needs. The primary motive for about 18.75% agroforestry was to generate income and the reason for 12.5 %of the respondent was their family background.

Based on the survey result, it was possible to conclude that majorities engaged in agroforestry management activity to meet family food needs and generate cash income through sale of various agro forestry products including tree products.

It was indicated during FGDs that some farmers were trying to diversify agricultural practices so that they could raise their income through improved crop and tree yields. They believed that they could generate cash income through sale of various agro forestry products including tree products. Further the key informant noted that agroforestry activities are considered as means for cash money for daily socio-cultural issues of the family.

Table 4.5: Motive to be Engaged in Agro forestry and major types

No.	Response for the Main motives to be engaged in agro forestry	No.of Respondents		%
		Yes	No	
1	Family background	6		18.75
2	To create employment opportunity	-		-
3	To meet family food need	22		68.75
4	To have ecologically sounding environment	-		-
5	To generate income	4		12.5
	Total	32		100
No.	**Main types of agro forestry products**	**No. of Respondents**		**%**
1	Avocados	23		71.85
2	Mango	2		6.25
3	Coffe	2		6.25
4	Livestock products	5		15.62
5	Banana			
	Total	32		100

All the respondents have their own plot of land to practice the agroforestry activities even though their plot is very small to accommodate different types of crops, trees and livestock.

The dominant income for a family on the kebele from agroforestry comes from Avocado tree 71.85 and livestock products 15.62. A single avocado tree may provide in thousands of birr for a house hold when market value is high and fruits of the tree is better in production. Dairy products are key for the livelihood of the farmers in the kebele because they buy products from market in daily to weekly basis from the income they get from livestock products. Coffee is not significant to income but it serves for home consumption for those who have the tree. Mango is not well practiced on the study area except for few farmers. The above description is keeping in mind the annual cereals like wheat, barley and bean seen as common agricultural products for main stay of the livelihoods of the farmers on the study area.KI noted that diversification of income is highly recognized by the farmers to satisfy growing demand of the family and some family members also work as daily labors in the town to support their family livelihood.

Regarding their income from the agroforestry most of the respondents does not clearly know how much it is mainly due to they use them on daily basis on one side and some of the products are seasonal so that

they are not sure of their net income but in average those who have avocado tree gained 3-4 thousand birr per annum where market price is high.

f) Contribution of agroforestry for income

As can be seen from the table below half of the respondents believe agroforestry is increasing their income by diversifying. But still some consider the involvement and productivity of agroforestry activity to income diversification of the family has been decreasing from time to time mainly because the productivity of the land is decreasing there by land is fragmented when it is re distributed to children from the central family. Some of the respondents are not clear with whether change is there or not and they hope the change is not seen significantly yet.

No.	Contribution of agroforestry to income of the family	No. of Respondents	%
1	Has been increasing significantly	16	50
2	Decreasing from time to tine	7	21.5
3	Not significant change yet	9	28.5
	Total	32	100

g) Agroforestry contribution to income diversification

Almost all the respondents replied that they clearly know the social values of agroforestry as the daily connection of the family with others depend on what they get for the agroforestry activities. Idir, Ikub and other social issues are covered mainly from what they get from their land.

h) Challenges of agroforestry

No.	Circle the problem that you consider as the most frequent challenges of agro forestry practices according to their weight	No. of Respondents	%
1	Lack of awareness	2	6.25
2	Scarcity of improved variety	2	6.25
3	Limited information on high value fruits	-	
4	Limited access in finance	8	25
5	Lack of market	11	34.75
6	Extension services	6	18.75
	Total	32	100.0

Lack of market, limited access to finance and extension services are considered to be the major challenges with34%, 25% and 18% respectively. When there is production on high ;level on seasons market value for crops is declining and farmers not granted with any financial access to involve on agroforestry and the extension service give due emphasis to permanent agriculture of cereal production on annual basis.

In relation to training most of the respondents replied they did not take specific training on agroforestry by extension workers or other government agricultural office.

V. Conclusion and Recommendation

a) Conclusions

- Agroforestry is core for income diversification and family livelihood in the study area. As the kebele is near to the town and its approaching diversification of income on small and fragmented land become must not optional.
- Next to common cereals which are produced annually avocado is the dominant tree with high value for income of the house hold when market value is better and livestock products (dairy) are vital to get income for the family to involve actively on the socio cultural aspects of the society.
- The central reason to involve in agroforestry activity is linked with meeting the ever increasing demand and need of the family thereby generating income to sustain livelihood of the family.
- Lack of market, access to finance and poor extension service were the major challenges to practice agroforestry for income diversification of house- holds.

b) Recommendations

- Extension workers must give due emphasis to agroforestry activity as it have two side advantage. While it diversifies income and increase security of livelihood on one side it has critical advantage on the ecological benefit for the area.
- Farmers need to focus on high market value products to secure their livelihood and diversify income.

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