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Governing Computing Proviso of Habitation in the Highland Forest Region: Evidences from Arbagugu Controlled Hunting Area, Oromia Regional State, Ethiopia

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Abstract
The growing ecological footprint tends to dwindling of ecological resilience. Deforestation and forest degradation, specifically, are unavoidable in any country with virgin forests. For the last ten years, there have been unsuccessful attempts to cease farming in the highland forest of Arbagugu Controlled Hunting Area (ACHA). The ultimate objective of this study was to assess determinants that oversee the ultimatum for habitation in the highland forest region of Arbagugu district. Thus, 244 (50% of them permanently dwell in forest region) household heads were identified using random sampling techniques. Both quantitative and qualitative approaches were used to analyze data. Binary logistic regression model analysis of dependent variable that showed demand to dwell in forest region permanently and own land but not dwell in the forest region. The findings of the study showed that education status, amount of farmland outside of forest region, residence time, expert visit and knowhow of the forest border were significantly contributed to permanently reside in highland forest region at five percent (5%) probability level. Similarly, weak institutions, overridden roles and untapped institutions contributed for fruitless practices of forest management. Marginalization of local communities and imposition of institutional interests were created local communities negligence. Therefore, empowerment of local communities, livelihood diversification, cooperation and collaboration among/between government institutions, and support from NGOs could bring betterment of highland forest management.
Keywords: Arbagugu CHA, Forest habitants, Forest management, Institutions, Logistic model

1.1. Introduction

Ethiopia is endowed with diversified biological resources that have local and global importance. However, most of these biological resources are depleted at alarming rate due to social, economic and environmental threats. Superficially, Bishaw (2001) stated deforestation and land degradation as the most important issues threatening the survival of Ethiopia and her people. This may be resulted due to growing of ecological footprint by seconds and dwindling of ecological resilience in the same rate (UNESCO, 2008).

Even though forest statistics in Ethiopia are unreliable and has little clarity which creates confusion for those involved in the sector (MELCA mahiber, 2008), forest depletion in 1990 reduced 25% GDP from forestry (EPA and MoEDC, 1997). Therefore, the rate of deforestation at national level was estimated at 150,000 hectares per year (MNRD and EP, 1993), 160,000 to 200,000 hectares per year (EFAP, 1994) and 62,000 hectares per year (WB, 2001), and eight percent per annum (WRI, 2003).

Before half a century the high forests were estimated at about nearly fifteen million hectares (which was approximately about 40%) of the land at that time in *Oromia*. But, currently the remaining high forest of the region is estimated to less than ten percent (Feyisa, 2007; Derero *et al.,* 2011).The highlands of *Oromia* are home to more than 80% of the total human population and 70% of the livestock population of the region and account for over 90% of the cropland (Tefera, 2002). This may be hastened the higher vulnerability of highland forest area.

Different studies that were conducted on land use and land cover change on adjacent areas of *Arbagugu* Forest District shows the shrinking of forest cover from time to time (Deneke, 2007; Midkessa, 2009). Similarly, in *Arbagugu* forest region, the size of forest stock due to human activities and unsustainable use of forests. In line with this, reports from different districts of *Arsi* zone indicated that there is high rate of deforestation (BoFED, 2011).Deforestation and degradation of forests have been resulted due to multifaceted causes (Rudel and Roper, 1996; Moussa and Foley, 1999; Geist and Lambin, 2001; 2002; Benhin, 2006; Robalino and Herrera, 2009; Mckee, 2009; Demissie, 2012). The extent to which successfulglobal concerns about deforestation and the relationship between forests and livelihoods remains an open question (Agrawal, 2007).

1.2. Statement of the problem

Deforestation is unavoidable in any country with rich virgin forest (Zhang, 2000). The growing demand for agricultural land and timber by either a local population, or population growth through resettlement, and institutions that affects transactions are critical reasons for deforestation. According to Klooster (2003) the enhancement of forest conservation and regeneration depends on the existence or evolution of institutions that coordinate people's behavior in socially and environmentally beneficial ways.

Moreover, understanding of the evolution and dynamics of the institutions can help to predict the patterns and consequences of landscape change (Foudjem-Tita *et al*., 2015). The attainment of forest management depends critically up on matters from the forest itself includes the quality and extent of enabling policy, legal and institutions conditions. Consequently, weak forestry institutions cannot enforce legislation (Monditoka, 2011). In Africa, there is identified inverse relationship between government interventions in forest sector and good governance, since forest resources have significance in the livelihoods of many African rural communities (Counsell, 2009). In Ethiopia, forests are governed through an overlapping mosaic of institutions initiated by the state, communities, NGOs or private investors under different levels of enforcement (Stellmacher, 2007). Absence of proper institutions that can integrate the legislative measure with the local communities' realities, and improper horizontal interrelationship that cannot protect forest from degradation and deforestation contribute for ill forest management.

Oromia Forest and Wildlife Enterprise (OFWE) surveyed from the year 2007 to 2010, more than 4631 household heads were encroached in the forest region in Arbagugu District Forest and Wildlife Enterprise (ADFWE) catchment in general, and 1000 household heads in the highland forest region. But, an attempt to stopover farming in the highland forest region was unsuccessful. In addition, *Arbagugu* mountain region is water tower for the surrounding districts (BoFED, 2011), located in the downstream, any threat to the forest region will harm the livelihood of these larger areas. According to Ejigu (2016), *Arbagugu* controlled hunting area supports the largest mountain *Nyala* population in Arsi and Ahmar Mountains and the area is characterized by steep hills of mixed open woodland and ericaceous habitat interspersed with rivers and streams. The species is naturally protected by deep and rugged landscape of the area.

Ejigu (2016) identified that livestock grazing, uncontrolled burning, wood collection and new settlements along with expansion for agriculture pose the most significant threat to mountain forest. In *Arbagugu* controlled hunting area, human encroachment and seasonal grazing of livestock brought serious challenge (Evangelista *et al*., 2007). Hence, this study investigated the factors behind the demand for land in the forest region among farming communities.

