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Causes and Consequences of Deforestation in Essera District, Dawro Zone South-Western Ethiopia

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Abstract
Deforestation is disturbing the strength and distribution of forests. The study was conducted to identify the causes of deforestation and its consequences on communities of Essera district. The cross-sectional survey design with the application of both qualitative and quantitative approaches was employed. A multistage sampling design was applied, which means combining different approaches like purposive, stratified, and simple random sampling procedures to select the study area and sample households. The result was obtained from both secondary and primary sources of data focusing on both qualitative and quantitative natures. A huge amount (48) 80% of respondents prepare the land by slash and burn, 13.33% or 8 of the respondents prepare the land by ecological farming whereas 4 of the respondents prepare the land by tillage. The farming ways usually affect the size of the land on which one undertakes his or her activities. Firewood collection was the major destructive activity, because, the local people depend on the natural forest as a source of fuel energy for household consumption and sale. In addition, the discussants bitterly objected to the destined robbery of the forest timber products as destructive activity. Some farmers organized at the micro level to acquire lands for the cultivation of cash crops such as chat, sesame, and eucalyptus trees. Firewood collection and preparation of land by burning contributes highly to deforestation. Integrated activities like financial support for scientific aid and serious planning data to state and local governments from agencies responsible for climate, weather, and risk mitigation are recommended.
Keywords: Deforestation, degradation, Essera, forest

Introduction
According to FAO (2010), the livelihood of most rural people in developing countries is strongly linked to natural resources like a forest. Currently, problems related to environmental and climate changes like land degradation, deforestation, over-extraction of both renewable and nonrenewable natural resources are controversial issues throughout the globe particularly in LDCs since the lives of the people, directly and indirectly, depend on the existence of these resources (Bedru, 2007 & FAO, 2010). Terefe (2003) pointed out that the major factor to exacerbate such severe problems are a high rate of population pressure with a low

rate of economic growth and low level of technological improvement, and increased consumption of nonrenewable natural resources. Moreover, the rural poor who have not accumulated wealth are unable to build reserve assets from the utilization of these resources in order to tackle problems in hard times (Tola, 2005). He further explained that rather depletion has continued and the remaining resources especially those endemic species both fauna and flora are in an endangered position. In addition to human factors, the topography is also another factor in land degradation and forest depletion i.e. highland areas are more vulnerable than the lowland areas (Gebremedhin, 2004).

In Ethiopia renewable natural resource degradation has become the most serious and acute problem. During the second half of the 20th century, the country experienced severe deforestation and degradation (UNDP, 2012). According to Winberg (2010), between 1955 and 1979, over 77 % of the country's forested area disappeared and it continues to lose 8 % of its remaining forests annually. Her study clearly stated that natural forests and woodlands covered in Ethiopia were around 15.1 million ha in 1990 however, due to different factors the forest area declined to 13.7 million ha after ten years in 2000. Another study revealed that in 2005, the forest cover had further declined and was estimated to cover 13.0 million ha (FAO, 2010 cited in Million, 2011). These statistics showed that Ethiopia lost over 2 million ha of her forests, with an annual average loss of 140,000 ha in fifteen years. According to the same reference data indicated currently, the area is estimated at 12.3 million ha, with 11.9 % of the total land area. The study concludes that the remaining closed natural high forests are 4.12 million ha or 3.37% of land area. In Ethiopia, the fast-growing population that has led to an increasing need for farmland, wood for construction, unsustainable harvest for timber and fuelwood extraction, high urbanization rate, road construction, and overgrazing are taken as the major causes of environmental degradation and forest depletion (Tola, 2005 & UNDP, 2012). Obviously, the country has an agrarian economy with 83% of the population living in rural areas, concentrated in the highlands, and depending on subsistence agriculture (MoFED, 2013). According to him the need to provide for an increasing population combined with other social, economic, and political factors has resulted in an ever-increasing expansion of the agricultural frontier and hence, subsequent deforestation and land degradation. In line with this, some writers estimated that within a year about 80,000 ha of natural high forests are changed to farmland for subsistence agriculture; about 50,000ha of acacia woodlands are deforested for charcoal production and for state farm expansion, and about 30,000 ha of woodland, thickets and bush are cut for fuelwood in the country (UNDP/ World Bank, 1988 cited in Tola, 2005). Moreover, this study advocated that wildfire, land tenure insecurity, various inappropriate conservation approaches, lack of integration between new innovative approaches and indigenous knowledge, and lack of awareness are considered as the contributing factors to deforestation. Imagine how much forest is cleared every year due to human factors like deforestation and

