ISSN No:-2456-2165 https://doi.org/10.5281/zenodo.14908890

Assessment of Farmers Local Knowledge on the Effect of Indigenous Agro Forestry Practice to Land Degradation Management a case Study of Chelia District, West Shoa Zone, Oromia Region, Ethiopia

Getu Dame Muleta[1]

[1]Rural Land Administration and Registration Expert, Rural Land Administration and use Lead Executive Office, Ministry of Agriculture, Ethiopia

Publication Date: 2025/02/22

Abstract: A study was conducted in chelia district westshoa zone of Oromia regional state in Ethiopia to describe farmer local knowledge on the effect of indigenous agro forestry practices to land degradation management. The objective this study was to generate the existing of local knowledge of people about the role of indigenous agroforestry effect on land degradation management. Simple random samplingand purposive sampling were used to select a total of 66 farmers (41 females and 25 males) to make an interview for data collection by preparing structured questions which consisted both open ended and closed questions. In addition some socio economic factors (wealth status, sex of household head, education status and age) of the respondents were study to see their effect on the use of indigenous agro forestry system for land degradation management in the study area and to identify the type of tree and shrubs found at the study area.In the study area majority of the respondents (>84%) use agro forestry to gain better quality organic matter while others (>81%)confirmed prevention of soil erosionso of Agroforestry land use system ,the majority of the respondents were reflected that indigenous agroforestry could be a positive contribute to soil management approach. In the study area the major tree and shrub species diversity in their dominance order were:- Acacia albida, Eculyptus,Cordia africana, Ficus and Oli africana.

Keywords: *Agroforestry, Local Knowledge Land, Land Degradation.*

How to Cite: Getu Dame Muleta (2025). Assessment of Farmers Local Knowledge on the Effect of Indigenous Agro Forestry Practice to Land Degradation Management a case Study of Chelia District, West Shoa Zone, Oromia Region, Ethiopia. *International Journal of Innovative Science and Research Technology*, 10(2), 300-311. https://doi.org/10.5281/zenodo.14908890

I. INTRODUCTION

➢ *Background*

Land degradation is the result of complex interaction among, physical, chemical, biological, socio-economic and political issues of local, national or global nature while, the scale of global process may be vast, they may be in state of dynamic equilibrium easily up set by human forces (Ghebru, 2010). Land degradation is increasing in severity and extent in many parts of the world, with more than 20% of all cultivated areas, 30% of forests and 10% of grasslands undergoing degradation (Baiet al., 2008). Millions of hectares of land per year are being degraded in all climatic regions.

Rural population in Africa is depend entirely on agriculture and the exploitation of natural resource for their livelihood and development. In Africa many countries and regional policies are recognize Agriculture as backbone of their economy (Mann, 1997). The natural resources (soil, water, forests) are the fundamental to survival and livelihood of the majority of Ethiopia in rural Area. The degradation and depletion of natural resources have led to climate change, ecological unbalance soil degradation biodiversity lose, agricultural productivity decline (Shibru Tadela & kifle Lema 1998).

The Sub-Saharan Africa (SSA) region accounts for more than 950 million people, approximately 13% of the global population. By 2050, this share is projected to increase to almost 22% or 2.1 billion. Undernourishment has been a long-standing challenge, with uneven progress across the region

ISSN No:-2456-2165 https://doi.org/10.5281/zenodo.14908890

Agriculture employs more than half of the total labor force (IMF, 2012) and within the rural population, provides a livelihood for multitudes of small-scale producers. Smallholder farms constitute approximately 80% of all farms in SSA and employ about 175 million people directly (Alliance for a Green Revolution in Africa, 2014). In many of the countries, women comprise at least half of the labor force (FAO, 2015).so the aim of this study is to assess Farmers local knowledge on the effect of Indigenous Agroforestry practice to Land degradation management.

➢ *Statement of the Problem*

Expansion of cultivation in many parts of East Africa has changed land cover to more agro-ecosystems and less cover of natural vegetation. These changes are fueled by growing demand for agricultural products that are necessary to improve food security and generate income not only for the rural poor but also for the large-scale investors in commercial farming sector(Maitima and Mugatha,2009)

The Agricultural production is mainly dependent on the maintenance and improvement of soil productivity. However, today land degradation is the main environmental problem, which directly linked with the agricultural and sustainable development.Land degradation encompasses the various forms of soil degradation, water degradation; biological (plants, animals), non-renewable resource degradation that led to lowering of the productive capacity of the land. Land degradation occurs when the economic and biological productivity of land is lost, primary through human activity. The loss of productive land obviously affects agricultural farming and rural community through agricultural production reduction, climate change, food insecurity, poverty and etc.

➢ *Significance of the Study*

The growing of human population, in the combination with the increasing pressure on land resource to fulfill their basic needs from time to time resulting land degradation. Innovative alternative solutions findings are required to ensure the sustainable development through proper land management and land use system. The different researchers recommend Agro forestry land use system to mitigate land degradation, the overall land productivity increasing and sustainable development. These study emphases to generate the local knowledge of farmers about the role of agroforestry land use system to mitigate land degradation. The study was also be proposing the alternative solutions of land management strategies in Ethiopia particularly chalia district Agricultural and rural development office.