1.3. Objectives of the study

The general objective of this study was to assess determinants that govern the demand for farmland in the *Arbagugu* controlled hunting areas of highland forest region. Specifically, this study intended

- To quarantine determinants of farmers' livelihood owning farmland in the forest region.
- To investigate forest management related institutions and their inter-linkage
- To assess local communities' perception toward forest related institutions' working in the area.

1.4. Significance of the study

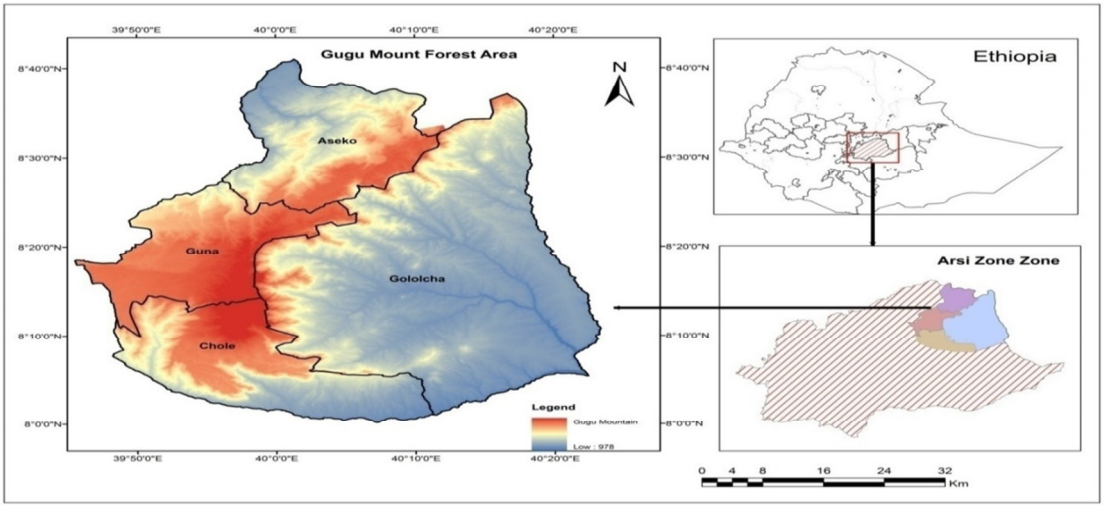
The outcome of the study pinpointed clear discrepancies among farmers that own farmland in the forest region and those nearer to forest region but not exclusively entered into forest region. It enabled decision makers to clearly realize the gap among institutions and communities.

2. Methods and Materials

2.1. Location of study area

Arbagugu was literally used to represent an area currently covered by six *woredas*[1], namely *Jeju*, *Merti*, *Chole*, *Guna*, *Aseko* and *Gololcha*. Of these *woredas'* the highland forest is predominantly confined in the highland named as *Gugu*, where *Sheikamsarie* mount is the highest point (3625 meters above mean sea level), *Meraro* and *Aselo*. Relatively, it is found at around 279 kilometers southeast of Addis Ababa, the capital of the Ethiopia. This forest region confined at intersection of four *woredas* that includes *Chole*, *Guna*, *Aseko* and *Gololcha*. Astronomically, it is located between $8^0$05'north to 8^0 35' north and $39^0$50'east to 40^0 10' east.

[1] It is equivalent to a "district"



Source: EthioGIS, 2016
Figure 1: Map of the study area.

2.2. Physical characteristics of study area
Arbagugu Controlled Hunting Area (ACHA) range from 2000 to 3625 meters above mean sea level and cover an area of approximately 225 square kilometers. This mountainous region is one of the peaks located in *Arsi* zone and characterized by cool, cool-temperature and temperate agro-climatic zone. It is also characterized by cold climatic condition which possesses temperature ranging from 10 to 15 degree centigrade (^{0}C), and rainfall estimated between 800 to 1200 millimeters. Streams such as *Gololcha, Refrefa, Jeldi, Hindhesa, Koro, Moye, Moyeamuma, Nano, Tebe, Legebuna* and others are discharging from this mountain range.

2.3. Flora and Fauna of the study area
Due to its elevation and corresponding climatic features, the study area is home for alpine and afroalpine vegetation, and pertaining wildlife. Accordingly, different species of flora which are trees, shrubs and grasses such as *asta* (*Erica arboria*), bamboo (*yushina alpina*), *koso* (*haginia absinica*), *gibira* (*Lobilia sp.*), *ameja* (*hypericum rivolutum*), *azohareg* (*clematis hirsuta*), *ameraro*(*discopodium penninervium hochit*), *indahula* (*kalancho epetitiana*), *raskimir* (*leonotis ocymitolia*), *injori* (*rubusstedneri*), *guassa* (*festucasp*) and others are common. On the other hand, in the study area fauna that includes *baboons*, *ape*, *Klipspring*, *monkey*, *Columbus monkey*, *warthogs*, *antelopes*, *hyena* and different birds.

2.4. Target population
The subject of the study were farmers whose farmland was demarcated to forest region by *Arbagugu* forest and wildlife enterprise beginning from 2008 to 2010. Accordingly, the office identified that more than 4631 farmer household heads have farmland in the forest area in *Arbagugu* district. But, this study focused on household heads who own farmland in the highland forest areas. Hence, it was identified that 1000 household heads owned farmland partially and fully in the highland forest region of the district. The *woredas* that have highland forest are, therefore, deliberately included as target area for this study.

2.5. Research Design
Descriptive research design was utilized for this study. According to Burns and Grove (2003), descriptive research is designed to provide a picture of a situation as it naturally happens. It may be used to justify current practice and make judgment and also to develop theories. Descriptive research designs help provide answers to the questions of who, what, when, where, and how associated with a particular research problem; a descriptive study cannot conclusively ascertain answers to why. Descriptive research is used to obtain information concerning the current status of the phenomena and to describe 'what exists' with respect to variables or conditions in a situation.

