



## IMPACTS OF RESETTLEMENT ON WOODLAND DEGRADATION IN ABOBO WEREDA, GAMBELLA, ETHIOPIA

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### ABSTRACT

This study was conducted to assess the impacts of resettlement programme on woodland degradation in Abobo wereda. Land sat images from 1987, 2002 and 2009 were used to produce three maps of the respective years using GIS with field verification. Data from satellite images, coupled with field observation and socio-economic

survey revealed an effective approach for analyzing the extent, rate and spatial pattern of Land use land cover change. The result shows that seven land cover categories, namely forest land, wetland, woodland, farmland, bare land, water body and grassland have been identified. The general trends observed from 1987-2002 was a decrease in forest land at the rate of -0.51ha/year, grassland at the rate of -1.467ha/year and woodland reduced with annual rate of -2.837ha/ year. A corresponding increase was observed in farmland and settlement area with the rate of 37.3ha/year and bare land increase with the rate of 9.50ha/year. Similarly, between 2002 and 2009, bare land and farmland continued to increase with the mean annual rate of 859.43ha.year and 9.88ha/year respectively. Whereas the reduction of forestland and grassland more or less in similar pattern with the rate of -1.27ha/year and -10 ha/year respectively.

**KEYWORDS:** Resettlement, Environmental impacts, Woodland degradation, and LU/LCC.

### INTRODUCTION

Ethiopia has experiences of population resettlement since 1960s either spontaneous or planned. Since the 1970s, peasants were resettled in large-scale state-enforced programs from the drought-prone and degraded central Ethiopia to the forested areas of the south-west. More than half million people were resettled by the Derge Regime mostly in the lowland areas of

western and southern parts of the country in response to the 1984/85 famine (Dessalegn, 2003b).

The country is characterized by extreme poverty, high population growth rate, severe environmental degradation and recurrent drought. These caused poor performance of agricultural production for several years. This shows that the prevalence of food insecurity, both chronic and transitory is affecting the life of considerable proportion of the population of the Country (Markos, 1997). These conditions forced the people from the northern and central highlands to move to the northwestern, south and southwestern parts of the country for resettlement both planned and spontaneous. Such movements resulted in population increase, consequently leading to environmental degradation, and depletion of natural resources (Paterson, 2007).

Hence, to address these environmental and livelihood problems the government of Ethiopia has designed different policies and strategies even though the level of performance or implementation varies from regime to regime. One of the major developmental programmes is resettlement. Therefore, massive resettlements were undertaken during the Imperial, *Derg* and Ethiopian People Revolutionary Democratic Front (EPRDF) led governments. Ethiopia like several other developing countries has embarked on planned resettlement undertakings since the late 1950s (Eshetu and become, 1988).

The present government has also planned voluntary resettlement programmes as formulated in the national strategy. The strategy published in March 2002, states that the voluntary resettlement programme will be carried out intra-regionally and the main idea behind the governments plan for the resettlement programme is to put the underutilized land under economic use resulting in improvements of the welfare of the resettled people and contributing to economic growth (CFS, 2003).

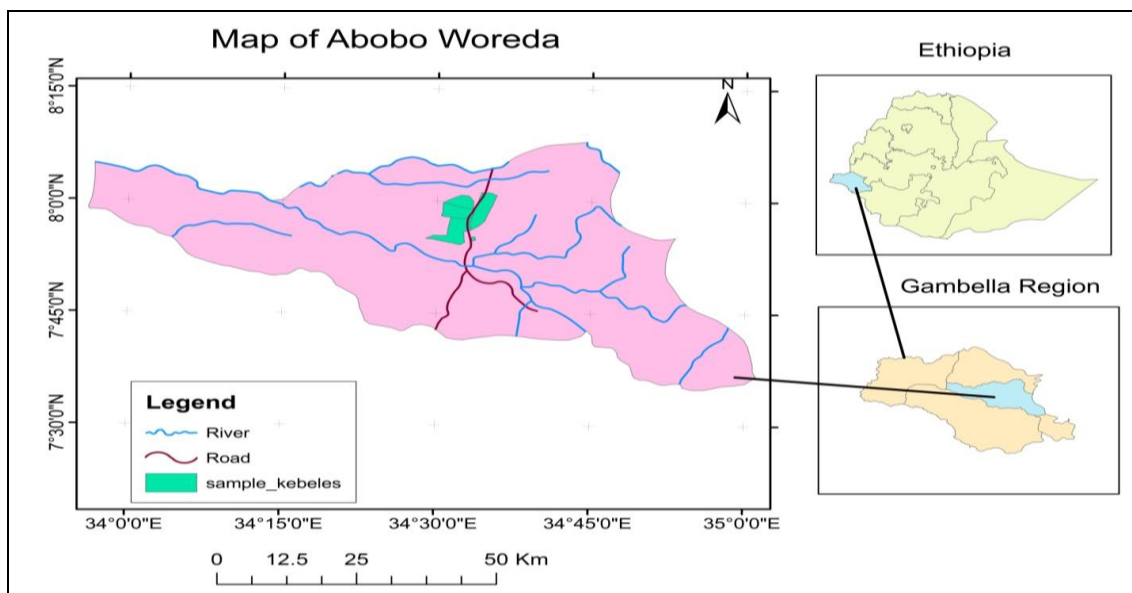
Gambella region, which is rich in flora and fauna species, was the second largest resettlement area in the country during the 1980s resettlement schemes (Mengistu , 2005). At these time, some 50,000 to 60,000 resettlers from the Ethiopian highlands were relocated and approximately 366,000 refugees from southern Sudan were also settled in the region (Kurimoto, 2005).