➢ *General Objective*

To assess the farmer's local knowledge toward the effect of indigenes Agroforestry to land degradation management in Chelia district.

➢ *Specific Objective*

- To identify tree and shrubs species diversity in indigenous agro forestry land use system.
- To assess farmers perception toward the effect of indigenous Agroforestry practices to biodiversity and soil management.
- To assess farmers perception towards the effects of indigenous Agro forestry to water management.

➢ *Main Survey Questionnaires*

The main questionnaires that addressed the settled study objectives were:-

- For how long you live in this area?
- What are your land use systems?
- What type of Agro forestry system to be practice?
- What are the tree species and shrubs that growing on your farm land in Agro forestry system?
- Do you think that your Agro forestry land use system has effect on soil management?
- Do you think that your Agro forestry land use system has effect on water management?

II. LITERATURE REVIEW

➢ *Agroforestry System and Farmers Indegenous Knowledge of Land Management*

Agro forestry was traditionally practiced in many parts of tropics. Most traditional agro forestry system and its practice techniques have not yet been subject to institutional scientific experiments. However, they are well tested by local farmers often over many generations. This traditional system and species can provide strong local based frames work for future agro forestry development. Indigenous knowledge are now being regarded as an invaluable resource.

Indigenous and local communities are resident populations that identify with the original inhabitants of a region. There are at least 370 million people who define themselves as indigenous and retain social, economic, cultural, and political connections to the original populations who inhabited a country before conquest or colonization (Shawoo and Thornton, 2019). Indigenous peoples are stewards to over a 15% of the land around the world. This overlaps with 40% of terrestrial protected areas and ecologically intact landscapes (Garnett et al., 2018; Sze et al., 2022). Granting tenure rights and management of these lands with conservation value to local communities is often preferred to establishing large uninhabited vast sanctuaries.

Land degradation is a major environmental issue affecting the Sahel region of Africa (UNEP, 2012). Land degradation has negative consequences on agriculture. Unsustainable agricultural practices in turn promote land degradation (Olsson et al., 2005). With agriculture being the main economic activity in the Sahel (Suttie et al., 2005), the effects of land degradation can be significant (UNEP, 2012).

Agro forestry is a land use system in which woody perennials form apart or grown deliberately on the same piece of land as Agricultural crops and animals either in the form of a spatial arrangement or in sequence, (Dwivedi, 2001). Simple agroforestry system refers to Association

ISSN No:-2456-2165 https://doi.org/10.5281/zenodo.14908890

involving small number of components arranged with obvious usually well ordered patterns; one or a couple of trees species either as a continuous canopy in equally distant lines or edges and some annual species for ground cover, (Buck, etal, 1997). Complex Agro forestry are tree based with afforest like configuration. They associate a high number of components among trees as well as tree lets, ians, and herbs. (Buck etal, 1997).

➢ *Land Degradation*

Land degradation is one of our most pressing ecological challenges, with more than 75% of land worldwide currently impacted. These losses affect an estimated 3.2 billion people that are dependent on degraded land for food, water, and other essential ecosystem services (IPBES. 2019). Together with climate change, land degradation is undermining the livelihood of local communities, displacing populations from traditional lands, and causing rapid and widespread loss of biodiversity (Hermans and McLeman, 2021).

There are numerous reasons why local communities are wellpositioned to manage restoration efforts. Local communities often harbor intimate knowledge from thousands of years of observation, experience, and management of the land (Wehi and Lord, 2017; Robinson et al., 2021). This ecological knowledge informs restoration efforts and effective management practices.

Land degradation is process in which the value of the biophysical environment is affected by combination of human induced processes acting up on the land (Conacher, 1995). Also environmental degradation is the gradual destruction of the quality and quantity of human induced activities or animal activity and natural means like water causes soil erosion, wind and etc. (Johnson, 1997). It is considered to be an important topic in 21th centuries due to the implication land degradation has up on agronomic productivity, the environment, and its effect on food security. (Eswaran, 2001,). It is estimated that up to 40% of the world agricultural land is seriously degraded. (Lan Sample, 2007).

➢ *Role of Agro Forestry to Land Degradation Management*

Agro forestry is considered to provide a number of benefits to degraded land management that contribute to sustainable land use, which is knowledge-based procedure.

That aims at integrating the management of land, water, Biodiversity and other environmental resources to meet human needs while sustaining ecosystem services and livelihoods (world bank 2006).

In the 1980'sand 1990 is a number of hypothesis were formulated on the potential of well designed and well managed agro forestry system to control soil erosion, maintain soil organic matter, soil physical properties, promote nutrient cycling and efficient nutrient use (yourg, 1997).

➢ *Agro Forestry and Soil Management.*

This is found in both indigenous and modem Agro forestry systems. Agro forestry has contained a strong element of soil management. The earliest form of Agro forestry shifting cultivation, had objective which were primary related to soil; the use of natural tree fallow to tree store fertility lost during crop cultivation, many other agro forestry system achieved maintenance of soil fertility some the pioneering work was on soil aspects, including the first experiment on hedge row intercropping (alley cropping) at India (young, 2002).