2.6. Sampling design and sample size
In order to determine the samples for this study, four *woredas (Guna, Aseko, Chole and Gololcha)* having large coverage of highland forest were selected. These four *woredas* accounts about 1000 household heads that own farmland in the forest region. As a result of the socio-economic and demographic characteristics homogeneity of the local communities and more forest inhabitants, *Guna* and *Chole* were purposively selected as study site. Thus, the selected sites have also more border share with forest region and more than two third of household heads

encroached to forest region were found belongs to these two *woredas*. Meanwhile, by using list in Arbagugu District Forest and Wildlife Enterprise as sample frame, samples for the study were identified using cluster sampling (pertaining villages) and simple random sampling (for household selection).

To determine sample size to be included in the study using formula[1] designed by Krejcie and Morgan (1970) was used. Then, by using list of household heads owning farmland in forest region prepared by *Arbagugu* forest and wildlife enterprise as sample frame, stratification based to forest region dwellers and outside forest dwellers was made. Meanwhile, disproportionate sampling techniques were used to obtain equal number of samples from the two areas. At the end, using simple and systematic random sampling techniques 244 household heads were identified from 671 target household heads.

2.7. Data sources

To acquire all necessary data for this study, information was primarily obtained from both primary and secondary data sources. Primary data sources were farmers, experts and officials whereas secondary data sources were obtained from documents archived ADFWE offices, *Kebele*[2] administration offices and *woredas* of the study area.

2.8. Tools of data collection

In order to generate data, instruments such as key informant interview (KII), focus group discussions (FGDs), questionnaire, field observation and analysis of documents were used. Accordingly, **6** KII (including ADFWE manager and border delineation committee member) and **2** FGDs (one for communities dwelling in forest region and other for those dwell outside) were conducted. Questionnaires were administered for about **244** household heads owning farmland in forest region and those who have no such holdings in forest region.

2.9. Variable specification

For employing Binary Logistic Model variables were organized on the basis of priori expectation for independent variables and dichotomous option for dependent variable. Household heads' residence: **1**=dwell (if the household head own home in the border of forest region, thus, owns more land), and 0=not dwell (if the household head own home out of forest border).

EDUC (education status of house hold head): the higher education status (the more time the household head pass through school) the more awareness about environment. The lesser the education status the higher impact on environment due to higher resistance to new technologies and new ideas on preservation of forests. Moreover, it shows negative relationship with deforestation.

FAMSIZE (family size): the higher number of family in the household the more need to agricultural land to grow crops and rare animals. The more need to farmland the more forest to be cleared and vice versa. The positive relationship with deforestation is expected from this variable.

GRASSL (grassland size): the more grassland household possesses the lesser release of livestock to forest. There is negative relationship in regression of grassland size with deforestation.

FARML (farmland size): the more farmland the household head have the less futurity forestland cleared. The less farmland household owns the more the need to forest land conversion. The negatively regression between farm land size and deforestation is expected.

LIVSIZE (livestock size) (negative or positive relationship): the stock and flow of cattle encourage forest clearance. Livestock sizes, in short, have both negative and positive relationship with deforestation.

OFFARM (off farm activity): if household head have other employment other than plough land and rearing livestock, there will be a possibility to supplement the income for house consumption. Off-farm activity has negative regression up on deforestation.

RESIDENT (time of residence in the area): the more time they stay the more forest land they cleared. The less time they stay in the area the less encroachment in the forest. Residence time shows positive sign while regressed with deforestation status.

EXPERV (expert visit): the higher frequency the expert visits the farmers, the more exposure to new means of production which can enable them to increase their productivity. Expert visit negatively affect deforestation level.

FORBDR (knowledge of forest border): the more knowhow of forest border the less encroachment to it and vice versa. Knowledge of forest border negatively affects the extent of deforestation.

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[1] According to Krejcie and Morgan (1970);

$$S=X^2 NP(1-P) / [d^2 (N-1) + X^2 P(1-P)]$$

Where **S**: sample size; X^2: table value of chi-square for 1 degree of freedom at desired confidence level [1.96 x 1.96= 3.841]; **N**: population size; **P**: population proportion assumed to be 0.50 since this would provide maximum sample size; **d**: the degree of accuracy as a proportion (0.05) [0.05 x 0.05= 0.0025]

Thus, s= [3.841*671*0.50 (1-0.50)] / [0.0025* (671-1) + 3.841* 0.50 (1-0.50)]

=**244**household heads

[2] *Kebele* represents the smallest administrative unit.