The combined effects of these resettlers and refugees have a tremendous impact on the environmental resource base of the region particularly on woodlands that are the most important resources in the region. Some studies showed that the natural vegetation of the region is currently under very serious and widespread damage including the disappearance of plant species and wild animals and loss of complete ecosystem at an alarming rate. The forest area of the region including woodland is dwindling fast as trees are excessively being cut for resettlement, commercial farming, shifting cultivation, housing and fuel (G/markos, 1999). Therefore, the woodland vegetation is under immense pressure from resettlement.

## MATERIALS AND METHODS

### Description of the study area

The study area, Abobo *Woreda*, is one among the five *Woredas* of Agnwa zone found in Gambella People's Regional State. It is located 813 Kms southwest of Addis Ababa and 47 Kms south of Gambella (the capital of the region). Geographically, it lies between 07°45'00"–08°00'00" north latitudes and 34°30'00"–34°45'00" east longitudes. The *Woreda* bordered with Gambella zuriya *Woreda* to the north, Etang special *Woreda* to the northwest, Goge *Woreda* to the south, Jikawo and Jore *Woredas* to the west, Mengeshi *Woreda* and Oromiya Regional State to the east. It covers a total area of 361324.58. Km<sup>2</sup> and has 16 rural *Kebele* administration and one urban administration ((AWoFED, 2007; CSA, 2007). The terrain of the *Woreda* can be mostly characterized by vast flat landscape and slightly Plateau to the east. The altitude ranges from 460 to 1650 m.a.s.l. The major water bodies in this *Woreda* include river Alwero and lake Alwero (artificial).The *Woreda* has two agro-climatic zones. These are Woinadega (10%) and Kolla (90%). Accordingly, the mean annual minimum and maximum temperature of the *Woreda* ranges between 18°C and 39°C, respectively. In this area the temperature experiences very hot during the months of February and March and it reaches to 45-47°C. The average annual rainfall ranges between 900-920 mm. and the main rainy season in the *Woreda* is from mid-April to October (NMSA-Gambella branch, 2014)



**Figure 1: Map of the study area (Source: Redrawn from Ethio-GIS data base (1994)).**

### **The Research Design and Methods of Data Collection**

This study was a mixed type of research evolving both qualitative and quantitative methods in combination. The design followed in this research is sequential explanatory strategy by giving more emphasis for quantitative and used qualitative as supplementary for the quantitative data. Identifying the LU/LC and woodland degradation on the study area was analyzed by using bio physical and socio-economic survey data. In order to collect relevant data from the primary sources, this research used different data collecting instruments, which helped to obtain the appropriate information. These were Satellite Imageries and mapping, questionnaires, Interview, focus group discussions and field Observation.

### **Sampling techniques and sample size determination**

There are a total of 17 Kebeles in the study area, Abobo Woreda, where as resettlers are found in six Kebeles. Among these six Kebeles, four Kebeles was selected purposely. Namely: *Chobo mender* (8 and 9), *Chobo mender* (13), *Chobo mender* (11 and 12) and *Chobo mender* (14). Those Kebeles are seriously affected by woodland degradation .To determine sample size, formula developed by Yamane (1967) was employed. Therefore, 292HHs were included in the study (table1). Random sampling method was used to select respondents.

**Table 1: Selection of sample households (HHs)**

<b>Resettlement site/Kebeles</b>	<b>Total number of HHs (%)</b>	<b>Sampled HHs</b>
Chobo mender 8/9	423(39)	113
Chobo mender 13	247(23)	66
Chobomender 11/12	220(20)	59
Chobo mender 14	200(18)	54
Total	1090(100)	292

Source: From the offices of sampled Kebeles, (2014).

