

Case study on contribution of beekeeping to the income generation of the households bordering Menagesha suba State Forest:

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Abstract: The study was designed to assess the contribution of beekeeping for income generation and sustainable forest conservation in Menagesha suba state forest. For this purpose a total of thirty households bordering the Menagesha suba state forest were purposively selected for demonstration of beekeeping technology and socio economic survey. Beekeeping training was provided on how to manage bee colonies, honey harvesting and processing and integrations of beekeeping with natural resource conservation. Data on honey yield and types of plants found around home garden were collected. On top of this household interview was undertaken on the annual income obtained from honey, field crops and charcoal sales were interviewed before and after improved beekeeping intervention. Accordingly, the mean annual honey yield, annual charcoal production, type bee forages and number of transitional hives owned are significantly different among the sample households ($P<0.05$). The annual production of honey by sample participants was 244 and 1005 Kgs and total revenues 12,200 and 70350 Birr. The honey yield has increased by 4 fold (411%) and the revenue increased by **5.76 folds** (576%). On the other hand annual charcoal production and its revenue reduced by 72.8% and 43% respectively. The bee forage development has increased from 11% to 88% or grown by 8 folds. Therefore integration of beekeeping technology with conservation of forest will enhance the income of household and encourages planting of bee forages which directly contributes for sustainable forest managements. Thus beekeeping should be considered as incentive for the conservation of the forest particularly for participatory Forest management program for sustainable honey production and to increase household income.

Key word: conservation, Beekeeping, income generation

Introduction

Forests are critical in providing water and fertile soil hence food, fiber, fuel, and drugs (Legesse Negash, 1995; Thomas and Balakrishnan, 1999). Unfortunately, land clearance for various purposes led to increased forest product scarcity that in turn resulted in increased demands and led to further forest destruction (Legesse Negash, 1990). As a result, the closed natural forest, which in the 1930's covered more than 35% of the country, has now been reduced to less than 3% (FAO, 2001, 2003). Consequently, massive soil erosion, unusual flooding, and declines in agricultural productivity are now rampant throughout Ethiopia (Legesse Negash, 2002; Zerihun Woldu *et al.*, 2002). The low standards of living of the people coupled with lack of alternative option to alleviate poverty are some of the factors responsible for aggravating deforestation. This in turn results in increased poverty of the rural inhabitants, which also affects urban dwellers economic conditions. To alleviate this problem looking for alternative technologies which friendly to the environment is crucial. Introduction of improved beekeeping technologies is an alternative income generating activities which can be appropriate solution for sustainable development in general and forest conservation in particular.

Beekeepers are more aware about the importance of conservation of natural resource than the any ordinary farmers. This is because beekeepers conserve the forest or fragmented large trees for hanging beehives and to remain the plant to stay long with flowering so that they could collect honey frequently. Many experiences showed that beekeepers not only try to maintain the natural vegetation in their surrounding but also plant trees in their home garden and farm lands which contributes for plant species richness and diversity.

The Menagesha suba state forest has social, economical and ecological significance for local community of which beekeeping is one of the major income generating activity. According to (Admassu *et al.* 2008), the floristic composition of the forest is potential for beekeeping and the forest contributes for the income generation for the surrounding communities. However, it is currently under human pressure due to encroachment, agricultural expansion and unwise exploitation of the forest products. Therefore, in this improved beekeeping technology demonstration, an attempt was made to assess the contribution of beekeeping for household income generation and forest conservation for the people bordering Menagesha suba state forest.

Materials and methods

Description of the project area

The study was conducted in Menagesha- suba state forest which is located in central Ethiopia, southwest of Addis Ababa in Oromia regional state. The total area of the suba forest is about 3860ha. Of this total, 1360 ha of the land is covered by plantation forest and 2500ha is the natural forest.