➢ *Role of Agro Forestry to Water Management*

Converting the woodland, forest and others to exotic annual grass of crops and pasture have severely disrupted hydrologic cycle. Water infiltration can be affected by various factors like vegetative cover, which increase soil organic matter and lead to soil to be fertile and discharge ground water by infiltration (Rasiah & Alymore (1998). Connolly et al (1997) Reported that reduced leads less water stored in the soil for later use by crops and often reduces crops yields. So runoff associated with low infiltration is also the driving force for soil erosion, a serious problem for sloping lands (Free biarn et al. 1998). Agro forestry and grass buffes establish deep root system which increases the proportion of macro pores and improve the soil hydraulic properties as compared to row crop systems (Allaire-leungetal, 2000).

III. MATERIALS AND METHODS

➢ *Description of the Study Area*

- *Physical Features*

The study was conducted in the central western part of Ethiopia, west shoa zone, Chelia District. Chelia District is located at distance of 156km from Addis Abeba in the western part of Ethiopia on the main road of Addis Abeba to wollega . The woreda consists of three ecological zones: Dega (37%), woinedega (45%), Kola (17%)and the elevation of the woreda ranges from 1380-3194 masl. The annual average temperature is characterizing 16-31^{0}c and the annual average rain fall recorded is 800-1100mm.The soil characteristic that commonly found in the area in their dominance order red soil (48%). Black soil (27%), and clay loam soil (25%).(chelia district Agricultural office ,2023).

- *Socio-Economic Features*

The woreda consists about 28 rural kebeles and 4 urban Kebeles, which are totally 32 kebeles administrated. The human population of the woreda is estimated to be 200645 which consist of 2341 house Holds heads. According to the gender categories, the population density in the woreda is 100122 males and the 100523 is females.The area coverage of the woreda is approximately 78,888 hectares according to the woreda Agricultural and rural development office, data basis (2024).

ISSN No:-2456-2165 https://doi.org/10.5281/zenodo.14908890

Table 1 Land use System

No	Land use type	Area coverage (ha)	Percentage %
1	Farming land	54,920	69.61
2	Grazing land	9750	12
3	Forest and Bush land	4118	5.2
4	Rocky Area	645	0.8
5	Settlement Area	6350	8.4
6	Other land	3105	3.9
	Total.	78,888	99.9

➢ *Research Design*

To generate the farmers' local knowledge on the effect of indigenous Agroforestry to land degradation management. The research study was employed as quantitative & qualitative or mixed data collection approaches. The study was carried out by using structured questionnaires, which consist both closed and open-ended questions

➢ *Sampling Techniques*

With regarding to the sampling techniques, within the woreda of total kebeles, four (4) kebeless were selected as representative sample for present study. Within selected samples s kebeles 12% of the total households head those having farm lands were selected for primary data collection by using structured questionnaires.

The Rrepresentative Samples of house hold heads (respondent) were consisted both gender categories (females and males) in their equal proportional. The representative sample for four kebeles of the respondents (households heads) have been selected by using simple random sampling procedure.

➢ *Data Collection*

The survey data have been collected from both secondary and primary sources. The secondary data were collected from the woreda Agricultural and rural development offices, kebele Agricultural and rural development center, and kebele administrative bodies. The secondary data at kebele level were collected the lists of households in the gender categories, farming system, extensions service, input supply and utilization.

The primary data were collected from the selected representative household heads (respondents) samples by using structured questioner and interview. In addition to primary and secondary data, some of data were taken by direct field observation during the study period, which helped us to understand the respondent's attitude and inventory of trees and shrubs species commonly growing on farmland in indigenous Agro forestry system in the study area.

➢ *Data Analysis*

The collected primary qualitative data from the respondents were organized and synthesized in sentences or phrases based on the nature of structured question. Summarized data results were displayed in tabulation form. Finally, the organized primary data were analyzed by using descriptive statistical method and the result was expressed in table and charts (%).

IV. RESULT AND DISCUSSION

➢ *Age Structure of Respondents*

Data obtained from respondents show that most of the farmers were within 46 – 65 age groups and have more knowledge about indigenous agroforestry system on management of land degradation than the farmers within 25 – 45 and 66 – 86. Farmers within 25-45 and66-86 age ranges have more knowledge about it on the management of land degradation than the farmers with greater than 86 age groups. So majority of my respondents age was from 46-65 because this group expected to be more active and experienced than those above 65 and below 46.

Table 2 Age Structure of Respondents for Questionaries'

Age group	No of respondents	Percentages
25 – 45	36	28.25
46 – 65	43	65.5
66 – 86	4	6.25
Total	64	100%

➢ *Socio Economic Information of Respondents*

The results from the survey area indicated that 21.875 percent are female and 78.125 are male farmers using Agro forestry systems and have knowledge on the effect of Indigenous agro forestry.

Table 3 Socio Economic Information of Respondents

Personal information	Option	No of respondent	Percentage
Sex	Female	34	21.875
	Male	32	78.125
	Total	66	100%

ISSN No:-2456-2165 https://doi.org/10.5281/zenodo.14908890

Marital status	Married	47	78.125
	Single	11	6.25
	Divorced	5	9.375
	Widowed	3	6.25
	Total	66	100%
Wealth stats	Rich	18	15.625
	Medium	32	46.875
	Poor	16	37.5
Educational level	Primary education (1-4)	6	25
	Primary education(5-8)	41	37.5
	Secondary education (9 – 12)	15	12.5
	Illiterate (unable to read and write)	4	25

- *Family Size of the Respondents*

Table 4 Family Size of the Respondents

Family size	Number of farmers	Percentages
2-4	3	9.375
5-7	32	43.75
8-10	24	25
11-13	7	21.875

Table 5 Land Holding Size of Respondents

Land in hectare	Number of Farmers	Percentage
1 - 2	13	19.69
2– 3	32	48.48
3 – 4	5	7.57
4–5	5	7.57
5-6	3	4.55
6-7	2	3.03
>7	5	7.5

According to the above table majority of the farmers (48.48%) have2-3 hectares of land and they have the knowledge of land degradation and impact of agroforestry to restore degraded land.

