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Impacts of human resettlement on forests of Ethiopia: The case of Chamen-Didhessa Forest in Chewaka district, Ethiopia

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Ethiopia has been practicing population resettlement programmes since 1960s mainly as a response to extreme land degradation in the highlands. The programmes were carried out mainly in the lowlands of western, southwestern and southern Ethiopia. Accordingly, 12,305 households (56,715 people) from Eastern and Western Hararghe zones were formally resettled in Chamen-Didhessa forest in Chewaka district. The major aim of this study was to assess the impacts of resettlement on the forest cover between 2004 and 2016. Data about the size of farmland held by the respondents and other issues related to the forest were randomly collected from 360 households from four sites through semi-structured questionnaires. Data were analyzed using descriptive statistics. Of the 54,200 ha of the natural forest, 38,906 ha (72%) was cleared by the government during the preparation for the resettlement programme in 2004. About 58% of the remaining forest land was deforested by the resettlers between 2004 and 2016. The average of farmland possessed by each household was 1.74 ha at the beginning of settlement in 2004 and it increased to 2.1 ha in 2016. The major causes for the forest cover reduction after the settlement were clearing of forest for farmland expansion, forest burning, cutting of trees for firewood, charcoal production and construction wood and logging. The human population increased from 12,305 households (56,715 people) in 2004 to 19,415 households (71,809 people) in 2016. The government has to take measure to rehabilitate the forest and conserve the remaining one.

Key words: Chewaka district, deforestation, forest, forest resource, population pressure, resettlement.

INTRODUCTION

Resettlement refers to a planned or spontaneous phenomenon of population relocation (Dessalegn, 2003). Resettlement can be implemented either voluntary or

forced. When people resettle in a new place under their own initiative, this may be called 'spontaneous resettlement'. If the resettlement is imposed on people

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by an external agent in a planned and controlled manner, it may be called 'planned resettlement' (Gebre, 2002). Planned resettlement seems to be the more appropriate to the Ethiopian context, as it suggests the deliberate moving of people to areas other than their own localities, that is, from places of origin to other locations (Dessalegn, 2003).

Ethiopia has been practicing population resettlement going back to the 1960s under the imperial regime (1930-1974) when, through a combination of spontaneous and planned settlement programmes, a relatively small number of northern peasants were settled in western Ethiopia and the Rift Valley areas (Dessalegn, 2003). The resettlements have been carried out mainly as a response to extreme land degradation and recurrent drought-induced famine (Messay, 2009). The resettlement schemes, past and present, are implemented by settling them predominantly in the lowlands where population densities are low and unutilized but potentially productive and risk free lands. The recent government sponsored resettlement schemes are more planned than the cases of the previous governments (Messay, 2009; Shumete, 2013).

The Imperial Government established the first known planned resettlement scheme in the present day Southern Nations and Nationalities Peoples National State (Cernea, 2000) which involved only 20,000 households (Feleke, 2004). It was during the Military Government (*Derg*) (1974-1991) that intensive and widespread resettlement schemes took place in Ethiopian history. *Derg* argued that the major objective of the program was to promote economic development and improve the living standards of the rural people. Specifically it aimed to ease the tension of farmland scarcity in central and northern parts of the country, combat drought, avert famine, and increase agricultural productivity. However, practically the implementation of the program seemed to have the characteristics of forced or compulsory-voluntary relocation. *Derg* implemented it forcefully and even on quota bases without the consent of the potential resettles (Ofcansky and LaVerle, 2002). The regime resettled many thousands of households at different times mainly from the north, notably Wello, Tigray and Shewa to the lowland areas of western and southern parts of the country, especially Wellega, Kafa, Illu Aba Bora and Gojjam, Gambela, Pawe (in the present day Benishangul-Gumuz National Regional State) and West Gonder (Gebre, 2002; Berhanui, 2007; MoARD, 2009).

