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Land Ownership and its Impact on Adoption of Agroforestry Practices among Rural Households in Kenya: A Case of Busia County

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ABSTRACT: The practice of agroforestry can be much beneficial in the African communities where there are harsh environmental conditions, low technologies of agricultural production, fragmented land tenure system, unreliable livelihoods and chronic food insecurity. This paper is an outcome of a descriptive survey study that was conducted in Nambale division, Busia County in Kenya, which partly examined the factors influencing adoption of agroforestry practices among rural households. The adoption of agroforestry has not been very successful due to land ownership and land rights aspects that have adversely affected its adoption to the larger extent. In Kenya, land ownership remains exceedingly skewed in many rural parts of the country. The authors argue that when land ownership is extremely unequal, agroforestry activities and its growth delivers fewer paybacks for the poor rural households. Land tenure problems have been exacerbated by continuous fragmentation of land, land inheritance, gender imbalance in land ownership and the rights to land use. The paper concludes that the decision to adopt agroforestry was partly influenced by land and tree tenure, size of land and gender equity (women's rights to property and recognition of co-ownership). Additionally, rural households' investments in agroforestry increase with increasing in land tenure. The important policy recommendation made is that laws affecting adoption of agroforestry practices should be updated and harmonized in-order to achieve the 10% tree cover and for farmers and households to achieve the maximum benefits of agroforestry.

KEYWORDS: Land Tenure System, Land Rights, Land Fragmentation, Decision Making, Gender, Agroforestry.

1 INTRODUCTION

In Africa, sustainable use of agricultural land is becoming increasingly important for maintaining capacity for the food supply and livelihood of the agricultural sector. The increased food demand due to the rapidly growing population has increased the importance of improving productivity of land [1]. Agroforestry is a long-established farming practice in many parts of the world. Broadly defined, agroforestry refers to a land-use system in which trees are grown simultaneously, sequentially, or in conjunction with annual crops or livestock. The trees are cultivated primarily for agricultural use, for example, to protect or enrich top soils for the benefit of crops or to provide browse and fodder for livestock [1]. Agroforestry is a collective name for all land-use systems and practices where woody perennial plants are deliberately grown on the same land management unit as agricultural crops and/or animals, either in spatial mixture or in temporal sequence and there must be significant ecological and economic interactions between the woody and non-woody components[2].

Agroforestry is a dynamic, ecologically based, natural resource management system, which involves the integration of trees on farms and in the agricultural landscape that seeks to diversify and sustain production for increased social, economic and environmental benefits for land users at all levels [34]. This is a definition that considers agroforestry as justified for being beneficial to the environment, household income, productivity, and sustained development of the community. Ideally, agroforestry systems, capable of providing substantial net economic and ecological benefits to households and communities, should be readily adopted by farmers. Despite this, many attempts to promote agroforestry have resulted in poor rates of adoption [3]. According to studies done by [4] and [5], there are higher Net Present Values (NPVs) for agroforestry systems when compared to monoculture systems, yet farmers in developing countries show low rates of adoption. Burley (1982) in FAO [5] has suggested that the major conditions which must be satisfied before rural people will plant trees are economic, socio-cultural, environmental and land ownership.

One of the critical factors that have been given consideration in determining the potential acceptability and viability of agroforestry is land fragmentation, land tenure systems and tree ownership. Land fragmentation at generational transfers has become a more important tendency in nearly all types of holdings. Rules of inheritance of land by all sons in a family and a larger family size inevitably imply a rapid fragmentation of family land. In areas already heavily populated with average land holdings of less than 2 hectares such as parts of western Kenya, the land fragmentation continues much below the limits of capacity to reproduce a family. This fragmentation has continued in spite of the legal instructions against sub-divisions below a minimum for reproducing a family [6]. This has reduced land sizes among families leaving only small pieces of land for food production.