➢ *Years of Domicile of Respondents*

Respondents were asked as to how long they have stayed within the woreda to know they can give each question correctly accordingly .as it helped to determine the level of familiarity and knowledge role of agroforestry in land degradation management.

Table 6 How long you live in this area

S. No	Time in year	Number	Percentage
1	Less than 5 year	1	1.5
	5-10	8	12.12
3	10-25	45	68.18
4	>25 year	12	18.18

Therefore , one can understand from the above chart that majority of the respondents lived in the study area for (10-25) years. This indicates that they are indigenous of the community which also implies that they were born, grown up and lived there as residents of the community.

The researcher has also conducted a focused group discussion with community elders. In consequence, (76%) of selected key informants have lived in the area for more than 45 and above years, while the rest lived there from 30 - 45 years.

ISSN No:-2456-2165 https://doi.org/10.5281/zenodo.14908890

➢ *Agricultural Practices in Study Area*

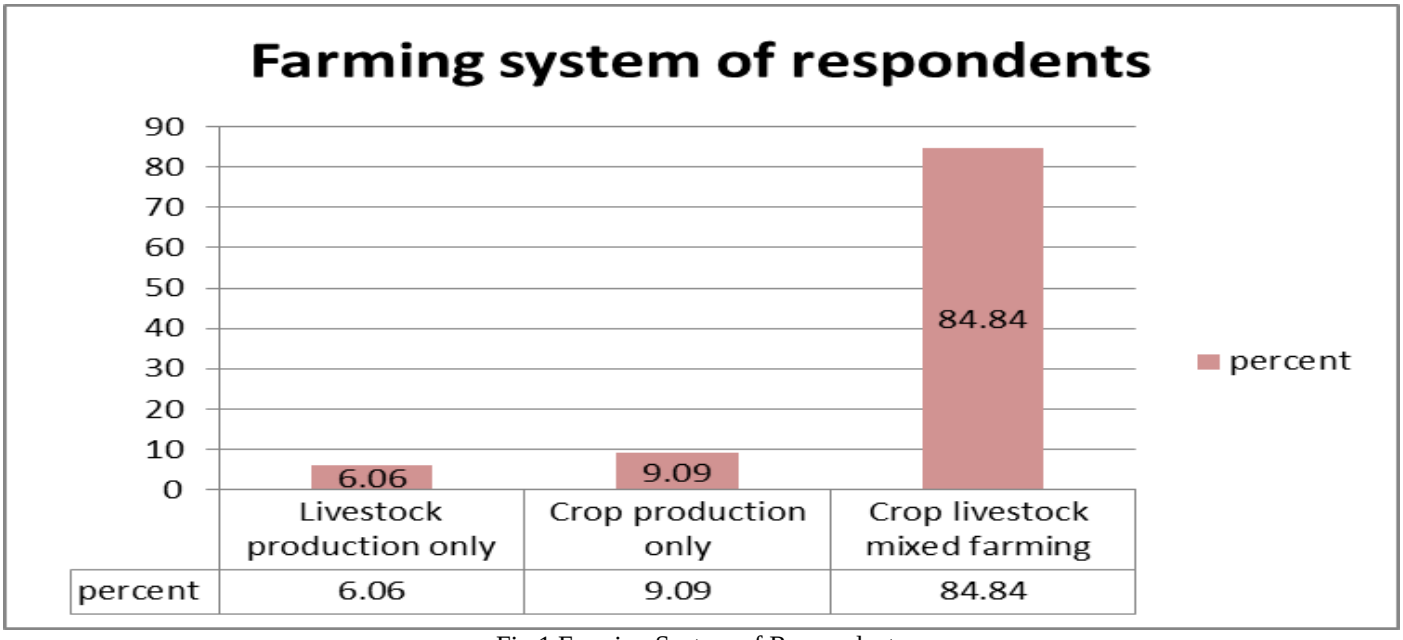

Fig 1 Farming System of Respondents

The common farming system in the study area as my survey indicated was mixed farming system which accounts 84.84% and crop production and livestock production were covers 9.09% and 6.06% respectively so that reduce land degradation and and maintain productivity. According to Maitima (2014) Farmers' who combine livestock rearing with cropping, use livestock manure to replenish soil nutrients in their farms and are thus able to maintain higher productivity.

- *Field Crops*

The major field crops grown in the study area were Teff, wheat, maize, sorghum and enset. as described in the following table with their respective dominance.

Table 7 Type of Field Crop at the Study Area

S. No	Type of crop	No of farmers	Percentages (%)
1	Teff	60	90.90
2	Wheat	40	60.60
3	Maize	30	45.45
4	Sorghum	19	28.78
5	Chick pea	16	24.24
6	Barley	12	18.18

N.B Each Respondent was cultivated Up to 4 different crops.