soil degradation; these big problems become a key factor challenging food security, community sustainable livelihood, and sustainable development at large in the country (PASDEP, 2006).

Since the mid-1970s the management of forest resources in Ethiopia was mainly carried out as state and community forestry programs. These non-participatory approaches failed to reduce tree felling and clearing, especially in Protected National Forest Priority Areas (FARM Africa, 2000). Further, this problem was beyond the control of the state therefore, the ultimate solution to this severe problem will be encouraging local people to manage and conserve their resources since they live with forests and they are primary users of forest products (FAO, 2010). According to Yemiru (2011), in Ethiopia, there is a growing understanding that deforestation and land degradation will further exacerbate poverty, which brings natural resource conservation to the forefront of rural development initiatives. Terefe (2003) on his side stated that community participation is very crucial, to overcoming the rate of deforestation. The causes of deforestation are varied but may broadly be categorized into anthropogenic and natural factors. The anthropogenic factors, increased wood fuel collection, clearing of forests for agriculture, illegal and poorly regulated timber extraction, social and environmental conflicts, increasing urbanization, and industrialization are the primary known causes of the loss of forests and woodlands (FAO, 2002). For the natural factors, the impacts of drought and natural forest fires have been highlighted in the cases of Australia and Ghana (FAO, 2010, Insaidoo et al, 2012).

Deforestation has also been noted to contribute tremendously to long-term environmental consequences like global warming, biodiversity loss, and soil degradation (Mahapatra and Kant, 2003, p.2) as well as increased poverty in forest fringe communities. Based on this analysis, deforestation posits a challenge for the practice of sustainable forest management, which focuses on balancing environmental benefits and the development of livelihoods for the rural poor so that deforestation can be avoided in the long term. It is in the light of this, that the current research focused on assessing the causes and consequences of deforestation in Dawuro zone Essera district, Ethiopia. The study applied empirically using a mixed research strategy towards the collection, analysis, and presentation of findings.

Problem Statement

Many forest-dependent people employ a diversity of means to help meet basic needs: food and cash crop production, forest and tree product gathering, and income-earning enterprises both on and off the farm. Often, the poorer the household, the more diverse the sources of their livelihood, as the needs for the year must be made up from various off-farm as well as on-farm natural resources, and often from migrant laboring as well (Shepherd *et al.*, 1999 in Tropenbos International, 2005).

Deforestation rates remain high and will probably increase in the coming years as the population grows and demand for new settlements, wood for construction, fuelwood, charcoal, and food increases as a consequence (Amisah et al., 2009). This study was conducted to assess the causes of deforestation and its consequences

on communities of Essera district. The main objective of this study was to examine the causes and consequences of deforestation in Essera district Dawuro zone, South-Western Ethiopia. This study aimed to: **1)** identify the extent of deforestation and its main causes in the Essera district, 2) examine how deforestation has affected the livelihood patterns in the study area and 3) assess how the people have been adapting to the effects of deforestation.

Scope and limitation of the study

Since it is not possible to cover the whole aspects of the study area with the available time and resources, it is advisable to limit the study size and scope of the problem to a manageable size. Hence, the study focused on the representative sites of the Essera district. The study was conducted in the Essera district of the Dawuro zone and it depended only on the causes and consequences of deforestation. Due to less understanding of the community about the study, small challenges were faced during the interview since the study highly focused on farmers near the forest. These farmers fear demarcating forests because there is a dispute in boundaries; so they might not be open enough to give clear information and less accessibility to transportation and the internet.

