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Impact of Land-Use Types on the Fringes of Budongo Forest Reserve, Uganda

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Abstract: An effort was undertaken to document the different land-use practices carried out by local communities along the edges of Budongo forest reserve. The data were obtained by administering a semi-structured questionnaires to 90 households living in the 5 villages of Nyabyeya parish bordering with Budongo forest reserve. The results of this study showed that agriculture is the major land-use practice and the major source of income to the local communities along the edges of the forest, followed with livestock keeping, agroforestry and bee keeping as the least land-use practice. These prevailing land-use practices are not economically viable as observed from the poor socio-economic condition of the people living close to Budongo forest reserve. Most farmers (60%) were reluctant to plant trees on their farmland and they depend on the forest reserve for fuelwood, fruits, timber and building materials. The constraints to development of agroforestry around Budongo forest reserve included land scarcity, lack of quality planting materials (seeds and seedling), lack of technical knowledge, insecure land ownership and unfavourable tree tenure rights. The key policy strategy for sustainable forest management should include strengthening of agroforestry activities to improve productivity, diversify alternative livelihood sources and promote off-forest income generating activities.

Key words: Agriculture, agroforestry, communities, incomes, socio-economic condition

INTRODUCTION

Uganda has approximately 14,900 km^2 (7.7%) of the total land surface gazetted as forest reserves of which 7,500 km^2 (3.9%) is savannah woodland and forest plantation, 5,900 km^2 (3%) is tropical high forest and 1,500 km^2 (0.8%) montane catchment forest (Howard, 1991). Conversion of natural forests into agricultural land became a serious problem in Uganda in 1970's of which 12% of forested land had been affected by this agricultural encroachment (Hamilton, 1984; Howard, 1991).

The majority of the forest area (70%) is on private land, consisting mainly of woodlands and scattered trees. The remainder is managed by Uganda Wildlife Authority (UWA) and National Forest Authority (NFA). NFA manages about 417,000 ha of tropical high forests and montane forests and 720,000 ha of savanna woodlands, while UWA manages about 321,000 ha of forested land. The two organizations manage a protected forest area system that accounts for 7% of total land area of Uganda (MWLE, 2001).

Budongo forest reserve is one of the oldest protected areas in Uganda. The forest reserve was officially gazetted between 1932-1939 and has been an important research area for forest ecology. It contains well-established research plots, some of which were set-up in the 1930's (FD, 1951). Due to its richness in timber species (Howard, 1991; Hamilton, 1984), there is a great threat from illegal pitsawing and unregulated removal of other forest products. The capacity of the Forest Department to police and monitor the vast forest area effectively has been limited by poor remuneration and lack of human resources (Falkenberg and Sepp, 1999).

There is considerable concern over the rate at which forest resources in Uganda are being degraded. Forest and woodland cover has decreased from 45% of the Uganda's total area to 8% in 1994 (FD, 1996). Deforestation was particularly severe between 1970 and 1985 when government control over Forests Deteriorated (FD, 1996). A high population growth rate, conversion of forest land to agricultural uses as well as break down in law and order have been the major causes for deforestation in Uganda (Byabashaija *et al*., 2001).

Budongo Forest Reserve forms the northern most extension of the line of forests running down the west of Uganda for the production of timber. Budongo has been

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managed on a sustainable yield basis since the mid 1920's with excellent records made out of the management practices used in each compartment in the forest (Howard, 1991).

The problem is that the central government of Uganda has failed to manage the forest reserve sustainably and benefits never trickle back to the local people (Greene, 1995). Consequently, the local people have developed a distrust of both the state-owned protected areas management authorities and conservation in general. A major reason has been the glaring lack of attention by authorities to the relationship between land-use, the survival of protected areas and livelihoods of these people. Thus, while people are the silent majority who determine whether wildlife will survive, conservation enthusiasts continue to concentrate on solutions that clearly ignore the socio-economic realities (Cunningham, 1992). According to Place and Otsuka (2000), the land-use practices on the edges of Budongo forest reserve have not been documented, thus a need to study and document the different land use systems along the edges and their impact on the management of the forest reserve. The objective of this study were: Examine the different land-use practices carried out by local communities along the edges of Budongo forest reserve and document the constraints to agroforestry practices.

MATERIALS AND METHODS

Study area: The study was conducted in Nyabyeya parish, which is situated at the southern edge of the Nyakafunjo block of Budongo forest reserve. Budongo forest reserve is located in Masindi District, Uganda. It lies between longitudes 30'30°E-30'45°E and latitudes 1'30°N-1'45°N. The forest covers a total land area of 47 km^2 (MWLE, 2002). The topography is generally undulating consisting of small hills with the highest peak lying at 1431 m above the sea level A large part of Budongo forest occurs on a very old rock of pre-cambian origin consisting of gneiss quartznic, chists and granulates. Other parts are underlain by Bunyoro-Kyoga series types of rocks which consist of mudstone, shale's, phylites, quartzite's and conglomerates of pluvio-glacial origin which have been metamorphosised (NEMA, 1998). The forest area receives rainfall ranging between 1397-1524 mm annually. The rains are predominantly of the thunderstorm type while severe hailstorm tend to be frequent in the afternoon periods (MUIENR, 2000).