As the above table shows Teff was the dominant field crop practiced at the study area with the respective percentages of 90.90.

- *Vegetable Crops*

The common vegetable crops practiced at the study area are tomato, onions and cabbages in their dominance order respectively.

Table 8 Type of Vegetable Grown at the Study Area

S. No	Type of Vegetable	No of Farmers Ended	Percent
1	Tomato	20	30.30
2	Onions	45	68.18
3	Cabbage	14	21.21
4	potato	14	21.21

ISSN No:-2456-2165 https://doi.org/10.5281/zenodo.14908890

Each farmers cultivated upto 2 vegetable crops where majority onions (68.18%)

- *Type of Agricultural Inputs*

The inputs used for the agriculture in our study area were both artificial and natural (compost) fertilizers.

Table 9 The main Agricultural inputs used by the Respondents at the Study Area

S. No	Items	No of respondents	Percentages
1	DAP	60	90.9
2	UREA	60	90.90
3	Compost	45	68.18
4	Other	-	-

Majority of the farmers in chelia district used highly artificial fertilizer like DAP and UREA which covers 90.9% (each of the fertilizers). and 68.18 % of our respondents use compost as price of arteficial fertilizers increase if they know how to prepare compost at their area.

Table 10 The main Problems to use Agricultural Inputs

S. No	Main Problem	No of Respondents	Percentages (%)
1	High cost for artificial fertilizers	60	90.90
2	On time availability of fertilizer	60	90.90
3	Short term service of artificial fertilizer	5	7.57
4	Shortage of skill in preparing compost	5	7.57

NB- Each respondents were have greater than two problem of agricultural input.

As survey indicated Most of the farmers responded that the main problem of using agricultural input is highly increasing of the cost of artificial fertilizers from time to time. According to the above table 87.5% of the respondents said fertilizer cost is the main problem of using agricultural inputs.

- *Common Problems in the Study Area*

Table 11 Main Problem to be Faced Agricultural Production according to Field Survey

S. No	Items	No of respondents	Percentages (%)
1	Cost of fertilizer	60	90.90
2	Shortage of improved seed	60	90.90
3	Land degradation	20	30.3
4	Size of farmland	20	30.3
5	Climate change	10	15.15

NB- Each respondents have faced greater than two agricultural problem.

The majority of the farmers in the study area (90.90%) and (90.90 %) have the problem of cost of fertilizer and shortage of improved seed respectively.

➢ *Presence of Land Degradation*

As a result of our field survey indicated on almost the entire farmer's farm land there is land degradation.

Table 12 Survey Result on Current and Previous Land Degradation and from Our Respondents.

S. No	Items	Response	No of respondents	Percentages (%)
1	Is there land degradation on your farm land	Yes	63	95.45
		No	3	4.5
2	Land degradation is severe now than before (previous)	Yes	45	68.18
		No	21	31.8
3	Land degradation is severe in previous than now	Yes	21	2531.8
		No	45	68.18

ISSN No:-2456-2165 https://doi.org/10.5281/zenodo.14908890

The majority of respondents (> 95% confirmed as there is land degradation on their farm land and the majority (≥ 68.18%)were indicated that the land degradation problem is increasing from time to time as compared to the previous time in line to this Wassie (2020) came with different land use types had been converted to agricultural lands in various places of the world since time immemorial .Clearing of the forest has happened in Ethiopia since the earliest time and even become more intense within the past 30 years in the name of investors. Unregulated commercial land resources exploitation by the investors is causing huge forest destruction, land degradation, and disruption of wildlife resources.

➢ *Trees and Shrubs Diversity in the Study Area*

There were a number of trees and shrubs found in the study area of the dominant tree species are listed below.

Table 13 Trees shrubs in the study area.

S. No	Local name of trees (Afaan Oromo)	Scientific Name	No of farmers	Percentages (%)
1	Laaftoo	*Acacia albido*	60	90.09
2	Baargamoo	*Eucalyptus*	60	90.09
3	Waddeessa	*Cordial africana*	45	68.18
4	Qilxuu	*Ficus*	40	60.6
5	Ejersa	*Olia africana*	11	16.6
6	Gaattiraa	*Juniper usprocure*	8	12.12
7	Bakkanniisa	*Crotomacro stachyus*	6	9
8	Ceekaa	*Celtis africana*	6	9
9	Birbirsa	*Podocurpus*	4	16
10	Emala	*Albizagranda*	4	6

N.B. Individual respondent's was growing retained more than five (5) tree and shrub species.

In the study area majority of the respondents were grown *Acacia albadia* (90.9%) for soil fertility enhancement,soil conservation purpose ,fire wood,charcool and shading purpose while *eucalypts cmaldulenals* was (90%)was also grown by majority of the respondents because it is used for fire wood, charcoal timber ,poles and shading .

Cordia africana, Ficus vasta and Olia africana were retained by medium number of respondents (68 %),(60%) and (16%)respectively. The main purpose for growing or retaining this trees are for the purpose of firewood, timber and utensils where other like *Junipures procera,Croton macrostachyus and Podocurpus* are grown for different purpose.