### **Data Analysis**

Since the data collected were qualitative and quantitative in nature, this research relied on both quantitative and qualitative data analyses. The data generated from key-informants interview, FGD and field observation were analyzed by using qualitative techniques. Concerning quantitative data, household sample survey data were coded and entered into a computer for analysis, using the computer software SPSS 16.0. Computation of descriptive statistic such as mean, percentages, frequency, pie charts and tables were used to organize, analyze and interpret the result of the study.

The other method of data analysis was done by using GIS. Land use and land cover mapping of Abobo wereda was carried out by standard methods like DIP supported ground truthing, for this purpose digital data (satellite imageries) were procured from EMA and down loaded from GLCF. Before image processing; image enhancement, transformation and classification, pre-processing had been done for muliti-spectral band. The changes in various land use/land cover categories for 1987, 2002 and 2009 were detected by overlying the three maps. Maps derived from satellite imageries constituted another forms of data presentation. Maps and tables were used to present the LU/ LC for 1987, 2002 and 2009.

Finally, the quantitative analyses of the data from the questionnery, satellite images and the qualitative analyses of the data generated through deep interview with key informants, focus group discussion and observation were integrated.

## **RESULT AND DISCUSTION**

### **Land use / land cover from 1987up to 2009**

Based on land sat imageries of the year 1987, 2002 and 2009, six major LU/LC type were identified for 1987 and seven types for 2000 and 2009 in the study area. The major LU/LC types include woodland, forestland, grassland, wetland, farmland, water body and bare land

(table. 1). FAO (2004), land cover classification legends were adapted with the little modification to distinguish the cover classes in the area.

**Table 2: Land use land cover types of the study area and their description.**

LU/LC TYPE	DESCRIPTION
Forest land	A vegetation type, which is dominated by trees forming a continuously closed, deep and complex, often multistoried, canopy rising up to 30 meters.
Wood land	Vegetation type dominated by heavily branched trees with heights from 5 to 20m and whose flat crowns do not form closed canopy (the verge canopy cover is over 20%).The ground is covered with grasses, herbs and shrubs.
Grassland	A land, which is permanently covered by grass. It may include trees of >5m tall growing occasionally with canopy coverage of less than 20%
Wetland	A land that is wet. This includes open water, seasonal swamps or Marshes
Farm land	A land that is being cultivated.
Bare land	Land that has no apparent vegetation cover. It is either in the form of exposed rock or exposed soil for A longer period.
Water body	A large accumulation of water, generally on the planet's surface, such as oceans, seas and lakes, river and streams.

Source: FAO, (2004)

### **Pattern of land use land cover in 1987**

Land use Land cover analysis for the year 1987 from satellite image showed that six-land use land cover categories were, forest, wetland, woodland, farmland, bare land and grassland. But in this satellite image, water bodies are not existed. Because, Alero dam was built after 1987. As result, the land use /land cover classification of 1987 indicate that 211210.6 ha (58.5%) was covered by forestland, 13124.6 ha (3.6%) wetland, 15825.5ha (4.4%) woodland, 232.7ha (0.1%) by bare land, 7500.9ha (2.1%) farmland and 113431.8 ha (31.4%) was grassland. The land use land cover classification for 1987 from land sat image (figure .2) showed that the largest part of the study area was under forest and grassland.

### **Pattern of land use land cover in 2002**

The Land use land cover analysis for 2002 form land sat7 ETM+ imagery ascertained that the forest land, wetland and woodland accounted for,194848.4ha(53.9%),17253.8ha (4.7%) and 9089.1ha (2.5%) respectively, while Bare land ,farm land, Grassland and water body covered 563.3 ha (0.2%),49468.7ha (13.7%),(88465.9ha(24.5%) and 1635.5ha (0.5%) respectively. The largest part of the study area was covered by forest 194848.41ha (table .3).

