International Journal of Science and Research (IJSR)
ISSN (Online): 2319-7064
Index Copernicus Value (2015): 78.96 | Impact Factor (2015): 6.391

Status of Farm Forestry in Tarakwa Location, Uasin Gishu County, Kenya

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Abstract: ***Farm Forestry (FF) is the act of incorporating trees into a farming system for ecological, economic or subsistence benefits. This study aimed at assessing the status of farm forestry in Tarakwa location, Uasin Gishu County, Kenya. Purposive sampling was used in selecting 50 farmers practicing farm forestry as respondents for the study. Data was collected using structured questionnaires, analysis done using Microsoft Excel 2013 and results presented in form of tables and graphs. The common farm forestry practices in the study area were boundary planting, alley cropping and farm woodlots. Study findings also revealed that both exotic and indigenous tree species were planted by the farmers with the five most preferred tree species being*** *Eucalyptus grandis* ***(86%),*** *Cupressus lusitanica* ***(80%),*** *Grevillea robusta* ***(78%),*** *Pinus patula* ***(62%), and*** *Acacia mearnsii* ***(40%). Farm forestry was practiced for commercial purposes; (timber, electricity transmission poles, charcoal) domestic use; (timber, fuelwood, medicinal herbs, fodder) and ecological benefits (soil conservation, soil fertility improvement). Challenges facing FF included diminishing markets for farm forestry products, limited land sizes, climate variability, pests and diseases and seedlings unavailability. Addressing the prevailing challenges and increased adoption of FF among the locals has the potential of improving their livelihoods while concurrently reducing the pressure on the nearby natural forests.***

Keywords: Farm forestry, Tree products, Forest conservation, Woodlots

1. Introduction

Farm forestry entails the incorporation of commercial tree growing into farming systems in the form of on farm plantations, woodlots, timber belts, alleys, wide-spaced tree planting and native forest (National Farm Forestry Program, 1995). There are a number of direct and indirect benefits associated with farm forestry. Farm forestry directly provides wood and non-wood supplies in the form of medicine, fodder, construction material and food, while indirectly contributing to the improvement of soil fertility on the farms, control of soil erosion, microclimate amelioration, carbon sequestration and environmental protection (Muchiri et al., 2002). It also contributes to biodiversity conservation, sustainable use of natural resources and promotes the better management of native stands of private forests and the strategic incorporation of plantations to address natural resource deterioration problem such as salinity, erosion turbidity and waterlogging (ICRAF, 1995). It is due to these benefits that the Government of Kenya, over the last decade, has sought to promote land use systems integrating trees with crops and/or livestock to reduce deforestation and improve soil and water conservation (Nyangena, 2008).

Farm forestry forms an important smallholder land-use options in Kenya as it provides subsistence and commercial values with some tree-growing practices showing close relation to the presence of both rural and urban markets for tree-based goods and to heavy household demand for those goods (Dewees, 1995).

The practice has moved from common resource extraction to planting in compounds, boundaries, and as windbreakers, intercropping and latterly intensively managed mono-cropping in the form of woodlots for commercial purpose (Koech et al., 2005).