Material and methods

Description of the Study Area

The study was conducted in the *Essera woreda* of Dawro zone, southwestern Ethiopia. According to the 2007 population and housing census population of the district had an estimated population of 82,218 of which 41,762 were male and 40,456 females. The district has 29 *kebeles*. The annual mean temperature ranges from 15.1 to 27.5^{o}c. The rainfall was a bimodal type, the short rainy season was between (February to March) and the long was between (May to September). The average annual rainfall ranges from 1201 to 1800mm. According to the land utilization data of the area, 38.4% is cultivated land, 13.39% is grazing land, 16.81% is forest bushes and shrubland, 17.09 % is cultivable and 14.31 is covered by others. The livestock resource of the woreda was estimated to be 313,094 cattle, 113,554 sheep, 45,703 goats, 7,081 horses, 1,934 mules, 5,064 donkeys, and 157,996 chickens and 28,557 traditional hives Central Statistics Agency (CSA, 2006).

Research design

The cross-sectional survey designs with the application of both qualitative and quantitative approaches were employed. The study involved multistage sampling, i.e. a combination of purposive, stratified, and simple random sampling procedures to select the study area and sample households.

The strategy used to identify the study area and sampling procedures involved the following steps. First, the Essera was purposefully selected because; in this woreda, there is huge forest cover and strong deforestation

activities are being undergone. After this, the sampling frame population or list of the population in sample kebele and the sample size in the study communities of HHs were determined. To draw the sampled households, the households in the study area was stratified into the different agro-ecological zone which was kola, dega, and woyna dega based on the altitude because of different forest cover, rate of deforestation, and attitude of the community towards forest conservation in the different agro-ecological zone.

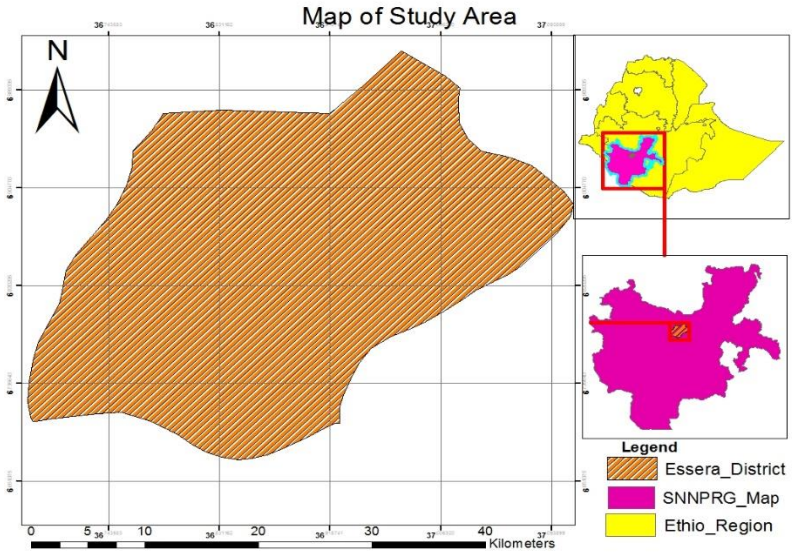

Figure 1. Map of Essera District

ii. Sample size

Sampling enables the researcher to study a relatively small number of units in place of the target population and to obtain data that are representative of the whole target population. In most cases, however, researchers opt for an incomplete coverage and study only a proportion of the population with homogenous properties, a sample. To make the sample representative of the study population, the sampling procedure was guided by a number of factors. Complete coverage of the population (universe) was not possible due to limitations like time, money, the width of the study area, and population. In this case, sampling serves the practical purpose of making possible the study of problems that otherwise could not be undertaken due to the prohibition of cost, time, personnel, or scope.