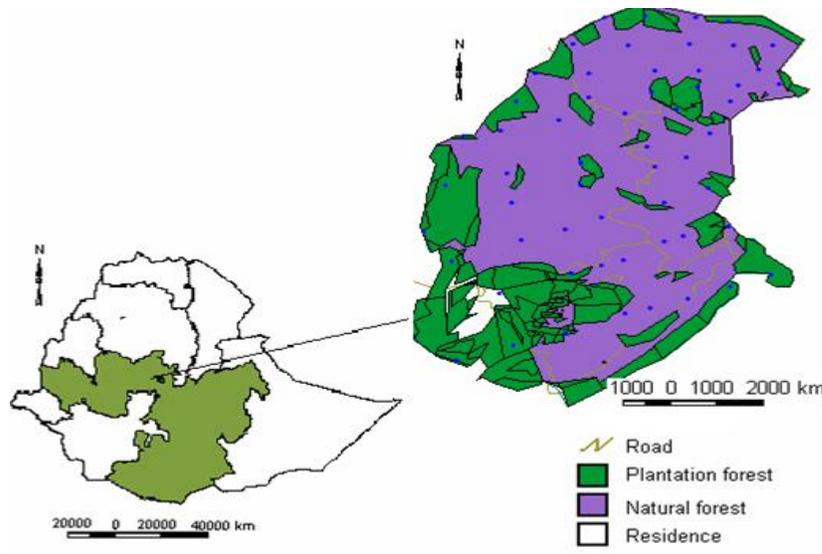


Figure 1. Map of the study area

Selection of the village adminstartion

Proximity to the forest is factor that was considered in this study. Due to logistic limitations only two PAs close to the forest were selected for demonstration of the technology (Nanoo Suba and Geresu sidda). People who practice charcoal production for their daily livelihood requirement were purposively selected. From each PAs, one FRG group which consists of 15 members was established. A total of thirty households were selected to conduct demonstration of locally made transitional beekeeping hives and socioeconomic data collection.

The impact of beekeeping demonstration on livelihood of the community was assessed based on house hold interview using structured questionnaire before and after beekeeping intervention. This includes household land uses, farm sizes, major crops grown; tree species preferences for charcoal production, the frequency and annual production of charcoal, beekeeping management practices and income from the sale of honey were interviewed.

Top bar hive demonstration and training

The two chefeka beehives were constructed and provided for each participant for honey production. On top of this the training was provided how to construct the chefeka hives, seasonal bee management and importance of integrating beekeeping for forest conservation and sustainable honey production. After training the chefeka hives were occupied with bee colonies by transferring from traditional hives. Then honey was harvested and recorded from FRG members. The data was analyzed using paired independent t- test.



Figure: Training of farmers on Transitional hives

Results

According to improved beekeeping demonstration and socio economic assessment, the mean annual honey yield, annual charcoal production, bee forage planting practice and number of transitional hives owned by the beekeepers are significantly different between the sample households ($P < 0.05$) before and after beekeeping intervention but the number of traditional hives owned was not significantly different between the household (Table 1). The average annual production of honey by household was 8.kg and 33.3 kgs and the total annual production of

honey are 244 & 1005 kgs and the total revenue 12,200 & 70,350 Birr before and after beekeeping intervention respectively. The total honey yield has increased by four fold (411 %) and the annual revenue increased by 576% (5.76 folds) after beekeeping intervention. Twenty eight (28%) of the beekeepers stated that the revenue obtained from sale of honey is used for land rent and to pay government tax. On the other hand a few beekeepers stated that the money from honey sale used to pay school fee and to purchase draft animals.

Figure2. The percentage of household consumptions from honey sales from sample participants