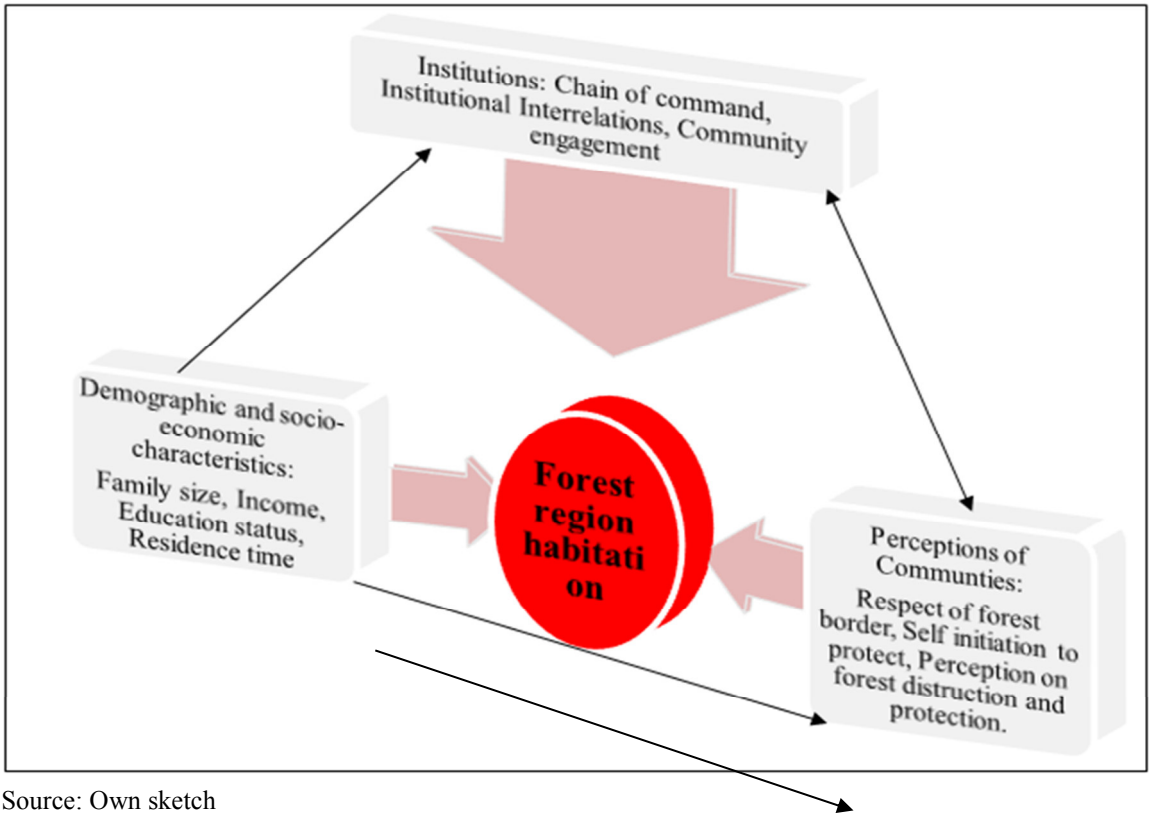
DISTANCE (distance of the home): the more time that the home takes from the forest border the lesser land the household heads pass to the forest region. Distance of home from the forest region will have negative regression on the forest region.

2.10. Data analysis method

Both qualitative and quantitative research analysis methods were used. All data obtained through questionnaire were coded and entered to SPSS version 20. Binary logistic regression[1] was computed for six quantitative and four qualitative variables were selected for the model computation. Facts related to institutional inter-linkages were figured and triangulated based on the data obtained from both primary and secondary sources were narrated and interpreted.

2.11. Conceptual framework

The computing demand for farmland in the forest region is determined by demographic and socio-economic factors, institutions and perceptions of communities. Demographic and socio-economic factors are contributing for institutions and perceptions of communities both positively and negatively. But, institutions and perceptions of communities are affecting each other in different ways. Well established institutions increased communities' awareness at local level whereas increased perception of communities creates good platform to enhance success of objectives of institutions.



Source: Own sketch
Figure 2: Conceptual framework

[1]According to Gujarat (2004) the probability to happen is given by:

Pi= E (Y=1/Xi) $=\frac{1}{1+e^{-(\beta 0+\beta iX1)}}$ $=\frac{1}{1+e^{-Zi}}$ $=\frac{e^{z}}{1+e^{z}}$ whiletheprobability not happen is given by: 1-Pi$=\frac{1}{1+e^{Zi}}$Then, the formula for finding the probability to happen then computed as: $\frac{Pi}{1-Pi}=\frac{1+e^{zi}}{1+e^{-zi}}=e^{zi}$

$Li=\ln\frac{Pi}{1-Pi}=Zi=\beta o+\beta iX1$

Where ***L*** is log of the odds ratios; ***ln*** is natural logarisms; ***P*** probability to happen; ***1-Pi*** probability not to happen.

Based on Gujarat (2004), Mahapatra and Kant (2005) derived the following formula to compute rate of deforestation using binary logistic model:

$\ln\frac{Pi}{1-Pi}=\beta o+\beta 1X1+\beta 2X2+\cdots+\beta 10X10+ui$ Where: β is coefficient of independent variables showing marginal effect (positive/negative); $X_1 \ldots X_{10}$ are list of independent variables in the model; *ui* error term. Therefore, for this study

$\ln\frac{P\,(dwell)}{P\,(notdwell)}=\beta 0+\beta 1*EDUC+\beta 2*FAMSIZE+\beta 3*GRASSL+\beta 4*FARML+\beta 5*LIVSIZE+\beta 6*OFFARM+\beta 7*RESIDENT+\beta 8*EXPVISE+\beta 9*FORBRDR+\beta 10*DISTANCE+ui$

3. Results and Discussion

3.1. Demographic characteristics of respondents

Respondents' selected for this study were 244, their demographic characteristic pertaining to sex, marital status and age was presented as follow.

Table 1: Sex distribution of respondents'

Sex of household head	Location of home		Total	Percentage
	In forest region	**Out of forest region**		
Male	119	106	225	92.2
Female	3	16	19	7.8
Total	**122**	**122**	**244**	**100**

Source: Field survey, 2016

As indicated on table 1, majority of respondents were male headed households (92.2%) whereas only few (7.8%) them were female headed. This is mainly due to patriarchal societal set up of communities males are taking responsibility of leading household. But, in households who lost their husbands and in some instance those women who were not married for longer and gave birth of children might be household head. Fortunately, in the study area, male headed households were predominant than female headed.

Table 2: marital status distribution of respondents'

Marital status of household head	Location of home		Total	Percentage
	In forest region	**Out of forest region**		
Single	11	8	19	7.8
Married	109	103	212	86.9
Widowed	2	7	9	3.7
Divorced	0	4	4	1.6
Total	**122**	**122**	**244**	**100**

Source: Field survey, 2016

According to table 2, majorities (86.9%) of household heads were married and 7.8% of them were never married. On the other hand, only 3.7% and 1.6% of the respondents were widowed and divorced respectively. This showed that, respondents in the study area were mostly engaged perhaps some lost their couple due to death and divorce.