“Reference [7], gave the assertion that patterns of technology adoption will be shaped by the structure of opportunities and constraints presented by the rules of tenure.” In the study of Agroforestry adoption and risk perception by farmers in Senegal, [8] established that land ownership was one of the two predominant factors (the other was labour) affecting the adoption of agroforestry practices. For instance, women worldwide have been at the centre-stage of economic production, including agricultural, livestock and business sectors. In Africa, where the mainstay of most economies is farming or agriculture and livestock production, women contribute to 80% of the workforce. In most parts of Africa, women are closely associated with production of food and raw materials for the industrial sector. Indeed, women are also more directly involved in small-scale crafts and localized industries, trade and general business. However, women who comprise over half of the world's population, rarely own any reasonable forms of property; do not have adequate access to the same, and do not even make major decisions pertaining to allocation and use of such property. Among farming communities where the basic property is land, women's access to it is determined by men as a matter of patriarchy cultural tradition. According to a study carried out by Women and Law in East Africa in 1995 on Inheritance Laws and Practices in Kenya, women only own land to the extent that they perceive or believe this is the case especially within marriage or other cohabitation relationships [9].

Among various Kenyan communities, women do not traditionally own land or other immovable properties. At best, they have usufruct rights, which are hinged on the nature of the relationship obtaining between them and men either as husbands, fathers, brothers or such other male relatives. Such access can be denied, as it is dependent on the whims of such male benefactors. This situation does not only place women in a precarious position in terms of their survival and livelihoods, but stifles their effective role and contribution to national development. With agriculture and other land based natural resources being the main sources of livelihood, the consequences for women not owning, controlling or accessing land are grave [9].

Agroforestry depends on people's rights to plant and use trees, rights which in turn depend on the prevailing systems of land tenure and tree tenure. Tree tenure is often distinct from land tenure, but they affect each other. Tree tenure consists of a bundle of rights over trees and their produce, which may be held by different people at different times. These rights include rights to own or inherit trees, the rights to plant trees, the right to use trees and their products, the rights to dispose off trees and the right to exclude others from the use of trees and tree products. The nature of the tree, the nature of the use and the nature of the person or group influences who and what rights. Land owners tend to be relatively advantaged in terms of their rights to trees [10]. However, rights to plant trees have been restricted in Africa. It has been reported that trees may be planted as visible evidence of a claim to land in Kenya. “Reference [11] has also found that if the user does not have security over the intended planting location, adoption of the tree planting innovation may be quite out of question.” “Reference [12] also noted that in vast agricultural lands of tropical Africa, agroforestry has yet to make a break through. The reason is largely due to the flexible system of land tenure as well as its attendant insecurity.”

Land tenure reforms in Ghana has been advocated by [13] on the grounds that the old system does not provide security of tenure; that it discourages the investment of natural resources and does not encourage investments, which bring about development in the land. Miniature farm sizes and the manner in which they are fragmented and scattered constitute an

obstacle to farm improvement for they do not enable farmers to take advantage of economies of scale in production. The old system, prevent the use of farmland as collateral for credit; also it discourages the adoption of innovations and individual initiative in farming.

Studies have shown that ownership of land title is found to increase total factor production (TFP) in all models. For instance, [14], [15], and [1] assert that having secure land title promotes a farmer's investment in land improvement. Land size has a negative effect, possibly because a small-scale operation is more efficient in subsistence production, which does not rely heavily on machinery. This results from the intensification of production with decreases in land size [15]. This paper is an output of one of the objectives of the study, which partly investigated the factors that influence the adoption of agroforestry. The paper gives an account on how land tenure system in Kenya is a critical determinant on adoption of agroforestry among rural households.

2 RESEARCH METHODOLOGY

The research on which this paper draws was conducted in Nambale District, Busia County. Nambale District, one of the Districts in Western Province of Kenya, is the indigenous home of the Bakhayo people. Busia County falls within Lake Victoria basin. The altitude varies from 1130m on the shores of Lake Victoria to 1375m. The County falls under latitude 0° and 0° 25° North and longitude 34° 54° East. It covers a total area of 1262 square kilometers, with 137 square kilometers under permanent water surface. The county has 924,200 hectares (924 sq. km) of agricultural land but only 40,000 hectares is under crop production. The high potential parts are found in Nambale, Matayos and Butula areas [16].