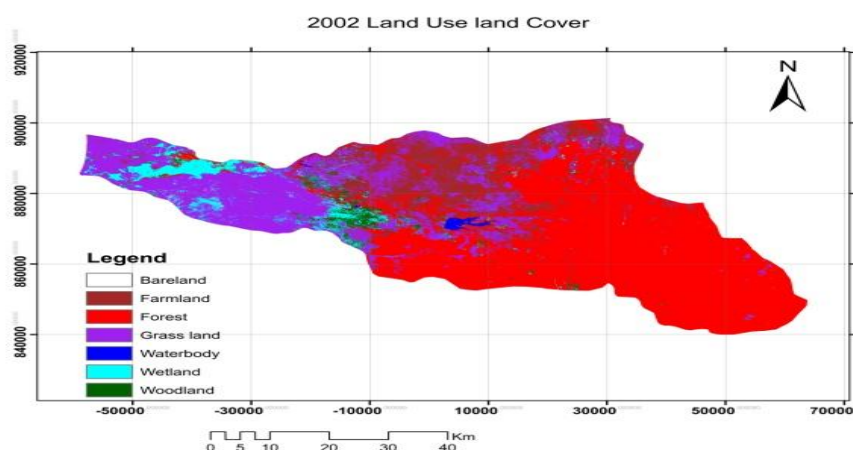
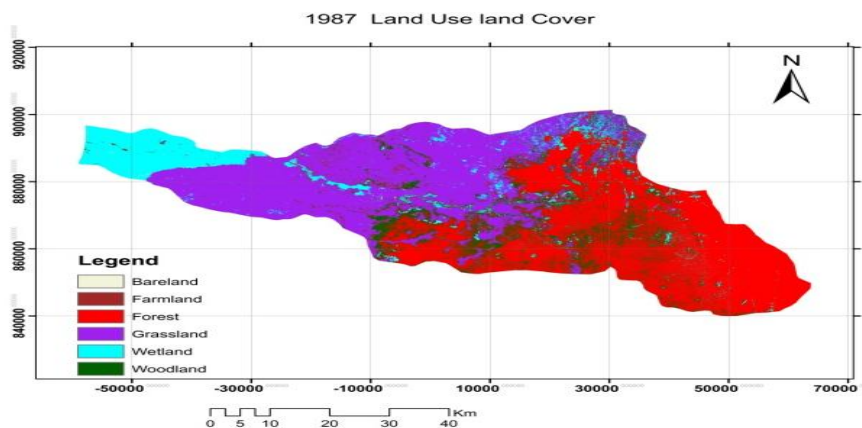
### Pattern of land use land cover in 2009

The result of the land use land cover classification from 2009 land sat ETM image indicates that 177406.7ha (53.9%) area was covered by forest, 17226.5ha (4.8%) wetland, 21177.8ha. (2.52%) woodland, 34450.9ha (0.2%) bare land, 83714.5ha (13.7%) was farmland, 25814.98ha (24.48%) was grassland and 1533.5ha (0.56%) was water body respectively. The largest part of the study area was covered by forest 177406.7ha (53.9%) (Table, 3).

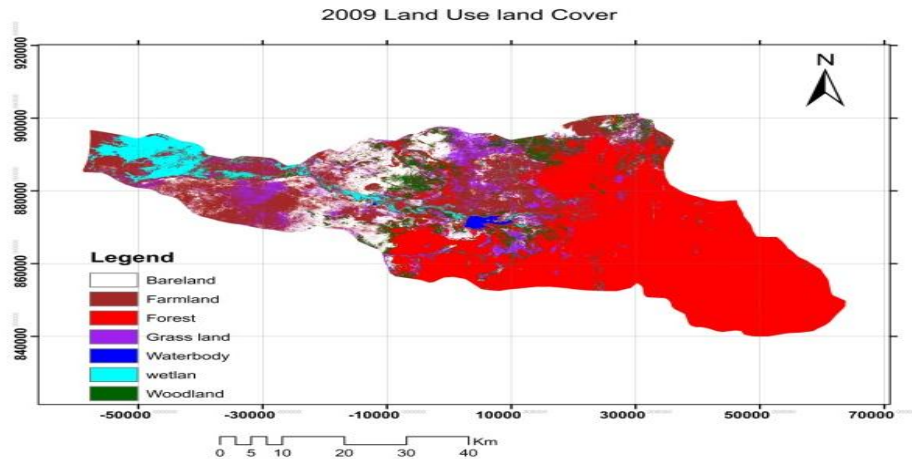
**Table 3: LU/LC classes, their corresponding areas 1987-2009**

Lu/LC type	LULC in 1987		LULC in 2002		LULC in 2009	
	Area in ha	Area in %	Area in ha	Area in %	Area in ha	Area in %
forest	211210.6	58.5	194848.4	53.9	177406.7	53.9
Wetland	13124.6	3.6	17253.8	4.7	17226.5	4.8
Woodland	15825.5	4.4	9089.1	2.5	21177.2	2.5
bare land	232.7	0.1	563.3	0.2	34450.9	0.2
Farmland	7500.9	2.1	49468.6	13.7	83714.4	13.7
Grassland	113431.8	31.4	88465.9	24.5	25814.9	24.5
Water body	0	0	1635.5	0.5	1533.4	0.56
Total	361324.42	100.00	361324.42	100.00	361324.42	100.00