The current Ethiopian government in power, Ethiopian Peoples Revolutionary Democratic Front (EPRDF) has also continued the resettlement program whose objective of the scheme remains similar to that of the military regime that is, ensuring food security. Accordingly, 45,000 households were resettled voluntarily in Amhara, Oromia and Tigray regions in the year 2002/2003 alone (Berhanu, 2007). The current resettlement by the EPRDF Government states that the program is based on

voluntary approach. According to the Voluntary Resettlement Programme, each settler household is supposed to be allocated a package of assistance that includes access rights to up to 2 ha of fertile land, seed, oxen, hand tools, utensils, and food rations for the first eight months.

The expansion of agricultural land in the country in general, could be directly related to rapid population growth and resettlement programs (Solomon, 2016). The thinking behind resettlement schemes can be understood in terms of both social protection and agricultural policy goals. Facilitating the relocation of farming families from areas where land is constrained, agricultural productivity is low and agricultural risk is high, to areas where land is more abundant, agricultural productivity is potentially higher and agricultural risk is lower, seems like an effective strategy for reducing vulnerability (a core social protection objective) and raising yields (a core agricultural policy objective). While this sounds like a 'win-win' outcome in theory, in practice resettlement schemes in Africa have more often failed than succeeded, mainly because they are implemented too quickly with inadequate preparation (e.g. providing basic infrastructure and services at the relocation sites, and ensuring that 'open' land is not actually dry season grazing for pastoralists) (Stephen and Bruce, 2007).

Forest cover in some parts of southwest Ethiopia has decreased from 71 to 48% between the years of 1973 and 2005 (Wakjira and Tadesse, 2007). The larger portions of the existing forest are even secondary (planted by man) due to widespread human influence (Kidane, 2002).

The ever-increasing human population coupled with unwise land use and farming systems, unsustainable forms of agricultural intensification, and catchment degradation has resulted in serious degradation of these important forest resources. These coupled with the impacts of climate change leads to economic destabilization and habitat destruction and loss.

Assisted by the government, 12,305 households (56,715 people) from Eastern Hararghe zone and Western Hararghe zone were formally resettled by the government in Chamen-Didhessa forest (54,200 ha) at seven sites in Chewaka district of Buno Bedele zone (formerly part of Ilu Aba Bora zone) of Oromia National State in 2004. The settlers were selected from highly degraded areas where agricultural production was poor and hence experienced chronic food insecurity (COWARDO, 2015). Each household was provided with farmland that ranged between 1 and 2.5 ha (Berhanu, 2007). The people were resettled in dense forest that was not inhabited by people before the resettlement programme and thus the land was under state holding system.

Therefore, the aim of this study was to assess the impacts of state assisted resettlement program on deforestation of Chamen-Didhessa forest of Chewaka