The study was conducted through a descriptive survey research. A survey research according to [17], is a self-report study, which requires the collection of quantifiable information from the sample. A survey is a method of collecting information by interviewing or administering a questionnaire to a sample of individuals to obtain data useful in evaluating present practices and improving basis for decisions. For the purpose of this study, survey design was suitable for data collection in order to gather qualitative and quantitative data from the target population. Simple random sampling technique was used to select a sample of 200 respondents' from Nambale District, Busia County and a structured questionnaire was administered to the sample. Key informant interviews, informal group discussions and participant observation were also employed. Data was analyzed both qualitatively and quantitatively. This paper is an outcome of one of the objectives of the study that examined farmer-oriented factors that influence adoption of agroforestry.

3 RESULTS AND DISCUSSION

3.1 LAND OWNERSHIP AND ITS IMPACT ON ADOPTION OF AGROFORESTRY

3.1.1 LAND TENURE SYSTEM

Study results indicated that all the respondents owned the land in which they were farming but their sizes varied. During informal discussions, it was established that personal land ownership encouraged the adoption of Agroforestry systems in the study area given that majority of rural farmers have personal land which was either culturally acquired (inheritance) or bought by an individual. Other types of land ownership such as rented or borrowed lands hindered the adoption of agroforestry practices for the reason that farmers could not use the land for long term production. However, allocation of land by household head to older sons with no clear demarcation and no title deeds hindered tree planting. This is because tree planting is seen as a claim of that portion of land since trees are long lasting and therefore, the cause of witnessed tree tenure conflicts in the area. As such, under such circumstances, the household head who is the father of the sons has all the rights to land ownership and tree tenure.

From the literature review, it is evident that nearly all small-scale farmers in many African societies fall within the customary tenure system whereby families depend on acquiring land through ancestry accession. This implies that each family is restricted to sharing land that belongs to their forefathers. Therefore, as family size increases, their share of land gets smaller since they have to pass on portions to the younger generation and more so to their sons. This has also led to land fragmentation into small portions which are hardly enough for household food production. Land ownership is mostly vested in men and women and they can plant their desirable crops on a parcel of land only when it is given to them as a gift [18]. However, for all the respondents, the land sizes varied. 63 (31.5%) of the respondents had land size between 1-3 acres, 77 (38.5%) had between 4-7 acres, 31 (15.5%) had between 8-11 acres, 19 (9.5%) had over 11 acres, while 10 (5%) had land but

did not know how many acres it was (Table 1). The number of acres included all the land, which did not have formal ownership vested to the care taker of the split piece of land.

Table 1. Land ownership and its impact on adoption of agroforestry

Responses	Frequency	Percent
1-3	63	31.5
4-7	77	38.5
8-11	31	15.5
>11	19	9.5
Unspecified	10	5.0
Total	200	100

Results indicate that majority of the farmers (70%) have less than 7 acres, which is relatively small given their household size and the fact that most of the respondents are subsistence farmers. The land tenure in this community is in the form of individual land holding. Men being the household heads are the ones that have the title deeds to the household's land, which make them have both usufructory and disposal rights to it. The implication of individual land ownership and the specific control of land resources by men in this community meant that men make most of the important decisions when it comes to issues of how to use or dispose the household land.

Out of informal discussions, the study found out that some of the men could even sell land without the knowledge of the wives or children. When it comes to decision making on what to plant, the wives would have to consult the husbands before they can know which crop to grow that season. For instance, one of the women said that they did not have sugarcane on their farm because her husband was in town and yet he was the one to approve whether to plant sugarcane or not, a decision he could not have taken when in town without coming back to see the situation on the ground, and also could not be convinced by the wife's justification for the same. This means that women are generally reduced to making proposals whose decisions are ratified by men, and after such decisions, women again implement the decisions by working or managing the farms through provision of labour.

3.1.2 LAND SIZE AND TREE PLANTING

Study results indicated that land size influenced tree planting (Table 2). Size of land impact greatly on farmers' decision to plant trees. A study done in Nyeri showed that farm size was one of the variables that were found to be statistically significant in explaining the size allocated to planting trees. As the size of the land increases, the acreage allocation to tree planting increases. Farmers with large farm size will spare larger portions of land to plant trees compared to their counterparts with small parcels of land [19].