3.2. Demographic and socio-economic determinants

Binary logistic model was employed to analyze demographic and socio-economic factor for demand of farmland in forest region. The dependent variable for the analysis was the tendency to settle in forest region. As a result, permanent settlers by owning in forest region (122 farmers) and those dwelling outside forest region but whose farmland demarcated in the forest region (122 farmers) were converted as categorical type. Therefore, the tendency to settle in forest region permanently could be affected by independent variables such as covariates (family size, grassland size, farmland size, livestock size, residence time, distance of former home from forest border) and categorical (education status, off-farm activities, expert visit, knowledge of forest border).

The goodness fit of the model in the findings of the study was found to be well. A chi-square ($\mathbf{X^2}$) value of 96.34 with degree of freedom (***df***) of 1 was significant at the probability level of 0.000. Similarly, the -2 log-likelihood (**-2LL**) value of 83.17indicated the model is well fitted the data. That is, both depicted that the independent variables affected the dependent variables. The *Wald statistics* indicated that there is interaction between the dependent variables and independent variables.

Table 3.Demographic and socio-economic factor for demand of farmland in forest region

	β	*S.E.*	*Wald*	*Df*	*Sig.*	*Exp(β)*
EDUC	-1.657	.833	8.026	1	.047*	.191
FAMSIZE	.137	.104	3.506	1	.189ns	.872
GRASSL	-1.653	.566	17.273	1	.004*	.192
FARML	-.384	.305	7.273	1	.007*	.681
LIVSIZE[1]	.078	.085	.849	1	.357ns	1.081
OFFARM	-.313	.675	.214	1	.643ns	.731
RESIDENT	.098	.026	29.139	1	.000*	1.103
EXPERV	-5.513	1.068	54.049	1	.000*	.004
FORBRDR	-2.288	.870	14.052	1	.009*	.101
DISTANCE	-.016	.043	.141	1	.707ns	.984
Constant	3.783	1.535	12.336	1	.014	43.937

N=244; -2LL=83.17; X^2=96.34 (p=0.000); Over all percentage=90.2%; ***β*** *=regression coefficient which stands for odds ratio; S.E. =standard error; df=degree of freedom; Exp (****β****) =odds ratio; sig=significance. *significant at 5%; ns= not significant*

Source: Model output.

Education Status: Education status (EDUC) has negative coefficient(β) of -1.657 with odd ratio Exp (β) of 0.191 which was statistically significant at probability level of 5% (p=0.047). This implies that the exposure of household head to formal education minimizes the likelihood of deforestation by reducing the chance of having more land in forest region, so that minimize tendency to live in forest region, by the factor of 0.191.In line with this, it is proponed that formal education lower pressure on forest (Moran, 1989; Tongpan *et al.,* 1990; Godoy *et al.,* 1998) by ease out migration and the adoption of the modern farm technologies that raise the productivity of land and labor (Lockheed *et al.,* 1994). Furthermore, UNESCO (2006) specifically indicated that four to six years education is the minimum threshold for increasing agricultural productivity through allowing farmers adaptation of new agricultural methods, cope up with risk and respond to market signals.

Grassland and Farmland Size: Grassland (GRASSL) size have negative regression coefficient(β) of -1.653 and -0.384 with odd ratio Exp(β) 0.192 and 0.681 which were statistically significant at probability level of 5% (p=0.004) and (p=0.208) respectively. This indicates a unit increase of land size of household create a chance of seeking lesser land in forest region by the factor of 80.8% for grassland and 35.8% for farmland. If there are more lands in forest region compared to outside there is high probability to settle in the forest region.

From the model description one can understand that the possibility of farmers who own more farmland have less chance to clear forests for further expansion of their lands. Similarly, Malthus (1914) described that when land becomes scarce people will keep on searching for new land, and so the share of agricultural land held by small holders exerts an influence on the annual rate of deforestation (Rock, 1996). Globally, the main forest conversion process in the tropics was the transformation of closed, opened or fragmented forest to agriculture at alarming rate every year (Archard *et al.,* 2002). There are studies that also suggested the damage to species is higher for land converted to pasture than for land converted for farming (Portela and Rademacher, 2001).

Residence Time: As indicated in Table 3, residence time (RESIDENT) has positive regression coefficient (β) of 0.098 with odd ratio Exp (β) of 1.103 which was statistically significant at probability level of 5% (p=0.000).On the other hand, the result portrayed that an increase in the number of years of residence of the households near the forest region increases the likelihood to own more lands by the factor of 103%.This implies that the more time the farmers live near the forest area the more land will be cleared and even dwell in the forest region by passing forest border. Even though this finding contradicts the idea that longer stay near forest area increase experience on deforestation and perceived need of reforestation (Mitinje *et al.,* 2007), it is in consistent with the increased number of years of residence increases the likelihood of forest reserve disturbance due to growing of family size (Giliba *et al.,* 2011).

Expert Visit: The model result of Table 3 indicated that the more expert visit (EXPVISE) the less deforestation to be happened. Expert visit has negative regression coefficient (β)of -5.513 with odd ratio Exp(β) of 0.004 which was statistically significant at probability level of 5% (p=0.000). Specifically, the presence of visit of households by experts reduces the likelihood of households to encroach in the forest area by the factor of 99.6%. The presence or absence of extension contacts depends on the government policies and institutional factors.

In the study area, there are no forest experts at *kebele* level. Surprisingly, there is also lack of experts at *Arbagugu* District level. The interview response of ADFWE manager clearly indicated the shortage of skilled man power in the area of forestry at the district level. Due to remoteness of these sites under district majority of the experts release their job and go to other areas.