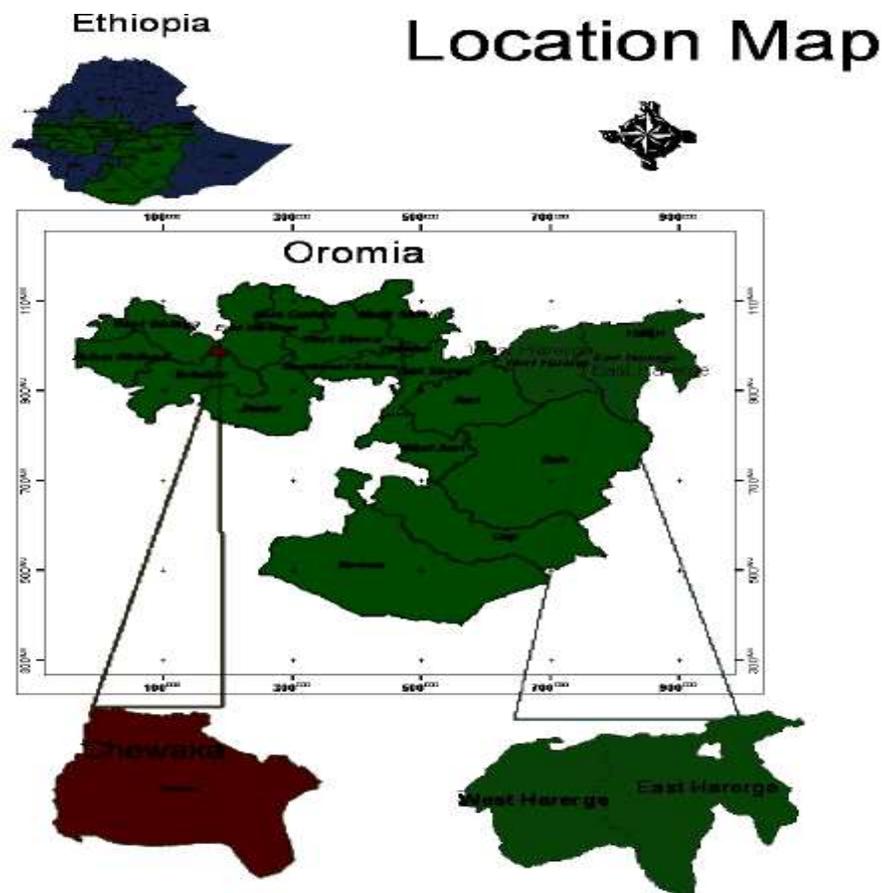


Figure 1. Location map of Chewaka Resettlement Scheme.
Source: Masresha and Ignatius (2013).

district.

MATERIALS AND METHODS

Description of the study area

Chewaka district (Figure 1) was established in 2004 through formal settling of 12,305 households (56,750 people) brought from Eastern and Western Hararge zones by the government. About 38,906 ha of forest land was cleared by the government to resettle the people (COWARDO, 2015). The forest was a home for wild animals such as lion (*Panthera leo*), leopard (*Panthera pardus*), hyena (*Crocuta crocuta*), African buffaloes (*Syncerus caffer*), bushbuck (*Tragelaphus scriptus*), common baboon (*Papio cynocephalus*), warthog (*Phacochoerus africanus*), bush pig (*Potamochoerus larvatus*), python (*Python sebae*), porcupine (*Hystrix cristata*), colobus monkey (*Colobus guereza*), common duiker (*Sylvicapra grimmia*), Vervet monkey (*Cercopithecus aethiops*) among others. Likewise Dhidhessa River which crosses the area is habitat for crocodile (*Crocodylus niloticus*) and hippopotamus (*Hippopotamus amphibius*) (Berhanu, 2007).

Chamen-Didhessa forest is found in Chewaka district, Buno Bedele Zone of Oromia National State. The district is found at about 420 km west of Addis Ababa, covering an area of about 542 km². It is located between 13°40' and 14°27'W and 36°27' and 37°32'S.

The elevation ranges from 900 to 1400 m above sea level. The annual average temperature is 24°C. Annual average rainfall of the district ranges from 1,200 to 1,500 mm. The district is bordered by four districts: at north by Diga (Arjo Gudetu), at south by Dabo Hana, at east by Jimma Arjo, and by Meko at west (CWARD0, 2015).

The major crops cultivated in the area are maize, rice, and sorghum for consumption, while crops like sesame, soybean, khat and coffee are grown mainly as cash crops. Cattle and goats are the major livestock reared in the area. The livestock production systems of the settlers differs from that of the nearby indigenous community in that the former raise less livestock and fatten them for sale (CWARD0, 2015).

Sample size determination and methods of data collection

Data were collected through semi-structured questionnaires with 360 household sample settlers selected by simple random sampling method. Four sites (sites 1, 5, 6 and 7) were purposively selected of the total seven sites of the settlement area based on their accessibility. In total the number of households of the four sites was 6434 (site one with 1684, site five with 1548, site six with 1800, and site seven with 1402 households). Therefore, total sample size required for the study and the sample size of each site were determined by the following formula at 95% degree of confidence, for population less than 10,000 (Sudman, 1976).

Table 1. Percentage of resettlers in Chamen-Didhessa forest by year and types of resettlement.