The sample size determination formula enabled the researcher to decide on sample size based on, which is given the care to have the sample size of the study to be as representative as possible in accordance with the time and budget billed. Having this into consideration, out of total households in the identified kebeles, the following formula adapted from Israel (1992) was used.

n=N/1+N (e) 2 where; N= the total population that had been studied

n= the required sample size

e= the precision level which is = (±5%) Precision Levels

Where Confidence Level is 95%. The number of respondents was determined after the total population of sample kebeles known during data collection from three kebeles.

Data Sources and Collection

To obtain relevant information concerning the topic under investigation, both secondary and primary sources of data focusing on both qualitative and quantitative natures were used.

a. Secondary sources: The secondary sources of information including, research journals and articles, internet sources, different agriculture and rural development office reports, and document reviewed at different levels of government organizations was used.

b. Primary sources: the primary sources of the thematic issues were focused on sample farmers in the Essera district.

To collect reliable data, the field study combined Key Informant Interviews (KIIs), Focus Group Discussions (FGDs), Household Surveys, Direct Observations, Transect Walks, and case stories.

Data collection tools

The main data collection tools, which were used to investigate the required data, are FGDs and KIIs guide, observation checklist, and Structured and semi-structured interview schedules.

a. Key Informant Interviews (KII)

In this study, for persons who have in-depth knowledge about the topic under investigation, key informant interviews became crucial and it was conducted with different individuals at different levels. At the kebele level, individual interviews with two people, one KA chairperson, one kebele manager, and three development agents. Further, at the Woreda level, mainly one Agricultural and Rural Development Office was interviewed.

b. Focus Group Discussions (FGDs)

Two focus group discussions were carried out within the study area, one at kebele and the other at Woreda level teams. Each group involved individuals. The discussions focused on different causes and consequences of deforestation.

c. Field Observations and Photographs

During field surveys, three transect walks down the watershed were carried out with the guidance of the Kebele chairperson and voluntary farmers, an enumerator, development agents (DAs), and the researcher. In so doing, the researcher took notes on specific observations in advance. During the observation period, information was also gathered from different members of the community.

d. Household Surveys

The household survey using the semi-structured questionnaire was the major data collection process of the study. The questionnaire involved both open and closed-ended questions. It was prepared in English and was translated into the local language of the study area. Before, the collection of data, the questionnaire was pretested with a few individuals who are not members of the sampled households. The data was collected by enumerators who gave training before data collection commenced.

e. Structured and Semi-Structured Questionnaires

The research-based on survey method uses questionnaires. Questions applicable to this study were selected and arranged in a manner that could yield meaningful results in a cost-effective manner. The household-based questionnaires in surveys provided information regarding the basic population characteristics such as sex, age, household size, marital status, education, and employment.

Data Analysis

Combinations of qualitative and quantitative methods were employed for data analysis. Quantitative analysis was employed in Statistical Package for Social Science (SPSS) or Excel. The data was edited and coded before entering into the cells of SPSS or Excel. The qualitative data, which was generated from different sources, were analyzed qualitatively, and the results of the key findings were presented in the form of narrations, graphs, diagrams, tables, and pictures to provide evidence and to support the qualitative information and descriptive statistics like mean, mode, median, and Standard deviation.

Results

Demographic and Socio-Economic Characteristics of respondent farmers

The demographic and socio-comic characteristics of the respondents' farmers in the study area are sex, age, marital status, family size, education level, and religion. There are 29 kebeles in the Essera district. The research data were collected from Zadi-Shamaity Arusi-Bala and Bala kebeles. The sample size obtained from this kebele was 60 in light of time and money by simple random sampling technique. From the table above respondents were volunteers to give the required information among which 50 were males and 10 were females from study kebeles.

Marital status of the respondents

Marriage is one of the known social events and plays a great role in different situations in society. In the current assessment, the marital status of the respondents' was that almost all respondents who were interviewed were married. Among the respondent, I didn't come up with unmarried widowed, or divorced,

unfortunately. A man who has lost his wife by death can marry an extra wife and a woman who has lost her husband can marry anyone else.