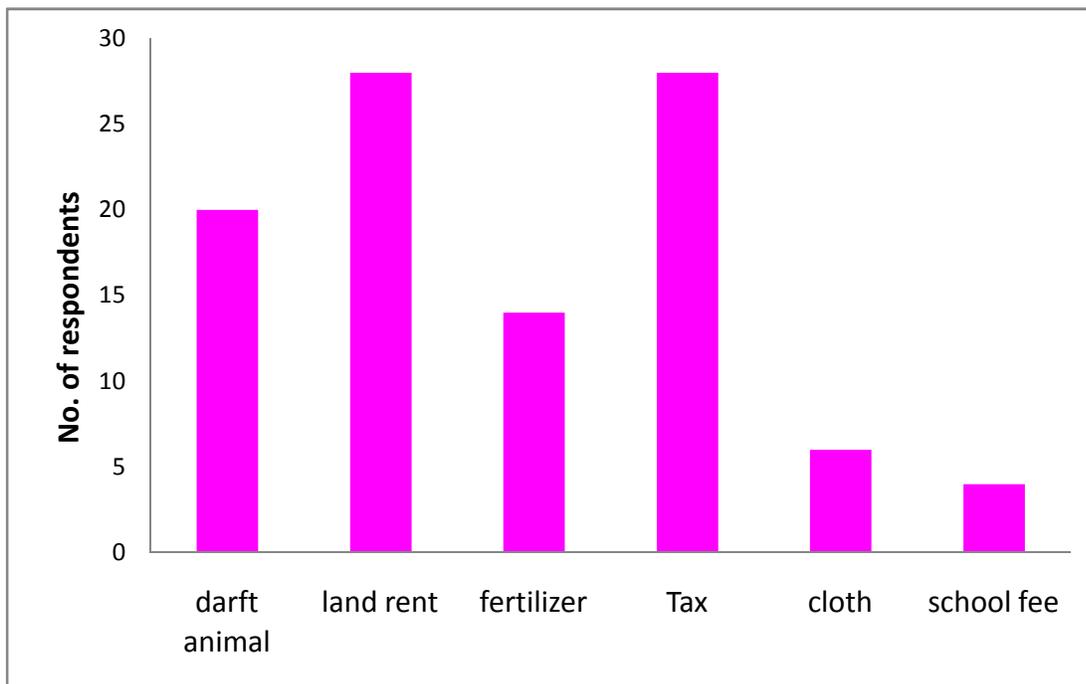




Photo: Home garden beekeeping apiary of the sample household

Charcoal production

The annual charcoal production by sample participants is 1056 & 480 quintals and the revenue from charcoal sale was 32,400 & 1760 Birr before and after beekeeping intervention respectively by considering the average price of charcoal sale is 40 Birr per quintals. According to this assessment the charcoal production reduced by 72.8% and the annual revenue from charcoal sale is reduced by 43%. According to the respondent before beekeeping intervention, 75% of the charcoal production used for market only 25% of the production used for household consumption. The frequency of charcoal production varies among the sample households. Forty one percent (41%) of the farmers stated that charcoal is produced every week and 17% of the farmers produced every two weeks. On the other hand 14% and 28% are produced every three weeks and every month respectively **Figures 2**. A large quantity of charcoal is collected from, *Olea africana*, *Vernonia amygdalina*, *Acacia abyssinica*, *Olinia spp*, *Juniperus procera*, *Podocarpus falcatus* and *Acacia decreens*.