[1] *It is converted to tropical livestock unit (TLU). One tropical livestock unit is equivalent with 250kg. Accordingly, ox/cow=0.25TLU; Heifer/young bull=0.75TLU; goats/sheep=0.15TLU; donkey=0.65TLU; Mule/horse=1.1TLU & Chicken=0.013TLU. (Storck et al., 1991)*

Knowhow of Forest Border: Knowledge of forest border (FORBDR) has negative regression coefficient (β) of − 2.288 and odd ratio Exp (β) of .101 which was significant at probability level of 5% (p=0.009) (Table 3). When households know the border of the forest it decreases the chances of entering into the forest region by the factor of 89.9%. This result depicted that the more the farmers know about forest boundaries the less likely to break in to forest areas to expand their farm land. On the other hand, this implies if farmers have the knowledge of forest boundary they fear to encroach. Similar to this finding, authors like Giliba *et al.,* (2011) showed the presence of negative regression between forest border knowledge and level of encroachment.

3.3. Institutions for forest and community by government

The study area is found in *Oromia* National Regional State (ONRS) in the present East *Arsi* zone. Administrative hierarchy of the forest area lies in *Oromia* Forest and Wild Life Enterprise (OFWE) at regional level, *Arsi* Forest and Wild Life Enterprise (AFWE) at zonal level and *Arbagugu* District Forest and Wildlife Enterprise (ADFWE) at district level. OFWE established as independent organ government in accordance with proclamation number 87/1997 article 49 (1) and regulation number 16/2001. The seat for OFWE is Addis Ababa. The enterprise, in general, structured as nine branch office and 39 districts.

AFWE, one of the branch offices of OFWE among the nine, is the business making public enterprise formed through regulation number 86/1999. The enterprise owns and administers 234,652 hectares of forest resources. Five districts (namely *Harana Kokosa, Adaba Dodola, Arbagugu, Chilalo and Galama Shashemenie*) are found under administration of the enterprise. The head quarter of AFWE is located in *Arsi Negele* town at 225 km south of the Addis Ababa. *Arbagugu* District Forest and Wildlife Enterprise (ADFWE), which is the study area, opened its office at the end of 2007. Initially, it was started by including forests in three *woredas* (*Guna, Merti* and *Aseko*) and later two *woredas (Chole and Gololcha)*. The center for the district is located at *Abomsa* town which is found at 187 km for Addis Ababa.

On the other hand, under ministry of agriculture and rural development (MoARD) there is an office that extends for resource management up to *kebele* level. Their co-existence could be potentially advantage for preventing forest resources. Hence, forests and communities nearby forest have two (OFWE and MoARD structure) governmental institutions that work for them.

3.3.1. Institutional override or interface

The overall set up of hierarchy for MoARD starts at national level and reaches the local community agriculture and rural development in general, natural resource preservation in particular. Forest and wildlife enterprise has two merging nature at zonal and district level: 1) at zonal level both *Arsi* and West *Arsi* merged under one administration and 2) at district level there are different *woredas* under one *Arbagugu* district hegemony. The possible simplicity for this structure emanated from its concern on forest alone.

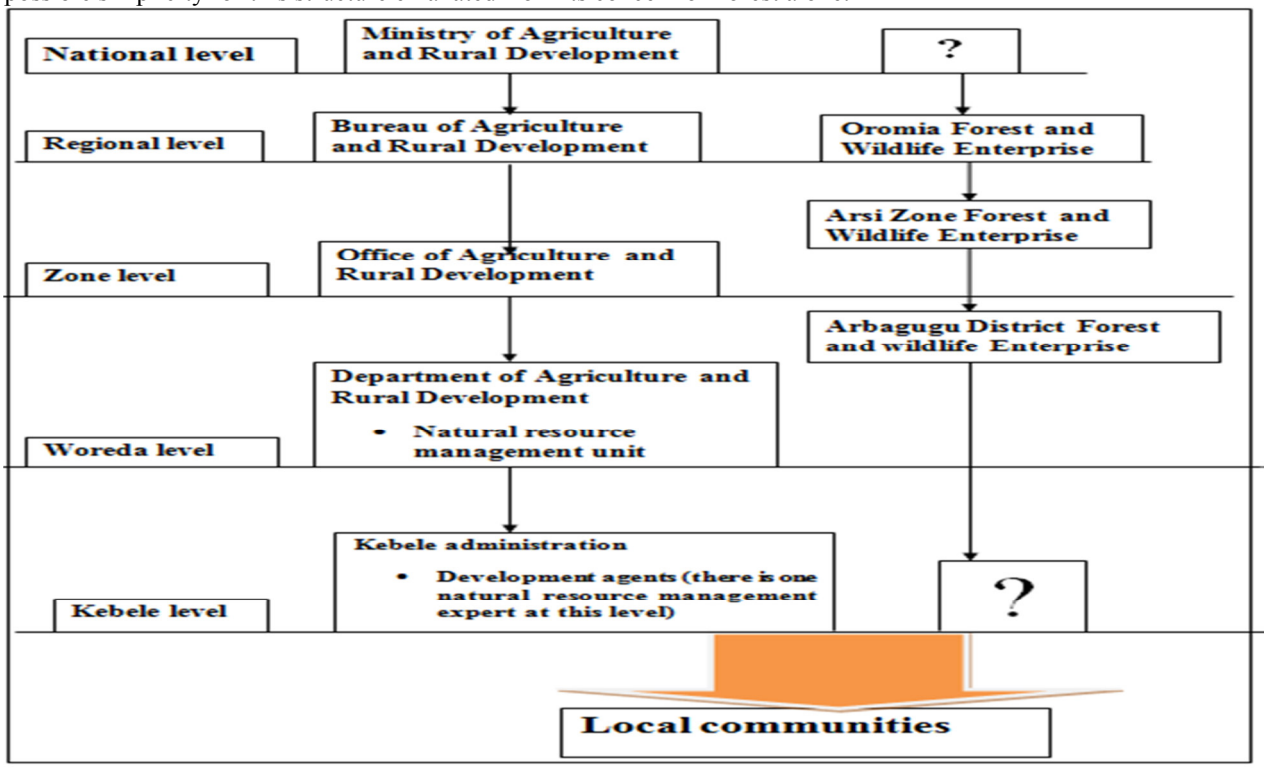


Figure 3: Hierarchical structure of forest institutions (MoARD and OFWE)