The religion of the respondents

As far as concerned the religious people in the study area different have religions and beliefs. Among the interviewed respondents 71.7 percents are the followers of the protestant religion and the rest 28.3 percents are the followers of the orthodox religion respectively.

Table 1. Demographic and Socio-Economic Characteristics of Respondent Farmers

Variables	Frequency			Percent
Sex structure of HH				
Male		50		83.33
Female		10		16.67
Religion of HH				
Protestant		39		66
Orthodox		21		34
Education of HH				
Illiterate		11		18.33
Can read and write	49	3249	68	81.67
Age of HH				
30-40	4	2		6.67
40-50	28	44		46.66
50-60	23	38		38.34
Above 60	5	16		8.33

Source own survey (2019)

Age grade of respondents

The age of the respondents was 30 up to 60 and above, but the age of the respondents is more their ages since they tell the assumption or estimate about their age. Dominated were 40 up 60 and above as can see on the bar graph. Of those respondents majority of their age accounts, 40-50 and 50-60 are 38.3%and 46.7% of the 60 respondents' respectively. This is because those people under the age of 30 do not have awareness of the benefit of forest production and protection, so age significantly affects participation in forest production and protection.

Educational status

Educational levels of the respondents about 38.3 percents are those who cannot read and write and sign their signature by their finger and the rest 61.7 percent literate who have learned from the grade four and above However majority of respondents can read and write. They could not know the exact date of birth.

Livelihood strategies of respondents

Table 2. Source of Cash Income for the respondents (Source: Field survey, 2019)

Major Sources of Income	Frequency	Percent
Agriculture	30	50
Bamboo products	11	18.34
Livestock production	10	16.66
Honey	4	6.66
Sale of firewood	2	3.33
Governmental worker	2	3.33
Charcoal	1	1.66
Total	60	100

Causes of deforestation in the study area

The study discovered that farming is the major and very known cause of deforestation in the study area though others such as logging, bushfires, mining, etc. do exist but on a limited scale.

Land preparation methods

From the survey, the system of farming and land preparation methods were identified as shifting cultivation, slash and burn, tillage, and ecological farming. The slash and burn method was the predominant means practiced by 80.7 percent of the respondents. However, this method of farming has a lot of environmental repercussions and often accounts for bush fire occurrences and rapid deterioration of soil fertility. It also accounts for some of the factors that lead to deforestation and eventual loss of livelihood sources despite some awareness created about the effects of the method being used. Farmers are still engaged in this kind of poor farming practice as against the other methods that are environmentally friendly, due to reasons such as finances to purchase/ hire tractors for land preparation.

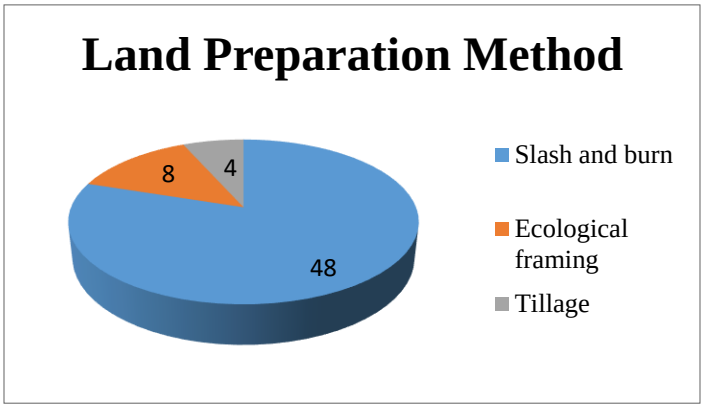

Figure 2. Land Preparation Method

As it can be seen from the above figure, a huge amount (48) 80% of respondents prepare the land by slash and burn, 13.33 % or 8 of the respondents prepare the land by ecological farming whereas 4 of the respondents prepare the land by tillage.

Purpose of farming and farm sizes

With regards to farm size, the majority of the respondents (50.2 percent) were identified to be farming on a land area of 1-2 acres with 6.7 percent of the respondents farming on less than an acre of land.