2. Study area and Methodology

2.1 Description of the Study Area

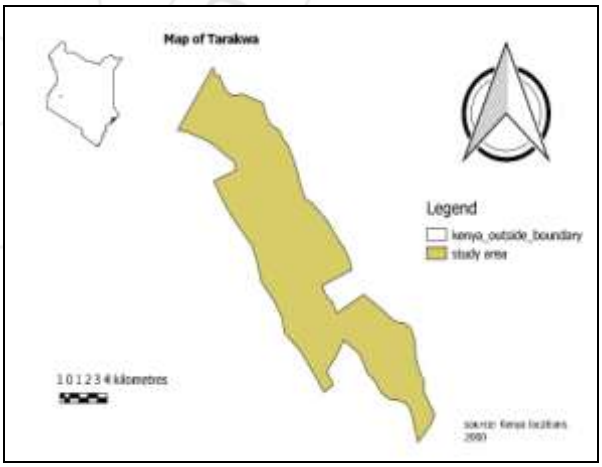

Figure 1: Map of the study area

The study was conducted in April, 2017 in Tarakwa location, Kesses sub-county, Uasin Gishu County, Kenya. Tarakwa is situated in the rift valley of Kenya, approximately 35 kilometers from Eldoret town and lies between latitude 0.22721ºN, and longitude 35.3949ºE with an altitude of about 2, 593 meters above sea level. The area receives an average annual rainfall of about 1200mm, with temperatures ranging from 8-27ºC. Brown loamy soils dominate the area, with majority of Tarakwa residents practicing mixed farming

(agricultural crops and livestock rearing) as the major economic activity.

2.2 Methodology

The target population comprised the local population of Tarakwa location practicing farm forestry. A sample size of 50 respondents (10% of target population) was selected for the study. The researchers used purposive sampling design in which farmers practicing farm forestry were selected as a representation of the target population. Structured questionnaires (both open and close ended) were used for data collection based on the study objective. Data was then analyzed using Microsoft excel 2013 and results presented in the form of tables and bar graphs.

3. Results and Discussion

3.1 Socio-economic characteristics of the respondents

Table 1 below presents a summary of the respondents' socio economic characteristics.

Table 1: Socio-economic characteristics

Socio economic characteristic	*Frequency (n)*	*Percentage (%)*
Gender		
Male	23	46
Female	27	54
Age		
18-25	3	6
26-30	10	20
31-35	20	40
36-40	9	18
>40	8	16
Education level		
No formal education	2	4
Primary	11	22
Secondary	24	48
Tertiary	13	26
Marital status		
Single	15	30
Married	34	68
Widowed	1	2
Land size (Acres)		
1-5	30	60
11-20	3	6
21-30	15	30
31-50	2	4
% of land tree cover		
1-10%	32	64
11-20%	3	6
21-30%	15	30

Majority of the respondents (54%) were female while (46%) were male. Though regarded as household heads and key decision makers in regards to land use, there was a lower male respondent since most of them were engaged in other economic activities away from the farm. Women therefore provided most of the labor in the farms. This is in agreement with findings by World Bank (2012), which asserted that men were key decision makers in land and tree tenure yet women provided the greatest labor force on the farm. Most of the respondents (40%) were between 31-35 years. About 20% of the respondents were in the age bracket of 25-30 years, 18% was between 36-40 years, 16% was above 40 years and 6% of the respondents between 18-25%. This was an indicator that farm forestry had been taken up by the youth as a means of income generation and subsistence as 66% of the respondents fell in the age brackets of 18-35 years.

Research findings also indicated that almost a half of the respondents (48%) had attained secondary education while those with tertiary education (college and university) were 26%. Those who had attained primary school education were 22% and 4% of the respondents had no formal education. Respondents who had attained basic education had large portion of trees in their farms, a clear pointer that educated respondents had sufficient knowledge on tree value and benefits and it hence the adoption of farm forestry. A study by Appiah & Pappinen (2010), notes that education is a prerequisite for improved agriculture as it helps household heads in the making livelihood choices based on informed decisions.

More than a half of the respondents (68%) were married, with (30%) being single while (2%) were widowed. Married couples therefore were likely to come up with better joint decisions on farm forestry adoption and management practices in comparison to the single and the widowed farmers. The respondents were also asked to give the size of their land in acreage and the estimated percentage of tree cover on their land. More than a half of the respondents (60%) had a farm size of between 1-5 acres, 30% had farms ranging from 21-30 acres, 6% had 11-20 acres and only 4% of the respondents reported land sizes of 31-50 acres. On the estimated percentage of tree cover in the farm, 64% had 1-10% of tree cover, 30% had 21-30% tree cover and 6% of the respondents had 11-20% tree cover on their farm.