As far as interface of the two institutions concerns FGDs participants showed that there were representatives who came to work on demarcation of forest borders from both District and *woreda* experts. District manager also confirmed the fact and assured as there was involvement of experts for activities related forest management. The two corresponding *woredas* (*Guna* and *Chole*) fully disappointed with the way experts have been recruited and even still unclear with the role of the enterprise. Hence, it is clearly observed that institutions were working together without clear task division, but computing for taking the advantages. The only thing that they worked together was emanated from interest on forest, not for management at large.

According to FGD results and interview reports, the institutional override can be seen in different ways: i) ADFWE was taken as usurper by local administration; ii) the contention between the two led as different sides are aside communities while others are against; and iii) neglecting because of computation. This seemingly showed that an area was becoming out of any formal leadership and structural administration.

As showed in the above figure 3, despite of the existing overlap of structural set up of the two, forest and wildlife enterprise has no any structure that show its link with community. Comparatively, Agricultural office has better inter-linkage with local community and easily access the forest region frequently through its experts.

3.3.2. Untapped institutions

Always institutions are established to work with community and benefit the community. In most case, existences of untapped resources due to fragile and remote areas were commonly known. But, in this particular area responsible bodies formed to protect forest were untapped. Structurally, there are there but not hierarchical on the ground. Hence, the truth on the ground showed that there were no clear way out to address local communities on sustainable base. Specifically, OFWE can be viewed as institution floating in the air when glanced from study site. This further brought incapability of other local administrations to manage forest regions. Hesitantly, OFWE proclaimed as mandated to safeguard the forest there though not pragmatic.

3.3.3. Toward scramble for highland forest region

The growing demand without clear task division for safeguarding certain resources will tend to scrambling. Similarly, *Arbagugu* highland forest region suffered from the same problem as the need from local communities, Forest and Wildlife Enterprise, and local administration targeted on it both for safeguarding and obtaining services. As overviewed in figure 4, perhaps there are attempts for preservation were there among all stakeholders, always the destructive measures were overwhelming the balance. Thus, the size of forest coverage was highly shrinking, and if continued in the same rate all socio-economic and ecological services obtained from the forest will be endangered.

Hence, *Arbagugu* CHA agonized by the pressure of local communities to support their livelihoods, by local administration as the means for responding to emerging governance questions and by district management of an enterprise as source of revenue. Communities influence is/was not delimited to surrounding communities alone; rather those living further away even skip to this area whenever environmental hardships are/were observed. During absence of rainfall, societies were migrated to this region with their livestock in addition to the usual coming of the surrounding communities' every *kiremt* season for three to five months stay which locally named as *godansa*. Local administration effect goes back to the regime of derg. During that there were lands provided for farmers (locally named as *amerachoch*) as field for their livestock and now converting to farmland and part of it was demarcated as part of forest region by the then committee. Moreover, in *Samo bitena kebele*, immediately after a year the 2005 national election (2006) in the name of job creation adjacent forest land was distributed to youth and now days some of it was demarcated to forest region. There are also lands provided for farmers who own farmland by certain payment for their immediate leaders. Illegal settlements are/were also big challenge to the area. The surrounding towns' water supply was fully pumped from this region in spite of its lesser attention for ecological preservation and local communities' legitimacy. District enterprise is still collects revenue obtained from controlled hunting area wildlife. But, no district expert can feel free to persuade and aware local communities' on preservation and even considered as who were coming to confiscate the resource in the area. For balancing the positive and adverse effects of each stakeholder, their interaction with forest region was presented as the following figure 4.