The figure below presents much information about the sizes of the farm in the study area. In general, about 56.2 percent of the respondents' farmland was 2 acres or less. Again the survey results show that 32.7 percent and 10.7 percent of the respondents respectively are engaged in crop production for subsistence and commercial purposes only while 57.3 percent undertake it for both purposes. The motive for farming usually influences the size of the land on which one undertakes his or her activities. From the survey, it was realized that 57.3 percent of the crop farmers undertake farming activities for both home consumption and sale. This clearly indicates that crop production is the main source of livelihood for the respondents. From the discussions, therefore, farmers should be supported in diverse means to expand food and cash crop production but must be encouraged to integrate tree crops in the early years of the farm to regain the lost vegetation that nourishes the land for increased productivity.

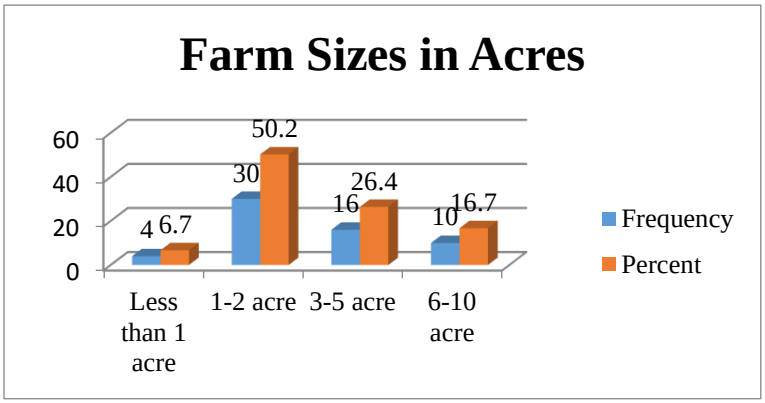

Figure 3. Farm Sizes in Acres

Land is one of the most important natural resources to a community or household. People use the land for many different purposes, like agriculture. As it is indicated in the figure above 50.2% or 30 of the respondents have land of 1-2 acres, 6.7 % of the respondents have land of less than 1 acre, and 16.7% of the respondents have land of 6-10 acres.

Fuelwood collection

Discussion with the focus group confirmed that firewood collection was the major destructive activity, because, the local people depend on the natural forest as a source of fuel energy for household consumption and sale. In addition, the discussants bitterly objected to the destined robbery of the forest timber products as destructive activity. As usual, debarking huge trees, setting fire to forests, and using the latest wood cutter machines were strategies of robbing the forest resources by the local wood smugglers. In general, in the name of fuelwood collection, complicated abuse of forest resources continued to be a serious problem for forest-based livelihoods of the community as well as environmental sustainability.

Farmland expansion

It is a common occurrence that households found adjacent to forests and woodlands continued to expand their farms gradually. Some farmers organized at the micro level to acquire lands for the cultivation of cash crops such as chat, sesame, and eucalyptus trees. The ongoing encroachment of the cultivation of crops towards the surrounding woodlands has resulted in further forest degradation. On the other hand, farmlands for investment were grappled from woodlands and the former forest areas, the process of which is found threatening the forests and integrated natural resources availability and forest-based livelihoods of the local communities.

Charcoal making

The majority of the participants of the focus group discussion pointed out that charcoal making has been practiced for generating household income. The respondents identified Manja ethnic group as the major one known for producing charcoal for sale. The forest degradation wave model confirms that charcoal making has been practiced by almost all households and the reliable forest-based market linkage between the local communities and the urban dwellers.

Effects of Deforestation on Livelihoods in the study area

This part of the study looks at the effects of deforestation on livelihood patterns in the study area. The section discusses the rights of the forest fringe communities to Forest Reserves, the commencement of farming activities, the trend of the output of farming products, and the income level of the respondents.