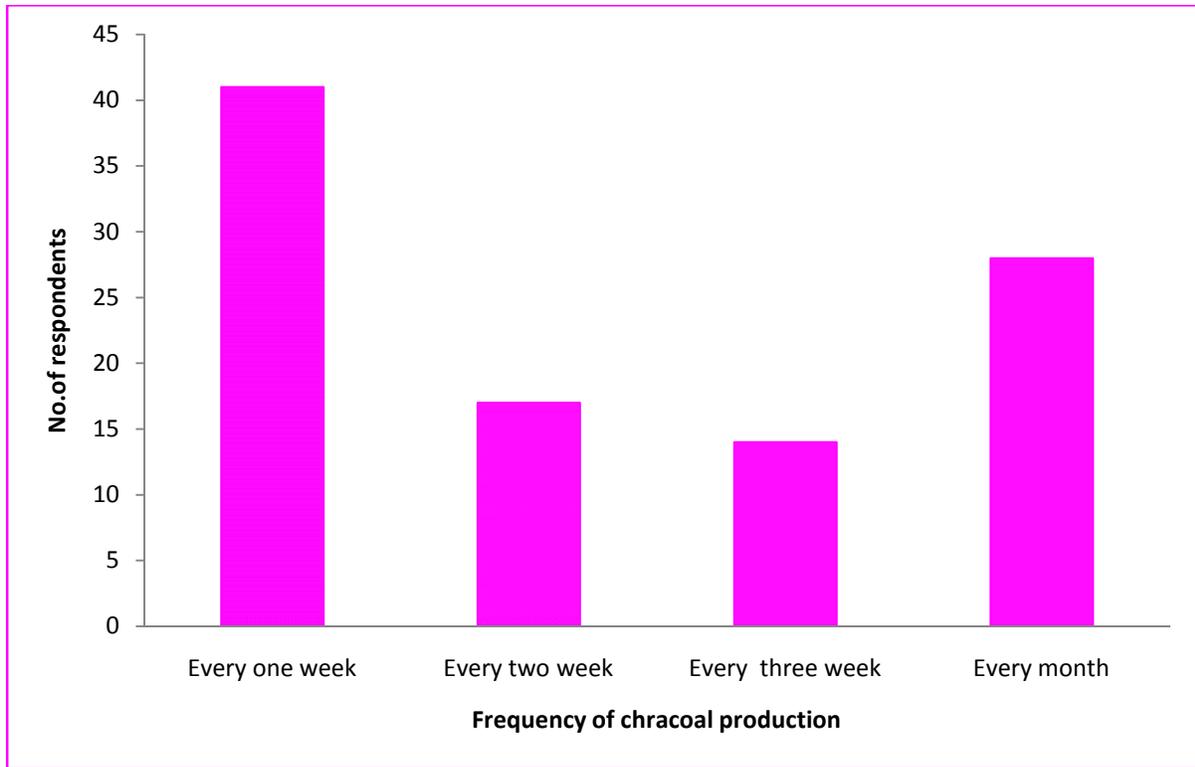


Figure2: The frequency of charcoal production at different time in a month

Table1: Average honey yield, charcoal, number of hives owned and bee forage planted before and after beekeeping intervention

Intervention	Annual average honey yield in kg	Annual Charcoal prods in quintals.	No. people involved in charcoal production	No, of trad. Hives owned	No. Trans. hives	Bee forages planted
Before beekeeping	8.1±2.1	36±3a**	0.93	1.3±.23	0.5±0.3	3.3±1.3
After beekeeping	35.9±4.6	10±2.8b**	0.655	1.1a±.28	2.1±0.09	23±3.4
T- test	**	**	ns	ns	**	**

** Highly significant at P<0.05) ns= not significant

Analysis of contribution of beekeeping to household income

The average annual income of the beekeeper households from honey and charcoal sales were also compared with sale of the *Teff and wheat* which are the major crops grown in the area. Accordingly Teff contributes 43.54%, wheat 33.9% while honey and charcoal contributes for 16.5% and 6.05% respectively (**Table 2**).

Table2. Average annual income and its proportional contribution to income generation

Source of income	Average household annual income	Proportion (%)
Teff	6332	43.54
wheat	4930	33.9
Beekeeping	2400	16.5
charcoal	880	6.05

Bee forage planting

The bee forage planting practice of the farmers also assessed and almost 95% beekeepers grow different bee forage for their bees. The mean number of bee forage planted by the beekeepers before beekeeping intervention was 3 plant species per sample farmers and **23** plant species per beekeepers after beekeeping intervention. The bee forage development has increased from 11% to 88% or grown by 8 folds (Table 1). The plant species planted by the beekeepers before beekeeping intervention were Podocarpus, Juniperous, Eucalyptus and Vernonia spp mainly planted for fuel wood requirement and cash income. The major bee forges planted after beekeeping demonstration were *Eucalyptus spp*, *Hagenia abyssinica*, *Dombeya torrida*, *Callistemon citrinus*, *Dovalis caffera* and *Peterolobium stellatum*. The source of bee forage seedlings were from Holeta Bee Research Center and suba nursery station.