➢ *Land use System*

The usual crop farming system of the household, heads of the study area is given in the following table.

Table 14 Land use System of the Respondents.

S. No	Land use System	No of Respondents	%
1	Agro forestry	54	81.81
2	Crop rotation	45	68.18
3	Inter cropping	46	69.69
4	Mono cropping	10	15.15
Total		34	

N.B. each respondents was participated Up to 3 land use system

In the study area majority (>81%) of the house hold head were used their farm in agro forestry land use system. The reasons of farmers prefers agro forestry land use systems for diversity output, Land management, production risk minimization and sustainable development.similarly According to Nilson(2024),Agroforestry is a land use management system in which trees or shrubs are grown around or among crops or pastureland. This integration of agriculture and forestry has numerous ecological and economic benefits, including soil conservation, improved fertility, and enhanced biodiversity.

➢ *Types of Agro Forestry Practices*

The type of Agro forestry that was practiced in our study area was traditional agro forestry, home garden agro forestry and boundary plantation agro forestry.

ISSN No:-2456-2165 https://doi.org/10.5281/zenodo.14908890

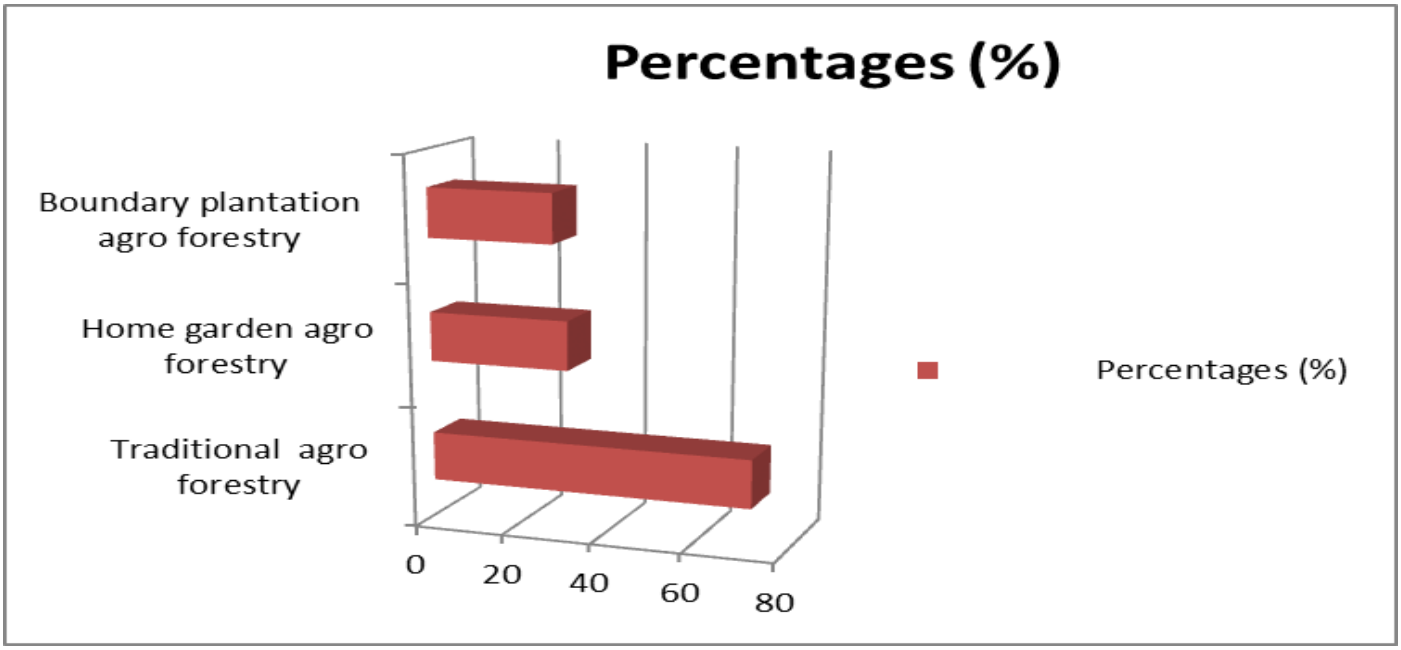

Fig 2 Bar Chart 1 Typeof Agro Forestry in Our Study Area.

N.B. individual respondent was mention > two AF system.

In the study area the majority of farmers are commonly practiced traditional agro forestry system (71.87%), Home garden (31.25%) and boundary plantation soil fertility and productivity by nutrient cycling used for SWC. It means agro forestry (traditional) Play a role in water and soil management.

In line to this Research Ethiopia,south west ethiopian Region in Dawuro Zone support my research Asit says , Traditional agro-forestry practices have the key role in sustaining land management activities. The traditional agro-forestry practices of home garden have great contribution in house-hold income, preventing land degradation, building materials, traditional medicine, and cultural, recreational and ecological value. Women have increasing the fertility of soil by depositing and felling down domesticated animals waste in their home garden and farmland(Gebre and Legesse,2020).

➢ *Trees and Shrubs Commonly used in Agro Forestry*

There were many trees used as agro forestry in the farm land in our study area, among the most dominant the listed ones were commonly practiced as indicated in the table.