Right to Forest Reserves (Hunting and Gathering of NTFPs)

It was discovered that the Municipality had imposed restrictions on the entry of Forest Reserves as a way of protecting the forestlands in the study area. The figure below shows that rights to forest reserves are greatly restricted as the majority of the respondents (77.87%) indicated that communities are not allowed to enter the reserves to undertake farming or some other commercial activities. To them, the reserves are restricted areas and one needs permission from the Forest Services Division to access the forest. It was observed that although entry is restricted, people enter the reserves illegally. For instance, hunters enter the forest under

the cover of darkness on hunting expeditions. There were also visible signs of collection of NTFPs such as palm-wine tapping, building materials, canes, and raffia. With the increasing population of fringe communities, the possibility of unsustainable pressures on NTFPs becomes real. Undoubtedly, forests have traditionally been used as valuable resources for forest fringe communities particularly because of the hunting and gathering of NTFPs. Nonetheless, it was revealed that people living in fringe communities in the study area could harvest a variety of NTFPs so long as they respect the rules governing the forest reserves to the satisfaction of the District Forestry Unit. This was, therefore, suggested that the forest resources provide useful products that support the socio-economic development of mankind and enhance their livelihood sources. Hence, the need for conservation and sustainable utilization of the forest resources for the benefit of current and future generations.

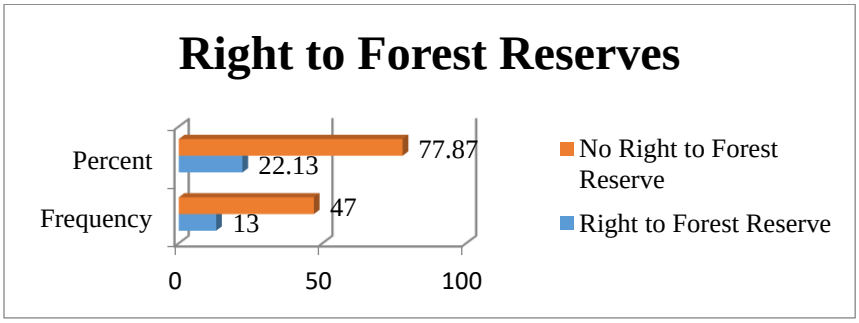

Figure 4. Right to Forest Reserves

Commencement of Farming Activities

The survey revealed that 56 percent of the respondents observed changing patterns in the date for commencement of farming activities. The figure below presents more information about the phenomenon. This assertion was corroborated by the Regional Meteorological Department that the study area has been characterized by erratic rainfall patterns in recent times. The two major rainy seasons in the area start from April to July and August to November and the farming seasons coincide with the rainy seasons due to the reliance on rainfall for cultivation. Due to the erratic nature of the rainfall, periods for planting have been affected dramatically. This is because it has become increasingly difficult to accurately predict the weather and the climate. Day-to-day and medium-term planning of farm operations has become more difficult. As a result, many farming activities and operations are either commenced rather too early or too late leading to poor yields. The implication is that poverty is exacerbated by the poor yield syndrome leading to much more pressure on the forest and the livelihood opportunities it provides.

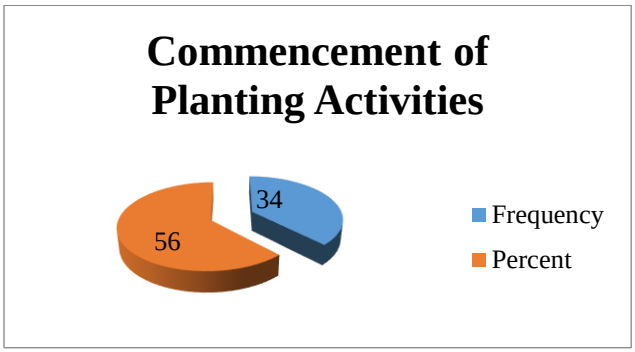

Figure 5. Starting of Planting Activities

Crop output levels

The yield found from crop production is one of the main considerations in measuring output levels. Data gathered and analyzed from the respondents showed that the yield of some crops has been decreasing over the years while the one which experienced increasing increase at a decreasing rate. For example, the yield of maize which is one of the major crops cultivated in the study area experienced a marginal drop of 0.74 percent from 2017 to 2019. This trend has been consistent with all the other crops that are cultivated in the Municipality. The statement is corroborated as 84.2 percent of the respondents described the yield or output levels as decreasing when the question about the output levels was posed to them. The low output level was mainly due to the erratic rainfall and difficulty in weather and climate prediction as discussion with key informants indicated.