Table 2. Cross tabulation results between size of land and number of trees on the farm

Variables x		Approximated number of trees on land			Total
		<10	10-30	>30	
Size of land (Acres)	1-3 count	28	36	0	64
	% within size of land	43.8%	56.3%	.0%	100.0%
	4-7 count	4	71	2	77
	% within size of land	5.2%	92.2%	32.6%	100.0%
	8-11 count	1	29	0	30
	% within size of land	3.3%	96.7%	.0%	100.0%
	>11 count	4	9	6	19
	% within size of land	57.9%	15.8%	26.3%	100.0%
	Unspecified count	4	6	0	10
	% within size of land	40.0%	60.0%	.0%	100.0%
	Total count	41	151	8	200
	% within size of land	20.5%	75.5%	4.0%	100.0%

A cross tabulation between size of land and the number of trees planted showed that farmers with 1-3 acres of land had the majority (43%) with <10 trees on their farm, while those with >11 acres had the majority (26.3%) with > 30 trees on their farm. A chi square value of $p=0.001$ significant at 0.05 level showed a significant relationship between size of land and number of trees planted on farm meaning that there was a positive influence on size of land and number of trees planted and therefore, adoption of agroforestry practices. As the land size increases, adoption of agroforestry technologies also increases. [20] revealed that land size has a positive correlation with farmer's decision to plant improved fallows in Zambia. This could be because farmers with extra land are likely to use it for experimenting new technologies.

Study results are in tandem with what [21] found that land size has a positive effect on adoption because farmers with more cultivatable land are more likely to set aside a piece of land for fodder trees without impacting much negatively on land available to grow food crops or disturbing household food security. This is in contrast with a study done in Muranga in 1995, which observed that despite the pressure of land, trees were grown in 5 to 10% of the agricultural land [22]. Another study done in Kakamega district in western Kenya showed that 80% of the rural households had planted trees on 25% of their farms despite the small household land sizes in the district [23].

Study results are also consistent with the findings of [24] who found out that as parcels of land increases, more land will be allocated to tree planting. Ref [25] noted that tree growing awareness through extension services related positively to tree growing in the fields. Study results indicated that there was high awareness on tree growing in Nambale Division, but tree growing was limited by sugarcane farming which does not allow intercropping with perennial crops and more so trees. However, the findings of the study agreed with what was reported in Zimbabwe, Philippines and Ethiopia where land size of household was positively correlated with the number of trees planted by individual households [26]. Therefore, size of land limits farmers to certain agroforestry practices, which depicts the number of trees planted. During focused group discussions, it was found that secure land tenure systems influenced to a larger extent the adoption of agroforestry practices. For instance, those who did not own land or rented land could rarely involve themselves in agroforestry practices. This concurs with [35] who found tree planting in the Brazilian Amazon to be 15.4 times more likely under secure land tenure, and [36] study of contour hedgerow adoption in east Indonesia found that the landless comprised 31% of the population but only 11% of participants participated in *leucena* based farming systems.

Tree tenure and gender was also blamed 70 (35%) for limiting trees on crop land and adoption of certain agroforestry practices. Men being the land owners are more advantaged to tree planting and rights over trees, while women implement men decisions and only benefit from harvesting tree products, and some tree parts for the welfare of the family. The situation regarding tree tenure and gender varies in different parts of the country: In some areas tree planting is clearly dominated by men (justified by the fact that men are the owners of the land), and trees are markers of ownership [2]. In many African communities, land use is decided by men who are the household heads and owners of land. Therefore, tree planting being long-term and involving land use is controlled by the household head. Women and children can only plant trees on permission from the household head and can only own the trees by association but cannot decide on when to cut the trees and how to use the tree products.

3.1.3 GENDER CONSIDERATION

Gender considerations in the promotion of agroforestry have been highlighted partly because of the varying gender perceptions of tree resources, their different roles in production activities and land ownership rights. 70% of the respondents indicated that gender influenced tree planting in the study area. According to [27], gender is an important factor in influencing adoption of agroforestry practices and the probability of adoption was higher for men than women farmers in the highlands of south western Uganda. This is perhaps due to the gender-equity issues in the introduction of technology to farmers which include land tenure issues, where women in Uganda do not have secure land and tree tenure due to the largely patrilineal inheritance systems [27]. Only old women, widows and female-headed households are often able to have access to more secure land rights. This is because the right to ownership of land by women in patrilineal societies is fully transferred to the woman in case the husband dies and/or when she takes the official household headship roles for the absentee husbands. Similar results in Cameroon, found that the gender of farmer facilitate the adoption of agroforestry systems [28]. Conversely, results from Tanzania indicated that 30% of the males and 26% of the females in the selected villages drawn from farming communities in Kilimanjaro were testing improved fallows, and there was no significant difference between the two proportions. Moreover, single females are often disadvantaged relative to female heads of household whose husbands live away [29]. Results showed that the same proportions of these two groups were testing the technology [30]. This means that other factors, beyond gender, were responsible for the kind of findings observed.