Time of settlement (year)	Percentage (number)
In 2004	78.33 (282)
After 2004	21.67 (78)
Total	100 (360)
Type of settlement	
Formal	78.33 (282)
Informal	21.67 (78)
Total	100 (360)

$$n = N/1 + N(e)^2$$

where n = total samples included in the study, N = total number of households of selected sites (6434), e = desired level of precision (0.05).

$$n = 6434/1 + 6434(0.05)^2 = 360 \text{ were selected as total sample size}$$

Sample size for each site (n_i) was determined as:

$$n_i = N_i n / N$$

where n = total calculated sample, n_i = sample size of each selected site, N = total households in all selected sites, and N_i = households of each selected site.

Therefore,

$$\text{No. of site one} = (1684 \times 360) / 6434 = 94$$

$$\text{No. of site five} = (1548 \times 360) / 6434 = 87$$

$$\text{No. of site six} = (1800 \times 360) / 6434 = 101$$

$$\text{No. of site seven} = (1402 \times 360) / 6434 = 78$$

The questionnaire administered to the sample settlers was first prepared in English and then translated into the local Afan Oromo language. As majority of the respondents were unable to read and write, the questionnaire was read for each respondent individually by trained field assistants and their responses are written. Data about the size of the forest prior of clearing it for the preparation of the resettlement and the size of the forest land cleared for the resettlement was collected through an interview made with the manager of the Agricultural and Rural Development Office of Chewaka district and secondary data from CWARDO (2015).

Data analyses

Collected data were analyzed using descriptive statistics (percentage, frequency and mean) with Microsoft excel.

RESULTS AND DISCUSSION

Population of settlers and forest size at the beginning of resettlement

As per interview made with the manager of Chewaka District Agricultural and Rural Development Office

(CDARDO), Chewaka district was established for the resettlement purpose by clearing the existing natural forest. The total area of the district is 542 km² (54,200 ha) which was totally covered with forest prior to the 2004 resettlement program. In 2003/2004 about 38,906 ha of the forest was aggressively destroyed by the government for the resettlement programme (CWARDO, 2015) and this shows that only 15,294 ha of forest remained at the time of the resettlement. This shows that about 72% of the forest was cleared by the government at the time of preparing the land for the resettlement purpose.

According to the manager of CDARDO, 12,305 households (56,715 people) were resettled formally in 2004 after which no planned resettlement was carried out. The same source also indicates that 7,110 households settled informally after 2004 and the total number of settlers increased to 19,415 households (71,809 people) in 2016. About 78% ($n = 282$) of respondents mentioned that they were formally settled by the government at the beginning of the resettlement while 22% of them settled later informally (Table 1).

The respondents argued that after the formal resettlement programme of the 2004, informal settlement continued in the forest both from the existing formal settlers themselves (children of the settlers when became independent of their parents) and other people coming from different areas outside the settlement area which contributed for the population increase in the forest. The reasons for the resettlement were mainly to acquire farmland for crop cultivation and forest resource extraction and these were the major causes of deforestation practiced without any control by the local government. In a similar study, Messay (2009) reported that alarming increase in population size following the 2003 and 2004 resettlement program in Jiru Gamachu in Central Ethiopia, the dense grasslands and woodland vegetation have been entirely converted to villages, grazing and farming lands. Messay and Bekure (2011) also noted that in Nono Resettlement sites in Central Ethiopia, the existing high rate of population growth and the resultant newly emerging households seems exerting another immense pressure on land resources in the area. The emerging young households need cultivable land for livelihood purposes. This, undoubtedly, intensifies the conversion and/or modification processes of the land use types. They may be forced to encroach into vegetated lands for cropping, grazing, and settlement. Solomon (2016) noted that forest degradation in Ethiopia is closely linked to the ongoing population growth. More people generally lead to an increasing demand on land for living and for agricultural production. Consequently the pressure on the forest resources themselves increased due to a higher demand on fuel wood and construction timber.

Deforestation and degradation of habitats due to the action of settlers are among the major contributors to current global climate changes and biodiversity losses (Foley et al., 2005). Temperature changes due to

Table 2. Percent frequency (number) of participants' land size possession in 2004 and in 2016 (n = 360).