3.2 Assessment of tree species and their utilization by the respondents

Table 2: Tree species planted and their uses/benefits

Tree species	*Frequency (n=50)*	*Percentage (%)*	*Uses/Benefits*
Eucalyptus grandis	43	86	Electricity poles, timber
Cupressus lusitanica	40	80	Timber
Grevillea robusta	39	78	Timber, fuelwood, windbreaks, soil conservation
Pinus patula	31	62	Timber, paper pulp
Acacia mearnsii	20	40	Charcoal, fuelwood
Dombeya torrida	12	24	Fuelwood
Calliandra calothyrsus	9	18	Fodder, soil improvement
Prunus africana	7	14	Medicine, charcoal
Juniperus procera	5	10	Posts (fencing and construction)

The major farm forestry practices adopted in the target area were Alley cropping, boundary planting, farm woodlots and on farm tree plantations. Both exotic and indigenous tree species were planted by the farmers. The five most preferred species included *Eucalyptus grandis* (86%), *Cupressus lusitanica* (80%), *Grevillea robusta* (78%), *Pinus patula* (62%), and *Acacia mearnsii* (40%). Other species planted were *Dombeya torrida* (24%), *Calliandra calothyrsus (18%), Prunus africana* (14%) and *Juniperus procera* (10%). Exotic tree species were the most planted in comparison to the indigenous species due to a number of factors. First the farmers cited the short maturity period as an incentive to plant exotic species as the returns are usually realized within a short time. Kenya Forest Service (2009), reported that eucalyptus species have a market niche which gives them a competitive edge over other tree species and contributes to the growth of national economy. Secondly, the exotic seedlings can easily be obtained from commercial and research institutions in comparison to the indigenous species which the farmers had to look for in the wild.

3.3 Benefits of farm forestry

Farm forestry was practiced for both commercial and domestic purposes. Trees planted for domestic use included C*alliandra calothyrsus* (livestock fodder, soil improvement), *Grevillea robusta* (windbreaks and shade during sunny days, timber for construction of farm structures and soil conservation). *Prunus africana* had medicinal value, *Dombeya torrida* were used as fuelwood, and *J. procera* produced good posts used in farm construction and fencing. Farmers also carried out farm forestry for commercial purposes for household income generation through the sale of the tree products. *E. grandis* was sold to Kenya Power and Lighting Company (KPLC) as electric transmission poles as the species has good form, straight boles and the ability to self-prune. *Acacia mearnsii* was used to produce charcoal for commercial purposes. *C. lusitanica* was majorly grown for commercial timber production and *Pinus patula* sold to saw millers as logs for the production of a wide array of wood products. Additionally farm forestry was a source of employment to the locals who were employed as casual laborers for nursery management and tree management practices like pruning, thinning and harvesting. The researchers also discovered that a land with trees had a higher commercial value than that without. The presence of trees on the land therefore increased the commercial value of the land and it is for this reason that farmers appreciated planting of trees on their farms. Farmers also identified a number of indirect benefits of trees in the farm including soil erosion reduction improvement of soil fertility windbreaks and aesthetic value

3.4 Farm forestry challenges

There were various challenges facing the practice of farm forestry in Tarakwa as shown in figure 2. They included diminishing markets for farm forestry products (84%), climate variability (76%) small land sizes (70%), pests and diseases (66%) and seedling unavailability (52%).