**Source:** Data generated from Land sat TM, 1987, ETM+, 2002 and ETM+ 2009







**Figure 2: land use/land cover 1987-2009 (Source: Ethiopian Mapping Agency).**

### LAND USE AND LAND COVER CHANGE DETECTION.

The extent of LU/LC change in the study area is an important aspect of change detection. It is used to determine what is actually changing to what category of land use/cover type and to what extent (i.e. which land use class is changing to other type of LU/LC class is changing to the other LU/LC types). This information will also serve as a vital tool in planning and management decisions. This process involves a pixel-to-pixel comparison of the study year images through overlay analysis. The LU/LC change matrix depicts the directions of change and the land use types that remain unchanged at the ends of the day

#### LU/LC change detection from 1987 up to 2002

As indicated in the methodology part of this study, the change detection was made based on the classified maps of 1987 and 2002. When 2002 land use land cover classification compared with 1987 land use land cover classification, there is change that shows decrease or increase in particular land use land cover type. The land use land cover categories that shows increase are wet land, bare land, farm land and water bodies amounted to 4129.5ha, 331.1ha, 41968.0ha and 1635.5ha respectively and also the average rate of change for these LU/LC classes were 2.097 ha/year, 9.5ha/year, 37.3ha/year and 6.67 ha/year respectively. On the other hand, the land use land cover categories like forest land, woodland, and grassland showed decrease amounted to -16361.83 ha, -6736.26 ha and -24965.93ha also the average rate of change for these LU/LC classes was -0.516 ha/year, -2.83 ha/year and -1.467 ha/year respectively.



The study area land sat Image of 1987 and 2002 was analyzed and land cover maps produced. Figure 1 showed that the forestland, woodland and grassland cover change were the main feature that can easily be detected in the study area. The reasons behind this could be many, but in the conservation strategy of Gambella (CSG) which is prepared by BOBED in 2000, the major factors that have caused and being causing deforestation and degradation in the study area are clearly sorted out as farm land expansion, fire, development works, fire wood and house construction.

All these factors become highly pronounced with the existence of resettlers in the study area, following the increase in population and their dependence on forest resources. Large cleared and burned vegetation areas by resettlers to be used for agriculture are common observable phenomena in Abobo resettlement area. Due to this the natural vegetation cover of the study area especially, forestland, woodland and grassland are shrinking from time to time. Besides their direct dependency and pressure, resettlers have various indirect impacts on the woodland and forestland resource of the study area.

#### **LU/LC change detection from 2002 up to 2009.**

When the 2009 LU/LC classification compared with 2002 LU/LC classification, there were changes that showed decrease or increase in particular land use land cover. The land use land cover categories, which showed increase are woodland, bare land and farm land accounting for 12088.16ha, 33887.67ha and 34245.77ha and also the average rate of change for these LU/LC classes was 19 ha/year, 859.4ha/year and 9.88 ha/year respectively.

On the other hand, the land use land cover categories like forest land, wetland, grass land and water bodies showed decreasing pattern to -17441.66 ha, -27.27 ha, -62650.91ha and -102.10ha and also the average rate of change for these LU/LC classes was -1.28ha/year, -0.0023ha/year, -1.467 ha/year and -0.89 ha/year respectively.

As can be seen from table 4, b/n 2002 and 2009 bare land increased with mean annual rate of 859.43 ha/year followed by increase of farmland and settlement area by 9.88ha/year and woodland also increased by 19ha/year. During this year, the woodland cover was increased. Due to, the area that was changed from other land use /cover types to woodland was large, as compare to the amount of woodland lost to other land use types (Table 3). The reduction in forest land, grassland and water bodies with the rates of -1.279ha/year, -10.117ha/year and -0.89ha/year respectively. Similarly, wet land decreased with slightly with the rate of -

0.022ha/year. As compare to previous years, an absolute reduction was recorded in forestland, wetland, grassland and wet land between 2002 to 2009.

The massive reduction in those land use/land cover type b/n 2002 and 2009 was related to the expansion of agricultural land b/n 2002 and 2009 in the study area. Therefore, the most substantial changes in the area in land cover is decrease in forest land, grassland, water bodies and wet land through changes in to other cover types. The increasing demand for cultivated land, fuel wood, and forest product for construction and for settlement must have contributed to the deterioration of forest and grassland. As result, these changes may be responsible for the lower tree species diversity in cultivated land and grassland types in the study area.