Table 15 Trees and Shrubs Commonly Grown in the Agro Forestry System in Our Study Area

S. No	Local name of trees (Afan Oromo)	Scientific name of trees	No of farmers	Percentages (%)
1	Laaftoo	*Acacia albedo*	53	80.3
2	Waddeessa	*Cordial Africana*	50	75.75
3	Qilxuu	*Ficus vasta*	13	19.69
4	Ejersa	*Olia Africana*	11	16.66
5	Bakkanniisa	*Croto macro stachyus*	9	13.63
6	Ceekaa	*Celtis Africana*	9	13.63
7	himalaa	*Albiza grando bractata*	5	7.57

N.B each respondent had up to three trees on his/her farm land.

In the study area the common tree species that growing in farm land in agro forestry system are *acacia albido and cardia Africana* in their dominance order of 80.3%, and 75.75% respectively. And they use these trees for fuel wood ,soil fertility management , charcoal, poles and etc.

➢ *Reasons to Planting or Retaining Tree Shrubs on Farm Land*

As the field survey and response of respondents indicated the reason why farmers use plants (trees and shrubs on the farm land was listed in the table below.

ISSN No:-2456-2165 https://doi.org/10.5281/zenodo.14908890

Table 16 Reasons of Retaining Trees on Farm Land

S. No	Items	No of respondents	Percentages
1	Fuel wood	63	95.45
2	Fencing material	60	90.90
3	Construction material	50	75.75
4	Shading	43	65.15
5	Land degradation mgt	63	95.45
6	Income generation	25	37.87

In the study area majority (95.45%) of the house hold head were retaining tree or farm land for the purpose of Land management and uel wood while (75.75%) of the respondents use the retained and grown tree on farmland for fencing shading and others.

- *Role of Agro Forestry to Land Degradation Management*

- *Role of Agro Forestry to Water Management*

Table 17 Field survey on the role of indigenous agro forestry on water management.

S. No	Items	No of respondents	Percentages
1	By increasing infiltration	55	83.5
2	by reducing evaporation	54	81.8
3	By erosion control	48	72.72

The result showed that 83.5% and 81.8% of the respondents know the role of agro forestry to water management by increasing infiltration and decreasing evaporation respectively. But 72.72% of the community responded agro forestry have role in erosion control and in line to this Allaire (2000) said agro forestry plays great role increases macrospores and it increase infiltration which reduces erosion. According to wolde(2020), Ecologically,Agro forestry helps rehabilitate and preserve the environment through soil and water conservation in sloping lands. Tree roots hold the soil together thus minimizing erosion and eventually the occurrence of floods during rainy season. Tree canopies also help to conserve the soil from the erosive impact of raindrops. It does not only intercept large amount of rainfall but also large amount of incoming radiation depending on the percent of canopy coverage, leaf structure and crown stratification. The leaf litter and humus built up under the tree stands control flow of water and allow them to percolate into the soil.

- *Role of Agro Forestry to Soil Management*

As our survey results and our respondents implies the indigenous agro – forestry system were used for soil management through the listed items.

Table 18 Role of Agro Forestry to Soil Management

S. No	Items	No of respondents	Percentages (%)
1	By providing better quality organic matter	56	84.84
2	Through prevention of soil erosion	54	81.81
3	By preventing frequent biomass decomposition	45	68.18
4	Through nutrient cycling	34	51.51
5	By using wind break and shelter belts	23	34.34

N.B. Individual respondents was mentioned 2-4different role of agroforestry to soil management.

In the study area majority of the respondents (>84%) use agro forestry to gain better quality organic matter while others (>81%) of the respondents uses indigenous agro forestry for prevention of soil erosion.

Inline to my result wolde(2015) states the following Maintenance or increase of soil organic matter through carbon fixation in photosynthesis and its transfer via litter and root decay Nitrogen fixation by some leguminous and a few non leguminous trees Nutrient uptake: the taking up of nutrients released by rock weathering in deeper layers of the soil Atmospheric input: the provision by trees of favourable conditions for input of nutrients by rainfall and dust, including via throughfall and stemflow. Exudation of growth-promoting substances by the rhizosphere. Processes that reduce losses from the soil: protection from erosion and thereby from loss of organic matter and nutrients Nutrient retrieval: trapping and recycling nutrients which would otherwise be lost by leaching including through the action of mycorrhizal systems associated with tree roots and through root exudation. Reduction of the rate of organic matter decomposition by shading. Processes that affect soil physical conditions: Maintenance or improvement of soil physical properties (structure, porosity, moisture retention capacity and permeability) through a combination of maintenance of organic matter and effects of roots Breaking up of compact or indurated layers by roots Modification of extremes of soil temperature through a combination of shading by canopy and litter cover Processes which affect soil chemical conditions: Reduction of acidity, through addition of bases in tree litter Reduction of salinity or

ISSN No:-2456-2165 https://doi.org/10.5281/zenodo.14908890

sodicity. Soil biological processes and effects: Production of a range of different qualities of plant litter through supply of a mixture of woody and herbaceous material, including root residues Timing of nutrient release: the potential to control litter decay through selection of tree species and management of pruning and thereby to synchronize nutrient release from litter decay with requirements of plants for nutrient uptake Effects upon soil fauna Transfer of assimilate between root systems.