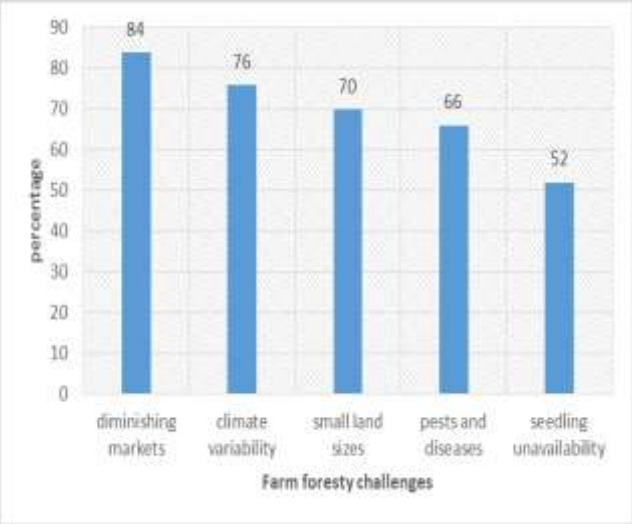

Figure 2: Farm forestry challenges

Diminishing markets of commercial farm forestry products (especially poles) was a common challenge facing the farmers. The recent shift by the Kenya Power and Lighting Company from wooden poles to concrete pylons in the power transmission sector has had negative economic implications on the farmers. KPLC currently uses concrete poles for new transmission lines, with the wooden poles being limited for domestic connections. The Kenya Wood Preservers Association estimates that the annual demand for wooden poles from Kenya Power dropped from over 500, 000 in the year 2011, when the shift commenced, to about 200, 000 in the year 2016 (Ojanji, 2016).

Land size was a constraint to the expansion of FF as majority of the farmers (60%) owned land less than 5 acres. Farmers were aware of farm forestry benefits and were willing to increase the percentage of tree cover on the farm but cited insufficient land size for as a limiting factor bearing in mind that in most cases the same piece of land was also used for crop and livestock production. Gradual population increase and land subdivision among family members further contributed to reduced land available for farm forestry. A study by Appiah & Pappinen (2010), in Rachuonyo district, Kenya had similar findings of reduction of land area under farm forestry due to the division of land among the increasing numbers of households or family members.

Climate variability was also an emerging problem towards this farming system as the area experienced extended drought at the end of 2016 and delayed rainfall in the early quarter of the year 2017. This led to the death of many tree seedlings and a discouragement especially to new farmers who had recently ventured into FF.

Pests and disease attack also posed a threat to the established plantations especially the young stands as with farmers reporting severe damage and even total loss of tree stands in some cases. The common pests in the farms included cypress aphids (*Cupressus lusitanica)* and Blue Gum Chalcid (*E. grandis*) while Eucalyptus rust disease was also prevalent in *Eucalyptus spp*. Inadequate supply of indigenous seedlings was another notable challenge as most farmers didn't know exactly where to get these seedlings and relied on seedlings

from the wild to establish indigenous trees.

4. Conclusion and Recommendations

4.1 Conclusion

Farm forestry is an important practice in the study area for household income generation from the sale of tree products while also meeting the residents' domestic needs for firewood, timber and fodder. It also presented employment opportunities through nursery management practices, tree planting activity, silvicultural practices and tree harvesting. Farmers also acknowledged ecological benefits of farm forestry among them improved soil fertility and soil conservation. Increased adoption of farm forestry therefore has the potential of improving the living standards of Tarakwa residents in addition to reducing their dependence on natural forests for various products and services thereby contributing to state forest conservation in a bid to actualize the 10% country's total forest cover target as stipulated in the constitution of Kenya.

4.2 Recommendations

Despite the aforementioned benefits, there were a number of challenges facing farm forestry in Tarakwa. We therefore make the following recommendations for the realization of full FF potential in the study area;

- The relevant government institutions to source for alternative markets for *E. grandis* (as building poles and timber for use in the construction industry) to counter the market deficit created due to the shift by KPLC from the use of timber poles to concrete pylons for electricity transmission.
- Establishment of indigenous tree seedling nurseries by government institutions, environmental Non-Governmental Organizations and Community Based Organizations to counter the problem of inadequate indigenous seedlings.
- Forest extension officers to offer quality education to farmers on modern FF irrigation techniques for adoption and appropriate drought tolerant tree species to be planted in order to cope with the effects of climate variability and climate change for optimum tree production and reduced losses due to failed rains and extended drought periods.
- State and other relevant agencies to advise farmers on the best and authentic pesticides for use to reduce tree losses associated with pests and diseases attack.

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Authors Profile

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