#### Rate of woodland cover and land use change

The following formula was used to estimate the rate of changes of land use land cover pattern between 1987-2002 and 2002-2009.

$$RC = \left( \frac{p2-p1}{p1} \right) * \left( \frac{100}{n} \right) = 100 \left( \frac{p2-p1}{p1n} \right)$$

Where:

RC – rate of land use land cover changes/ha/year

P1= previous year land cover

P2= Current year land cover

n= Number of years between p1 and p2.

**Table 4: Rate of change of land use type between 1987- 2009.**

Land use type	Rate of change	
	1987- 2002	2002-2009
Forest	-0.516	-1.279
Wetland	2.097	-0.02
Woodland	-2.837	+19
Bare land	9.503	+859.43
Farmland	37.301	+9.88
Grassland	-1.467	-10.12
Water body	-	-0.89

**Note:** -=minus sign for reduction and +=plus sign for enhance of LU/LC

**Table 5: Land covers classes, their corresponding areas and change for 1987 to 2002 and 2002 to 2009.**

Land use type	LULC in 1987		LULC in 2002		LULC in 2009		Change	
	Area in ha	Area in %	Area in ha	Area in %	Area in ha	Area in %	1987-2002	2002-2009
Forest	211210.6	58.5	194848.4	53.9	177406.7	53.9	-16361.83	-17441.7
Wetland	13124.6	3.6	17253.8	4.7	17226.5	4.8	+4129.47	-27.3
Woodland	15825.5	4.4	9089.1	2.5	21177.2	2.5	-6736.26	+12088.2
Bare land	232.7	0.1	563.3	0.2	34450.9	0.2	+331.06	+33887.7
Farmland	7500.9	2.1	49468.6	13.7	83714.4	13.7	+41968.03	+34245.8
Grassland	113431.8	31.4	88465.9	24.5	25814.9	24.5	-24965.93	-62650.9
Water body	0	0	1635.5	0.5	1533.4	0.56	+1635.47	-102.1
Total	361324.42	100.00	361324.42	100.00	361324.42	100.00		

**Note:** -=minus sign for reduction and +=plus sign for enhance of LU/LC

**Source:** Data generated from Land sat TM, 1987, ETM+, 2002 and ETM+ 2009

The study area land sat Image of 1987 and 2002 was analyzed and land cover maps produced figure 2 showed that the forest land, wood land and grassland cover change were the main feature that can easily be detected in the study area. On the other hand, the land use for farmland and settlement has increased by 11.61 percent in 2002.

The reasons behind this could be many, but in the conservation strategy of Gambella (CSG) which is prepared by BOBED in 2000, the major factors that have caused and being causing deforestation and degradation in the study area are clearly sorted out as farm land expansion, fire, development works, fire wood and house construction.

All these factors become highly pronounced with the existence of resettlers in the study area, following the increase in population and their dependence on forest resources. Large cleared and burned vegetation areas by resettlers to be used for agriculture are common observable phenomena in Abobo resettlement area. Due to this the natural vegetation cover of the study area especially, forestland, woodland and grassland are shrinking from time to time. Besides their direct dependency and pressure, resettlers have various indirect impacts on the woodland and forestland resource of the study area.

**Table 6: Area of LU/LC change matrix of the seven categories of 1987 and 2002 in study area.**

		Land use/land cover classes of 2002								
LU/LC type		Forest	Wet land	Woodland	Bare land	Farmland	Grassland	Water body	Total classes	
Land use land cover classes 1987	Forest	In ha <b>194712</b>	81.20	4947.51	44.35	350.74	11068.1	6.34	211210.3	
	Wetland	In ha 2.43	<b>11785.7</b>	46.70	33.55	463.60	493.40	298.91	12825.43	
	Woodland	In ha 39.10	374.45	<b>3953.68</b>	31.84	3341.24	7938.49	146.53	15678.8	
	Bare land	In ha 4.74	29.08	30.38	<b>102.07</b>	56.89	4.85	4.22	228.01	
	Farmland	In ha 4.84	2.40	48.00	16.89	<b>7217.08</b>	0.14	211.27	7289.4	
	Grassland	In ha 85.30	4980.93	62.80	334.59	38039.10	<b>68960.9</b>	968.20	112463.6	
	Total classe		194848.4	17253.8	9089.07	563.29	49468.65	88465.9	194848.4	359689.1

**Source:** Data generated from Land sat TM, 1987 ETM+, 2002

Table 6 shows that only 194712.00ha of the area that was covered with forestland in 1987 remained the same in 2002. The rest (16498.25ha) was cleared and changed in to other land use/land cover types by 2002. More specifically 81.20ha of forest land was changed in to wet land, 4947.51ha to woodland, 44.35ha to bare land, 350.74ha to farm land, 11068.1ha and 6.34ha to water bodies. In contrast, conversion of other LU/LC types to the forest amounted only 136.41ha compared with 16498.25ha forest lands lost to other land use/cover types (table 6).