Land size (ha)	2004		2016	
	Percent (frequency)	Total land size (ha)	Percent (frequency)	Total land size (ha)
0	10.56 (38)	-	-	-
1	5.28 (19)	19	20.28 (73)	-
2	84.16 (303)	606	57.50 (207)	-
3	-	-	17.50 (63)	-
4	-	-	3.89 (14)	-
≥5	-	-	0.83 (3)	-
Total	100 (360)	625	100 (360)	747
Mean		1.74		2.1

deforestation and burning forest lead to altered distribution of vector borne diseases (Magadza, 1995). Human settlements change the well stand of the forest, changes species composition observed in the locality are largely due to transition vegetation types influenced by extraction of green foliage, fire wood, timber and forest products for domestic use by inhabitants of the area. Settlements in the forest reduce the area of the forest, as settlers have no better sources of income, they have no other better alternative of fuel resources than extracting fuel wood from the nearby forest.

Farmland expansion and forest cover change

Besides the impacts of newly incoming informal settlers on the forest, the former formal settlers acquired additional farmlands than they were provided by the government. The size of land owned by settlers at the time of resettlement in 2004 and in 2016 is shown in Table 2. The results of this study revealed that the maximum size of farmland possessed by a household was 2 ha and the average was 1.74 ha at the beginning of the resettlement in 2004. In 2016, the maximum size of land was 5 ha and the average was 2.1 ha. The mean difference was 0.34 ha and this is an equivalent forest land size cleared by each settler within 12 years. Therefore, about 6601 ha of forest land was converted to farmland by the current 19,415 household settlers and the forest reduction rate was 550.1 ha per year. After the implementation of the resettlement program, the forest cover was amazingly declined from 15,294 to 8711 ha between 2004 and 2016 and only about 16% of the forest's spatial coverage remained after 12 years. The findings of this study, thus, indicated that resettlement was one of the major causes for the depletion of natural forests of the district. This result was also in agreement with the interview made with the manager of the district's Agricultural and Rural Development Office who mentioned that though the current forest land cover is not exactly known, it does not exceed 9,000 ha and this

remaining forest is under threat.

Different forests in parts of the country also face similar threats where resettlements were implemented. In Amhara National Regional State, Ethiopia, Teshome et al. (2011) reported that in Metema Woreda woodland coverage that was 232,001 ha (72.8%) before the resettlement of 2003 increased to 201,906 ha after the resettlement while that of Quara Woreda declined from 535,537 to 493,969 ha after the resettlement program.

Impacts of fire on forest

All the respondents agreed that the size of the forest had been declining alarmingly from time to time. Ninety-eight percent (n = 354) of the respondents agreed that the settlers severely affected the forest. They mentioned the underlying causes of deforestation and degradation as clearing and burning of forest (for further farmland expansion and new settlement, hunting wild animals, protecting domestic animals and themselves from some wild animals which attack them), harvesting firewood, charcoal production, and construction wood harvesting. Burning of forest was also evidenced from field observation.

When the settlers used fire for such purposes, sometimes fire went of control and often caused accidents of economic significance (Table 3). All the respondents mentioned that they used fire for preparing their farmlands and only about 11% (41) of them used fire control methods (for a possibility that the fires might go out of control) such as clearing grasses on the farm boundary and around houses.

The need for cultivation and grazing lands, settlements, charcoal production, commercial wood and construction materials have contributed much to the reduction of the forest cover in Ethiopia. In this way, the misutilization of wood production by rural human communities aggravates the degradation and habitat loss of wildlife. Habitat losses and fragmentation caused by human impacts is the greatest threat to the majority of Ethiopia's wildlife

Table 3. The impacts of fire accidents on the livelihood of resettlers in Chamen-Didhessa forest.

Year	Fire accidents	Sites
2012	Sire Gudo First Cycle School, teachers' shelter and properties and settlers' houses were burnt	4
2013	10 ha of maize and sorghum in the field and settlers houses were burnt	6
2014	Settlers houses were burnt and accident to family members of one household	4
2015	Settlers houses were burnt	5, 6
	Bechege Satellite School was burnt	1
2016	Oda Kebena Satellite School was burnt	
	Settlers houses were burnt	1, 5, 6

Source: Interviews with respective site manager of the settlement area.

species (Giller et al., 2001). Whatsoever type it is, most planned resettlement schemes in the world, including that of Ethiopia, has been reported to be unsuccessful and environmentally devastating (Messay and Bekure, 2011).