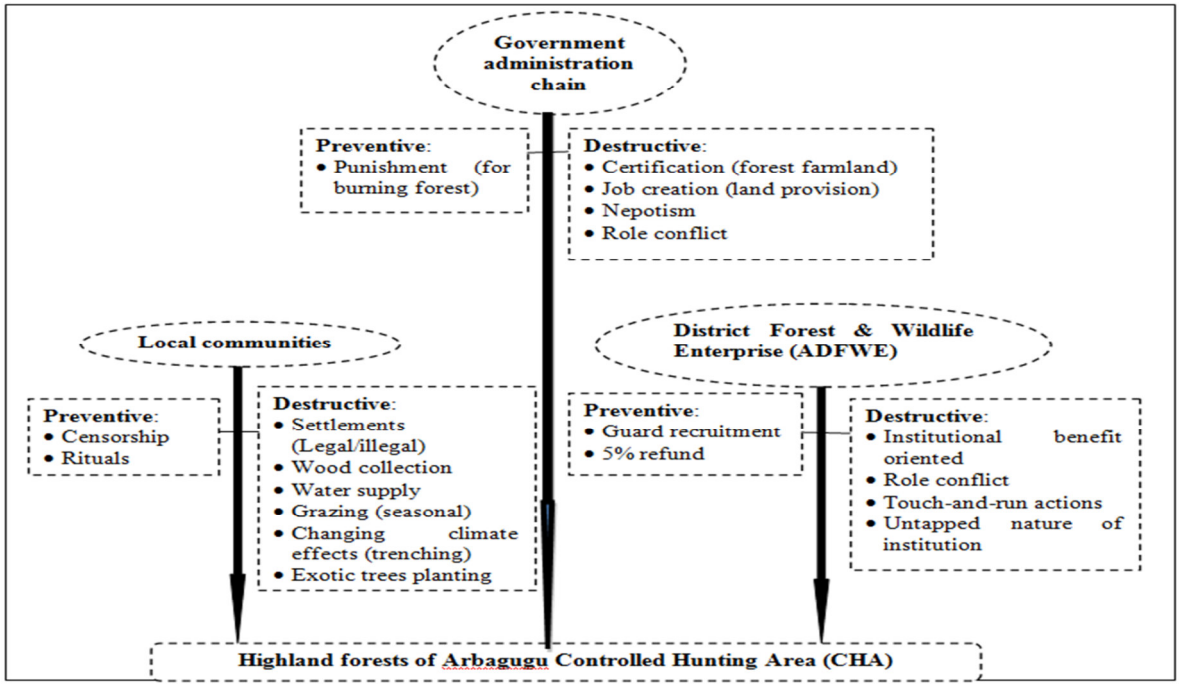


Figure 4: Scramble of *Arbagugu* highland forests

3.4. Communities' and forest institutions

Colding *et al.,* (2003) suggested that sustainable resource management needs to be embedded in social context. They argued that there must be social mechanisms in a society by which information from the environment can be conceived, processed and interpreted in order to confer resilience in ecological systems and their linked social systems. In doing so, the institutions established in relation to forest management have greater role at smaller scale.

In this regard, household survey result showed that as local communities know institutions working on the forest preservation in the area but most of them disagree on the effective and smooth relationship with them. FGDs participants were confirmed result and prompted that institutions were frequently visited them during the time of demarcation and sometimes individuals came to an area when they heard report of burning of forest. Otherwise, there was no formal and frequent interaction and discussion on forest fate. Local administration provide mandate to *woreda,* and *woreda* on the other hand levied mandate to district enterprise working on forest and wildlife. Worst of all, district raised problems like insufficient experts, lack logistics and remoteness of area to properly address the challenge. The gap observed here showed that there was vicious circle among different authorities. Hence, this created a greater crack to work with communities full heartedly.

Table 4: Knowhow of institutions

Item	Response	Residence	Number	Percentage
Knowhow of household heads forest related institutions working in the locality	**Yes**	In forest region	105	43.03%
		Out of forest region	92	37.71%
		Total	**197**	**80.74%**
	No	In forest region	7	2.87%
		Out of forest region	40	16.39%
		Total	**47**	**19.26%**
		Overall Total	**244**	**100**

Source: Household survey, 2016

Table 4 showed that 87.74% of respondents know forest institutions working in the local areas, whereas only 19.26% of them were not know. This data showed that households fully dwell in the forest region have the knowhow forest related institutions than those who dwell outside of forest borders. This might be resulted from their being kin to know the daily decisions on forest region that will consequences their full displacement.

Table 5: Ranking of institutions working on forest

Item	Name of institution	Number	Percentage
Which institution do you know?	Forest & wildlife enterprise only	138	56.56%
	Woreda office only	10	4.1%
	Both FWE and Woreda office	49	20.08%
	Community based institution	0	0%
	No institution	47	19.26%
	Overall Total	**244**	**100**

Source: Household survey, 2016

According to table 5, majorities (56.56%) of the respondents knew district forest and wildlife enterprise, and 20.08% of them know both the enterprise and *woreda* office. Only 4.1 % know *woreda* office only. Hence, this result showed that due to demarcation of forest region and the enterprise boldly known among the local dwellers.

Table 6: Ranking of institutions working on forest

Item	Response	Number	Percentage
I have been consulted for every action taken while a demarcation of forest border was made.	Strongly disagree	9	3.69%
	Disagree	203	83.2%
	Agree	32	13.11%
	Strongly disagree	0	0
	Overall Total	**244**	**100**

Source: Household survey, 2016

The above table showed that majority of respondents believed as they neglected from consultation from each and every actions while demarcated the forest border. From the total respondents, only 13.11% of them were consulted properly. From this it can be concluded that engagement of local communities were not sufficient. Thus, the community based resource management of the study area was not also full-fledged. According to Figueroa *et al.,* (2009) argued that the successful conservation and development demands the simultaneous participation of different stakeholders such as professionals, governmental institutions, NGOs and local communities.

4. Conclusion

The demographic and socio-economic factors determining the households to own more farmland in the forest region and establish as base for residence was analyzed using binary logistic model. The Wald statistics indicated the existence of interaction between the dependent and independent variables. Subsequently, education status, grassland and farmland size outside of forest region, expert visit and knowledge of forest border had negative regression coefficient to own home in the forest region at statistically significant at 5% probability level. But, residence time had positive regression coefficient and significant at 5% probability level.

In the study site, *Oromia* Forest and Wildlife Enterprise and Ministry of Agriculture and Rural Development were identified as major actor institutions. Thus, overriding role, absence institutional structure at the ground (at local level) and increased competition for benefits generated than preservation were exacerbated the encroachment of local communities to the forest region. Similarly, lower legitimacy of institution working on the forest of an area and absence of community consultation during forest demarcation minimized local communities' commitment to preserve the forest and ride out of forest region.

5. Recommendations

Based on the above results, the following recommendations are provided in relation to study area context:

- Involvement of local communities' in every steps of the highland forest region conservation. Thus, the concerned institutions should empower local community for every solution and increase perception before its implementation.
- The study site forest area supports the livelihood of the communities in the nearer to forest region and in the downstream. Diversification of their livelihood through proper study of agriculture and ecological tourism potential of the local area. Hence, local administration should work on livelihood diversification to enhance the income of local communities.
- Even though institutions established in certain area have greater role for enhancing effectiveness of activities, improper power division will lead them to role confusion. Hence, to minimize the growing challenge among institutions in the study area, the *woreda* natural resource department should take the responsibility to preserve the forest due to its nearness to the local community.
- There should be non-governmental organizations (NGOs) working on livelihood enhancement and natural resource management in the area. Thus, it supports governmental institutions in multi-

dimensional ways.

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