3.1.4 DECISION MAKING ON LAND USE

In many African communities, land ownership and land rights dictate and limits land use. Land use is decided by men who are the household heads and owners of land. Therefore, tree planting being long-term and involving land use is controlled by the household head. Women and children can only plant trees on permission from the household head and can only own the trees by association but cannot decide on when to cut the trees and how to use the tree products. Respondents were also asked who makes decisions to undertake the various activities on their farms. This question was intended to find out how decision making in a household can influence land use and the adoption of agroforestry practices depending on who makes decisions. Ref [31] noted that gender related decision making, which is often related to intra-household resource allocation is an important determinant of the adoption of agroforestry practices.

Study results indicated that decision to hire labour, choice of tree species, cash crop growing, location of trees and use of trees was majorly done by men. Shared decisions are made on cropping pattern, types of livestock and change of land use and mainly because it involves food security of the household which needs the contribution of woman of the household. Similar results were recorded in Ukambani where 65.5% of the decisions were made by men, 21.1% were shared decisions and only 14.4% were done by women [31]. Ref [32] noted that women's decision making power in household is limited to by products of men's trees and subsistence crops that have low cash returns on labor and women have obligations to provide labor for male controlled fields. The study results are in line with [31] who indicated that in western Kenya, the general understanding among the Luhya community, for instance, is that the husband as the head of household has the overall control of the household resources and in that capacity everything in the household is viewed as belonging to him. A study done among the Akamba indicated that men as the heads of households are the main decision makers on matters of tree planting. In Malawi, decisions on harvesting of tree products was dependent on the part of the tree: women's influence on harvesting decisions decreased with corresponding increases in men's influence in decisions moved from twigs to the trunk[31]. Decisions on labor was equal among men and women who made individual decisions and considering that hiring labour is cash based, a role associated with men, the study found that labor was divided depending on the work to be done. Men made a sole decision to hire labour towards cane farming and tree growing that required more cash, while women made a sole decision to hire labour for food crops. However, results indicated that many women belonged to farmer groups and therefore, had ready labour from the members of the groups who organize to provide labour to each group member at different days.

Study results also indicated that choice of tree species to be planted in the farm was a male issue and women would be required to provide labor. Similar results were given by [32]. A study done in Rwanda showed that men's knowledge related to big trees such as Eucalyptus, Grevillea and *Makhamia lutea*, the planting and management of trees, introduction of new species and or varieties of trees and decision making aspect related to species choice, placing, timing and harvesting trees for timber, fuel wood or stakes, while women knowledge focused on species identification and naming, utility of the species for seasoning, medicine, love portions and fuel wood qualities [33]. Therefore, changes in productive relationships and in the pattern of resource ownership which might be brought about by tree cultivation must fall within culturally accepted strategies for resource distribution. Further, appropriate and culturally sensitive technical expertise must be available.

4 CONCLUSION AND RECOMMENDATION

The decision to adopt agroforestry was influenced by land and tree tenure, size of land and gender equity (women's rights to property and recognition of co-ownership). Additionally, rural households' investments in agroforestry increase with increasing in land tenure. Land tenure system is a major factor that could hinder agroforestry adoption in cases where no formal responsibility is vested on the caretaker of the piece of land given to him by the household head. Therefore, tree tenure rights could encourage tree planting if incorporated to the current land tenure rights. Decision to hire labour, choice of tree species, cash crop growing, location of trees and use of trees is majorly done by men. Shared decisions are made on cropping pattern, types of livestock and change of land use and mainly because it involves food security of the household, which needs the contribution of woman of the household. Land size influences tree planting, and in an area where cane farming is a major cash crop, compatible tree species are inevitable in the study area. The question of land tenure, tree tenure, gender disparity and land use decisions, which greatly influence agroforestry adoption, should be resolved by updating and harmonizing laws affecting land rights.

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