Dessalegn (2003) reported that government sponsored large-scale resettlement programs that were carried out in the lowlands of western, southwestern and southern Ethiopia during 1984/1985 involved considerable environmental damage by clearing large areas of vegetation to build homesteads, to acquire farmland, and to construct access roads. He also indicated that the scheme failed to adapt farming practices to agro-ecological conditions of the lowlands, and as a consequence the environmental damage involved was quite considerable.

Rowe et al. (1992) stated that people use trees and other tree products for house building, energy sources, due to such needs directly and indirectly affect the forest or plant diversity and also affected by agriculture expansion through cutting for shifting to farmland. All the respondents (100%) mentioned that the main source of firewood and the only source of construction wood was the natural forest and 57% (n = 206) of the respondents used crop residue as source of firewood in addition to natural forest. These combined with clearing and burning of forest inevitably result into forest degradation. The major indigenous trees which the settlers usually used for house construction and source of energy are shown in Table 4.

Impacts of settlement on wild animals

Forest ecosystems contain a large number of biodiversity and when these are cultivated and crops are planted, the huge biodiversity is lost and replaced by few crops and weeds. Animal distribution, biodiversity and density depend on that of plants. Destruction of forest ecosystem threatens animal and plants of the forest and eventually will lead to local extinction of the species. Ukizintambara (2008) stated that habitat loss and fragmentation by human activities affect the survival of wildlife species in

various ways including influencing animal behaviors, reducing of the total amount of usable habitats, degrading habitat quality and creating edge effects. Small population size increases vulnerability of wildlife to extinction especially when human distributions increase. Besides deforestation the resettlement program was also responsible for the killings and fleeing of wild animals. When farmers destroy forests which are habitats of wild animals for the sake of expansion of farmlands and enhancing of grass growth for the livestock, population of wild animals will be affected because of migration and death caused by shortage of food and lack of habitat. All the respondents mentioned that the forest was a home of buffaloes, warhogs, antelopes, baboons, lions, wild pigs, leopards, and hyenas at the beginning of the resettlement. The forest was particularly known for its high buffalo population before the settlement. About 99% (n = 356) of the respondents agreed to the existence of human-wild animals conflict in the area and larger wild animals were highly affected by the conflict. Most of the respondents (91%) agreed that the conflict had been increasing from time to time because of human population increase and alarmingly declining forest cover, illegal hunting and killing of aggressive animals which attack both humans and livestock and damage crops. All the respondents mentioned that they had experience of hunting wild animals for different purposes (Table 5). Due to anthropogenic activities after the settlement, the existence of buffaloes was highly threatened and their habit and behavior was changed and most of them migrated to the nearby Meko forest. The remaining buffalo population became more aggressive and caused severe damage to crops and attacked humans on the farm and in the forest.

Forest conservation and rehabilitation

Resource conservation and rehabilitation in Ethiopia in general is very limited as compared to its loss and degradation (Berhanu, 2007). The removal of trees without sufficient reforestation has resulted in damage to

Table 4. Major indigenous trees cut by the resettlers from Chamen-Didhessa forest of Chewaka district.

Plants' scientific name	Local name (Afan Oromo)	Purpose
<i>Cordia africana</i>	Waddeesa	Timber (logging), farm utensil, firewood and house construction
<i>Ficus wasta</i>	Qilxuu	House construction, firewood and charcoal preparation
<i>Syzygium guinense</i>	Goosuu	House construction, firewood and charcoal preparation
<i>Podocarpus falcatus</i>	Birbirsu	House construction and firewood
<i>Acacia spp.</i>	Laaftoo	House construction, firewood and charcoal preparation
<i>Erythrina abyssinica</i>	Waleensuu	House construction and firewood

Table 5. Respondents' views towards reasons for hunting wild animals in Chamen-Didhessa forest of Chewaka district (n = 360).