Similarly, in table (5) shows that only 3953.68ha of the area was covered with woodland in 1987 remained the same in 2002. The rest (11871.65ha) was cleared and changed in to other land use type by 2002. Specifically 39.10ha of woodland was changed to forest land, 374.45ha to wetland, 31.84ha to bare land, 3341.24ha to farm land and settlement area, 7938.49ha to grassland and 146.53ha to water bodies. As compare to conversion of other LU/LC types to woodland amounted only 5135.3ha compared with 11871.65 ha woodlands lost to other land use/cover types and so on.

**Table 7: Area of LU/LC change matrix of the seven categories between 2002 and 2009 in study area.**

		Land use/Land cover classes of 2009								
LU/LC Classes		Forest	Wetland	Woodland	Bare land	Farmland	Grassland	Water body	Total classes	
Land use/Land cover classes of 2002	Forest	Ha	<b>177321.9</b>	3432.26	12286.21	855.17	762.4	159.98	30.53	194848.4
	Wetland	Ha	9.65	<b>12753.9</b>	500.67	2546.15	239.1	1193.38	10.97	17253.82
	Woodland	Ha	69.46	980.63	<b>7164.60</b>	110.06	143.1	621.07	0.16	9089.07
	Bare land	Ha	0.46	3.82	17.79	<b>186.11</b>	278.4	76.76	0.00	563.3
	Farmland	Ha	0.00	2.09	68.52	8406.38	<b>31625.3</b>	9366.30	0.00	49468.59
	Grassland	Ha	5.32	23.36	1139.43	22327.6	50657.	<b>14312.8</b>	0.16	88465.67
	Water Body	Ha	0.00	30.45	0.00	19.49	9.2	84.69	<b>1491.5</b>	1635.37
	Total classes		177406.8	17226.5	21177.22	34450.9	83714.4	25814.98	1533.4	361324.2

**Source:** Data generated from Land sat ETM+ 2002 and ETM+, 2009

Table 7 shows that 177321.86ha of the study area was covered with forestland in 2002, remained the same in 2009. The rest 17526.55 ha was cleared and changed in to other LU/LC types by 2009. Specifically 3432.26ha of forestland was changed to wet land, 12286.21 ha to woodland, 855.17ha to bare land, 762.40ha to farmland, 159.98to grass land, and 30.53ha to water bodies. During this period, the area that was change from other land use/land cover types to the forest was small and accounted for 84.89ha compared to the amount of forest lost to other types (17526.55ha). Further, only7164.60ha of the study area was covered with woodland in 2002 was still under the same covering in 2009. The rest (1924.47ha) area was changed to other LU/LC types purposely, 69.46ha of woodland area was changed to forest land, 980.63ha to wet land, 110.06ha to bare land, 143.09 to farm land, 621.07ha was to grassland and 0.16ha was to water bodies. In contrast, conversation of other LU/LC types to woodland amounted only (14012.62ha) compared with 1924.47ha woodlands lost to other land use/land cover types and so on.

### **View of resettlers about woodland cover change**

Almost all household respondents agreed on the existence of woodland vegetation in the first phase of resettlement in the study area before 1977. Table 7 shows that about 89.0 percent of the respondents mentioned that the coverage of the woodland vegetation to be very dense and there was savannah grassland in the past in the study area. It was also the habitat of many wild animals such as lion, tiger, pig, monkey, antelopes and baboons. However, these days there are wild animals, which survive in the area such as pig, monkey and hyena. Currently, due to the destruction of habitat most of the wild animals have already disappeared from the area. Ahmed (2005) similarly argued that the recent resettlement program has resulted in

large damage to the natural forest as well as the killings of wild animals in the Haro Tatessa resettlement site. Richard and Mohamed (1996) in their study in the refugees settlements of the Senegal River Valley, have described the decrease in woodland from 28 percent to 9 percent over the 11-year period, whilst the area classified as forest virtually disappeared.