V. CONCLUSION AND RECOMMENDATION

A. Conclusion

Agoforestry is a collective name of land use system in which woody perennials (trees, shrubs, bamboos) are deliberately grown or retain on the same land unit management with integrating agricultural crops and/ or animals ether in the form of spatial or sequential arrangement. While, land degradation is the process of land productivity reduction. Land degradation encompasses the various forms of soil degradation, water degradation, biological degradation and physical degradation that led to lowering of the productive capacity of the land.

In the study area the majority of household heads were commonly practiced the scattered tree and shrubs on farmlands (traditional agroforestry land – use system). The majority of tree and shrub species that farmers grown or retained on their form lands in their dominance order are *Acacia albaiola, Eculyptus* species, *Cordia* Africana, *,.Ficus vasta and* Olea Africana. The main reasons for this tree and shrubs species grown or retain on farm land were for fuel wood, fencing materials, construction materials, soil management and shading purposes.

The study result shows that the majority (>84%) of respondents were indicated the existing of tree and shrub species on farm lands have a positive contribute to soil management by means of soil conservation, organic matter addition by litters or biomass nutrient cycling and biological nitrogen fixation through passing decomposition and mineralization. Similarity, the majority (>83.5%) of the respondents were noted that indigenous agroforestry has a positive contribution to soil water management through physical barriers and cover approach, that led to increasing infiltration rate, reducing evaporation and moisture retention.

B. Recommendation

I recommended or suggest some of solution that could be contribute to improve the land degradation problem in the study area as follows.

The government should be give more attention to scaling up agroforestry development to promote ecological sound and sustainable land productivity.

The government sectors particularly, Woreda agricultural and rural development office should be trained farmers to use multipurpose tree or shrub species in agroforestry system rather than *Eucliypus* tree species used. i.e. *Euclyptus* tree species are not recommendable to agroferestry system because due to it fast growing species it more compete water and nutrient to the understory plants.

The Woreda agricultural and rural development office should be provide the multipurpose tree and shrub species of seedlings to farmers and initiating Land- users to planting seedling in agroforestry land use system.

Finally, this research finding is not the end, further study will also need to generate local knowledge of farmers on the effect of agroforestry to land degradation management and the management of agroforestry practices with related to land degradation management.

ACKNOWLEDGMENT

First of all I would like to express gratitude to my wife W/ro **Workinesh Adare Hatau** to care for all my children's and all responsibility at home while I am collecting and analyzing my data on farmer local knowledge on the effect of indigenous agro forestry practices to land degradation management. Next I would like to appreciate my respondents for giving me each and every answer for my questionnaires'. I also thank Chelia District agricultural office because they give me all secondary data related to my study.

LIST OF ABBREVIATION

- AF- Agroforestry
- ARDO –Agricultural and Rural development office
- DA- development agent
- DAP- Di ammonium Phosphate
- HA- Hectares
- HH-House Hold
- AF-Agroforestry

REFERENCES

[1]. Alleire leung S.E, Gupta SC (2000) .Water and solute movement soil as influenced by macrop ores characters.
[2]. Buck, Lussie& fermands (1997). Agro forestry in sustainable agricultural system London &Network.
[3]. Conacher, Teante (1995). Rural land degradation in Australia
[4]. Conolly RD, freebairn DM, (1997). Change in infiltration in characteristics association with cultivation history in southern queens of land.
[5]. Dwivedi, (2002). Agro forestry principles and practices oxford and IBH, New delhi.
[6]. Enetal,1997 as cited in young A.(2002).agro forestry for soil management,CAB, international university east Anglia
[7]. Eswaran H.R lal & P.F Reich (2001). Land degradation in new delhi. reebairn Dm, Woekner GH, (2000) Effects of catchement management on runoff.
[8]. 1Johnson D.L.SH, Ambrose (1997): meaning of environmental terms.

ISSN No:-2456-2165 https://doi.org/10.5281/zenodo.14908890

[9]. Gezahegn Gebre , Abiyot Legese , Senbetie Toma and Mathewos Agize(2020)The Role of Traditional Agro Forestry Practices for Sustainable Land Management in Maraka District of Dawuro Zone, Southern Ethiopia
[10]. Rasiah & Alymore LAG (1997). The Topology Of Pore Structure In Cracking Clay Soil.
[11]. Singh pathak and Roy, (1994). Agro forestry for soil management CAB& sustainable land use USA, Delhi).
[12]. Wojktokowski (1999). Theory and practice, of Agro forestry design Ink. USA.
[13]. Suttie, J.M., Reynolds, S.G., Batello, C. (Eds.). 2005. Grasslands of the world. Plant Production and Protection Series, No. 34. Food and Agriculture Organization of the United Nations (FAO). Rome.
[14]. Tephen DosoJnr(2014) Land degradation and agriculture in the Sahel of Africa: causes, impacts and recommendations
[15]. UNEP 2012, Sahel Atlas of Changing Landscapes: Tracing trends and variations in vegetation cover and soil condition. United Nations Environment Programme. Nairobi.
[16]. Wassie, S. B. (2020). Natural resource degradation tendencies in Ethiopia: A review. *Environmental Systems Research*, *9*(1),1-29.
[17]. Wudu Abiye (2019). Review on Impacts of Land Degradation on Agricultural Production in Ethiopia
[18]. Young (2002). Agro forestry for soil management, CAB, International university of East Anglia.