Purpose of hunting wild animals	Percent (number)
Food (flesh)	33.33 (120)
Skin (hides)	13.33 (48)
Culture	1.67 (6)
Protecting properties and self defence	51.67 (186)

habitat, biodiversity loss and aridity and deforested regions often degrade into wasteland (Tigabu, 2016). Most of the respondents (96%) mentioned that no measure was taken by the settlers to conserve the forest and other resources in the forest. The rest of the respondents (4%) mentioned that measure was taken by the society like by advising those people who cut and burn the forest. About 74% (n = 266) of the respondents agreed that the government did not take any measure to mitigate forest damage related to settlement, while 26% (n = 94) mentioned that some measures had been taken by the government such as advising people to stop cutting trees, planting tree seedlings when cutting trees for replacement, though these measures were loose and inconsistent and thus brought no measurable results which calls for appropriate awareness creation.

Wise use of forest resources is crucial for sustainability of the forest and trees should be replaced by planting seedlings. However, most (91%) of the respondents mentioned that they did not engage in tree planting on their farmlands and homesteads which could substitute the wood products from the natural forest and the rest of the respondents (9%) the planted only mango trees. Similarly, Teshome et al. (2011) reported that in the resettlement areas of Metema and Quara districts, in general, natural resource degradation was moving at an alarming rate, resettlers' total level of participation in natural forest protection and tree planting was found to be at low level because of lack of awareness. They also reported that 95.8% of respondents in Metema and 92.3% in Quara never engaged on private land conservation practices after the resettlement program. Similarly, 53.5 and 52.1% in Metema and Quara, respectively never participated on communal land

conservation practices in their new resettlement areas.

Conclusion

The results of this study revealed that the resettlement resulted in severe deforestation of Chamen-Didhessa forest. Of the 54,200 ha of the forest, 38,906 ha (72%) was cleared by the government during the preparation for the resettlement programme in 2004. The remaining 15,294 ha of the forest cover was declined to 8711.1 ha in 2016 within 12 years. The major causes for forest cover reduction after the settlement were clearing of forest for expansion of farmlands, forest burning, population growth and immigration of people settling informally in the forest, cutting of trees for firewood, charcoal production and logging. The existing high rate of population growth and the resultant newly emerging households seems exerting another immense pressure on the forest cover. The human population in the settlement area increased from 12,305 households (56,715 people) in 2004 to 19,415 households (71,809 people) in 2016 thus it had its contribution for the deforestation. The wild animals in the settlement area were also affected due to lack of sufficient food and habitat because of deforestation and killing by the settlers for different reasons. Unless appropriate environmental protection and rehabilitation measures are taken soon, the remaining forest will be entirely deforested within very short period of time and the problem will expand to the dense forests of the neighboring districts of Dabo, Meko, and Jimma Arjo. Hence, it is imperative to take all the necessary measures by the local government offices, NGOs, and other concerned bodies to rehabilitate the

deforested environment and conserve the remaining forest.

Recommendations

Depending on the results of this study the following points were put forward as recommendation.

- (1) Awareness raising activities should be conducted about conservation of forests, wildlife, and proper utilization of other national resources in a sustainable and environmentally friendly manner.
- (2) The government should not resettle people in forests for future possible resettlements.
- (3) The responsible governmental bodies should control any further informal settlement to reduce the pressures exerted on the forest by increased population.
- (4) Encouraging the community to implement agroforestry practices by planting trees in the farm and homesteads.
- (5) Promoting planting and use of trees like Eucalyptus as alternative for firewood and construction material.
- (6) The local government should control the sale of wood and charcoal in the forest area, on road and local markets.
- (7) Assisting farmers by giving them agricultural inputs and new farming techniques to enhance high crop yield from a small plot of land.
- (8) Reforestation activities should be launched in deforested and degraded areas by actively involving the settlers.
- (9) The resettlement schemes in Ethiopia lacked environmental considerations. Therefore, the outcomes of this study could be used as an important indicator for decision makers to make environmental impact assessment for possible future resettlement programs.

CONFLICT OF INTERESTS

The authors have not declared any conflict of interests.

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