Similarly, Messay (2009) reported that because of alarming increase in population size following the 2003 and 2004 resettlement program in Jiru Gamachu in Central Ethiopia, the dense grasslands and woodland vegetation has been entirely converted to villages, grazing and farming lands. Similarly, Tamrat (2010) also argued that the direct and most significant effect of resettlers in Abobo resettlement is deforestation particularly by farmland expansion, This can be seen from the already lost natural vegetation cover (forest and woodland) of the study area between 1973 and 1987.

**Table 8: Respondents View of woodland cover changes**

Variables		Frequency	%
Was there woodland cover change in the past 30 years?	Yes	260	89.0
	No	32	11.0
	Total	292	100.0

**Source:** Field survey of the study area (2014)

Table 8 illustrates the cover change of woodland in the study area. The participants in focus group discussions argued that woodland and other natural vegetation depletion occurred due to ever-increasing resettler numbers and gives priority to rice production instead of conserve and protect the intact woodland. The clearing of forests has been a long historical process in Ethiopia in general and in the study area in particular and it continues at a conservatively estimated rate of 62,000 ha per year (Leonard, 2003). photo (1) Shows the land previously under woodland vegetation.



**Photo 1: photo capture during field observation at mender 13**

**Table 9: Perception of respondents for status of woodlands.**

Variables	Frequency (%)	
Existence of woodland?	Yes	286(97.9)
	No	6(2.1)
	Total	292(100)

**Source:** Field survey of the study area (2014).

According to the information from key informants, more than 100 hectare of the study area was covered by woodland before 40 years ago. This study showed that before the occurrence of resettlement, the study area was covered by woodland vegetation. 2.1% of households said that, our surrounding was free from woodland vegetation.

The remaining 97.9 percent of the households said that, when we came here our surrounding was covered by woodland vegetation. Nevertheless, today most parts of our area were degraded. The causes mentioned for woodland degradations were expansion of agricultural land by resettlers, investors and state farms, wood collection for home consumption and for sale and increasing the numbers of resettled population (WBISPP, 2001).

Tamrat (2010) argued that the impact of resettlement scheme in Abobo has significantly affected the woodland vegetation of the study area, this is mainly the result of the excessive deforestation and degradation processes occurred on the area within the past three to four decades.

According to one of the Kebeles, leaders in the last three decades woodlands have been depleted for satisfying different needs of the communities. Among the farmers, one of the farmers in the study area said that expanding agricultural activities were the only options sustaining our life. According to the respondent, instead of using the land for woodlands, it was better for us to use for agriculture, because different agricultural products take few times to get the outcomes but in case of woodlands it takes long time to get it out comes. The kebele leader of meneder,<sup>14</sup> also added regarding income generation that agricultural products took the highest contribution than woodland products for local communities.

During discussion with key-informants, they perceived that Immediate income generation being gained from agricultural products was the key solutions for sustaining the communities livelihood rather than income generation which takes long time like that of income being gained from woodland products. Therefore, as was noted earlier, woodland area, had been



changed to agricultural area, at this time, huge hectares of woodland areas were being depleted for the condition that attaining the need of the local communities.

### CONCLUSION AND RECOMMENDATION

Results of this study showed that seven land cover categories, namely forest land, wetland, woodland, farmland, bare land, water body and Grassland. The general trends observed from 1987 to 2002 were decreasing in forest land at the rate of -0.51, grassland at the rate of -1. and woodland at rate of -2.837ha per year respectively. Correspondingly, increase was observed in farmland as well as settlement area with rate of 37.3 and bare land with rate of 9.50 ha per year respectively. Also, between 2002 and 2009, bare land and farmland continued to increase with mean annual rate of 859.43 and 9.88 ha per year respectively. Whereas reduction of forest and grassland more or less in similar pattern with rate of -1.27 and -10ha per year respectively.

During discussion with key-informants, they perceived that woodland area, had been changed to agricultural area, at this time, huge hectares of woodland areas were being depleted for the condition that attaining the need of the local communities. The causes mentioned for woodland degradations were expansion of agricultural land by resettlers, investors and state farms, wood collection for home consumption and for sale and increasing the numbers of resettled population. Therefore the following recommendations are also forwarded.

- Appropriate training should be given to the development agents and extension workers to increase the awareness of the community about the use of natural resources and the need for conservation.
- The agricultural expert at the wereda level and development agents at the kebele should give appropriate environmental education to the resettlers, so that the community will practice, conservation measures compatible with the agro-climatic zone of the area.
- Creating better awareness and full participation of local people and resettlers in environmental protection is crucial.
- Attention should be given to see whether the resettlement activities undertaken within frame work of the overall development and existing conservation strategies of the country and the region to address the issues of sustainability in their developmental activities.

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