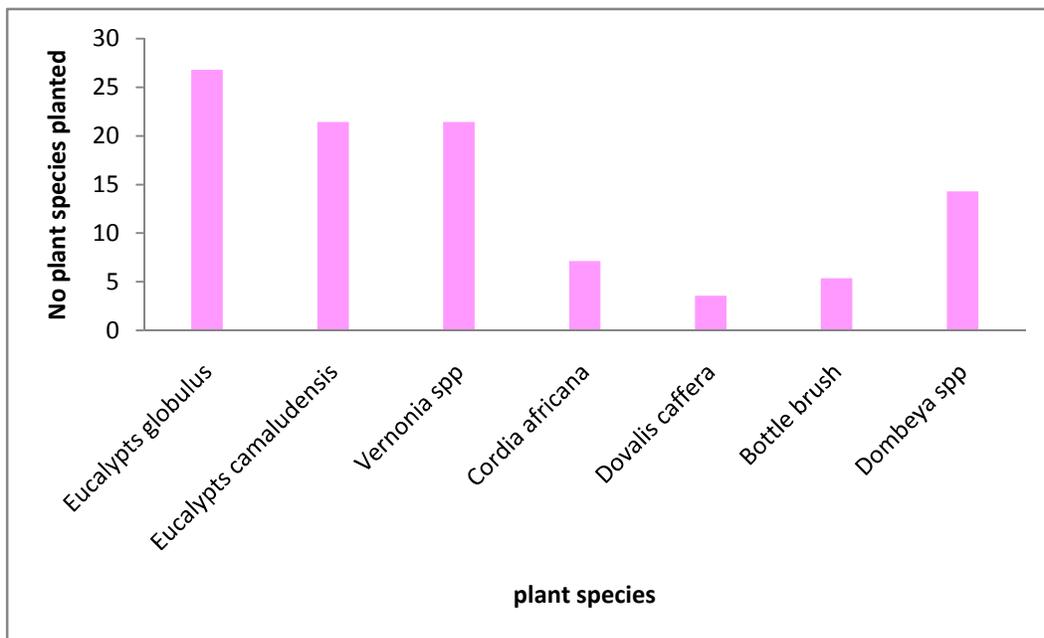


Figure 3. Bee tree planting status of beekeepers around apiary

Discussion

The mean annual honey yield per sample participants is 8 & 33.3 kgs and the revenue obtained from honey sales **405&2380** Birr and highly significant before and after beekeeping intervention. This indicates that improved beekeeping technology contributes for income generation of households which indirectly minimizes the pressure on forest for charcoal and timber production. This is also supported by Hussein's (2000) finding which confirms that beekeeping enhances the income generation potential of small holders and promotes the conservation and utilization of natural resources that are being rapidly depleted. According to our field observation and household interview, farmers are not increasing the number of traditional hives after improved beekeeping technology demonstration because of its low yield and unsuitability to manage for internal inspection.

The annual charcoal production practice is higher before beekeeping intervention and lower after beekeeping demonstration. The number of charcoal producers has decreased from 55% to 44%, but the change is not significant. This can be explained that farmers have recognized the value of forest for honey production and they are able to increase household income which contributes to minimizing pressure on forest. The income obtained from honey sale is greater than charcoal sale and therefore farmers may not be interested to produce charcoal for generating cash income and it is an illegal activity due to its negative impact on ecology. In this study it is not possible to bring all attitudinal change in the area to stop charcoal making at time due to limited number of PAs and the number of transitional hives demonstrated was also small. Because of the above limitations, still the result indicated positive impact of beekeeping for income generation and for forest conservation.

The socio-economic survey and on farm inventory of bee plants around their apiary indicated that 95.9% of the beekeeper households plant bee forage for their bees. The bee forage growing tendency of beekeepers has increased from 3-23 species per individual (11- 88%). This indicates that beekeeping encourages tree planting or conservation of the forest. This study is also in agreement with Debissa (2006) plant species diversity and species richness of home gardens are higher in beekeepers home garden as compared to non-beekeeper households.

The interview result also revealed that 95 % of the respondent stated that for the sustainability of honey production, the integration of beekeeping with forest conservation based on participatory

forest management approach was suggested for conservation and sustainable honey production in Menagesha suba state forest. Cost of beekeeping equipment is the main bottle neck problem to expand beekeeping technology and therefore farmers should be access to micro finance credit facilities.

Lesson learnt from demonstration

Bee keepers have developed awareness on the value of keeping for conservation and income generation as the result they have brought relatively better attitudinal change from charcoal making to beekeeping business after this demonstration.

Beekeepers are very interested to expand the technology if they are provided with adequate beekeeping equipment, bee forages seeds and seedlings and training.

Constraints

Shortage of bee colonies and they are not access to forest to hang bee hives due to lack of Co-ordination and support from Suba state forest.

Conclusions and recommendations

As result of demonstration of the technology, the average annual income of the beekeeper household from honey sale has increased from **405&2380 Birr** and indicating that beekeeping has strong contribution for raising house hold income thus, incentive for sustainable forest management.

The bee forage growing practice of the beekeepers have increased and thus beekeepers have due regard for forest conservation and planting bee forages for bees. Therefore demonstration and scaling up this technology should be promoted particularly in participatory Forest management program for sustainable forest resource utilization and to diversify the household income.

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