Conclusion

As a result, the study showed that there was a significant deforestation process in the study area. This was a result of the fact that most of the dwellers in the study area depend on agriculture, especially crop cultivation; which required the clearing and converting of vast forest areas into farmlands. From interviews with some of the farmers, it was pointed out that, the principal way they expand their farm sizes is by clearing additional virgin lands, which are usually forest areas and areas like “guity” in Arusi-Bala, Bira in Bala kebele, Gudumu, especially around Yilga Buba ketene. It was shown in the analysis that, just between 2015-and 2019 is 64.53 percent, implying an annual forest loss of 6.453 percent. This gives a clue about the spate of deforestation in the study communities. An increase in farm sizes has also resulted in a significant increase in agricultural outputs. This phenomenon is distressing because going by the current rate of change the lands under cultivation of food crops alone will increase.

As it could be identified from the field, the major causes of deforestation and forest degradation in the study of forest communities include bad farming practices such as slash and burn method and the clearing of vast

forest lands for agricultural purposes. Though some of the farmers indicated that, illegal logging of trees is rampant in their communities; however they could not provide concrete evidence/data on the activities of such chain-saw operators. Additionally, the study showed that hunting and gathering of NTFPs are other critical livelihood activities in the study area that divests the forest of its resources such as wildlife including game, mushrooms, snails, and other things. Charcoal production was widespread and thus, serves as another livelihood activity that precipitates deforestation in the study area. During the survey, it was made known to the researcher that; many of the charcoal producers undertake their production in deep forests, which makes it challenging to track and forestall their activities. Crop yield is one of the major measures in crop production which can be used to assess the effects of changing forest envelop on livelihoods. From the literature review, it was discovered that forests play a crucial role in enhancing both microclimate and local weather of an area. The study has confirmed this, as 56 percent of the respondents indicated that, they have observed changing patterns during the period for commencement of farming activities. It was observed that it was becoming increasingly difficult for the respondents to predict the date for the commencement of farming in the study area which leads to the late planting of crops. This late planting according to the farmers has been having negative repercussions such as low and poor quality of yield from their crops. Additionally, there have been several incidents of diseases and pests, especially alien ones as a result of a change in temperature and humidity and long droughts were identified as one of the most obvious impacts of climate change on crop production. The prevalent pests identified are aphids, beetles, birds, cockroaches, and rodents among others. The commonest crop diseases which were found are black spot, blast; maize dwarf, Mozaic, root rot, and stem rot among others. The attack by these pests and diseases causes damage to the crops which reduces the quality and quantity of their yields the study unraveled.

Recommendations

As a result of the findings of the study, the following recommendations were made. its impacts on crop production. Seriously educating the community about the rules governing the forest reserve, methods of tree production, sustainable forest management practices, conservation, and livelihood-based approaches. The extension package should be stationed in each of the communities in order for the person to easily understand how to conserve forests. The farmers should be trained in other alternative livelihood approaches such as Bee-keeping, glasscutter and snail rearing, Garry processing, and mushroom farming. This is so because of the high demand for honey, glasscutter, snail, and mushroom in urban centers across the country. There is the need to enhance action on the access to long–term financial resources and investment to support action on mitigation. The various institutions and the stakeholders must be provided with the requisite financial resources by the government and sector ministries to enable them to design, implement and enforce their

mitigation programs and strategies effectively. There should be augmented financial support for technical support and critical planning data to state and local governments from agencies responsible for climate, weather, and hazard mitigation. Support standardized monitoring and reporting of GHG emissions.

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