The area has population density of 230 persons/km^2 and a growth rate of 2.7% (UBOS, 2002). The population is influenced by the influx of immigrants who form 31% of the district population. This population is made up of diversity of tribes, which include the Banyoro (35%), Lugbara (53%), Alur, Lendu and Kakwa who form 12% of the population. Most of these are squatters who are low-income earners surviving on subsistence farming. About 65% the population depend mostly on subsistence farming for their livelihood (MFPED, 2003).

Data collection and analysis: Primary data were obtained through household and key informant interviews and informal discussions with different people while secondary data were sourced from various documents such as policies for both NFA and UWA, Acts of Parliament, institutional and district reports and other relevant documents for the 2 departments. It was a descriptive study aimed at obtaining information on the different land use systems carried out by local communities and how viable these systems have been for the past periods in and around Nyabyeya parish. Self-administered questionnaires and interviews were held with key informants.

The sample villages were those located in close proximity or bordering with the nature reserve. Five from the nine villages of Nyabyeya parish were selected as study sites. Out of 725 households, 90 households were selected and interviewed. The sample respondents were drawn from the villages of Nyakafunjo (15) Maramu (15), Nyabyeaya II (20), Karongo (20) and Kanyege (20) shows in Table 1.

The household sampled was selected randomly by presence and availability of interviewees who were either male or female heads, which was done without preference. 90 households were systematically sampled through out the study basing on village statistics according to Nyabyeya environmental action plan records. Chi-square test (Fowler and Cohen, 1998) was used to show the association between economic viability and the land-use types around Budongo Forest Reserve. Statistical Package for Social Scientists (SPSS) was used to summarise information from the household survey.

Table 1: Demographic information

Village	Total HH	Total HH	Village HH (%)	Male	Female	Population
Nyakafunjo	76	15	10.05	175	205	380
Nyabyeya I	83	-	10.97	165	250	415
Nyabyeya II	83	20	10.97	173	243	415
Nyabyeya centre	110	-	14.55	225	325	550
Kyempunu	75	-	9.92	167	208	375
Nyabigoma	67	-	8.86	107	228	335
Maramu	70	15	9.26	152	198	350
Karongo	88	20	11.64	185	255	440
Kanyege	104	20	13.75	242	275	520
Total	756	90	100	1590	2190	3780

Key: (-) = not sampled, HH = Household, Note: Household number is based on Nyabyeya Environmental Action Plan Records, 1999

RESULTS

Land tenure insecurity negatively affects local community participation in long term forestry activities. Land tenure insecurity could hinder community participants in conservation and management of Budongo forest reserve. The results reported in Table 2 show that the majority (60%) of the households consisted of less than 8 persons and 17% had more than 10 persons. The mean family size was 8 persons, however, family size ranged between 4-20 members. Households possessing large farmlands were observed to have large families.

Figure 1 shows that 32% of respondents acquired land through purchase, 25% through customary allocation, 14% through inheritance, 13% through renting and 11% through inheritance undivided (Fig. 1). It was important to ask how the land was acquired before establishing land tenure because, before land can be owned, it has to be first acquired. Land tenure includes both user and ownership rights of land (Gombya-Ssembajjwe *et al*., 1999).

As the population increases, there will be more division of land leading to over-use hence loss of soil productivity and reduced land size for settlement and agriculture. Since land is inelastic, forest reserves are the easiest alternative resort to acquire free land for agriculture, urban expansion and other uses. This shows that as the population increases, there will be no land to accommodate it resulting in encroachment on the forest reserve.

Land is an important asset to the households living adjacent to the forest reserve. About 53% of the respondents indicated that the size of their land is between 1-3 acres, 27% have 4-6 acres, 2% have more than 7 acres and 7% are landless. To improve the livelihoods of the people living close to the forest, there is a need to improved their access to the forest resources. This can be done by improving formal systems for mapping and registering the forest environmental values according to the needs of the people and by establishing effective systems of user agreements with participatory monitoring and control systems to secure and enhance the natural resource base.

According to the survey results presented in Table 2, it is clear that 90% of the respondents own land. The remaining 10% were squatters and old sons sharing part of their parents land. Of those who own land 33% own land under private free hold, 30% operated under customary tenure and 27% own land under private leasehold. Most of the land on which farmers operate is consolidated in one piece. About 72% of the respondents indicated that land is not enough for all their activities whereas 22% had acquired more land through renting and

Table 2: Household size and landholding size

Household size	Frequency	(%)
1-4	14	20.0
5-7	28	40.0
8-10	16	23.3
>10	12	16.7
Land size		
Not applicable	6	6.7
<1 acre	8	8.9
1-3 acres	48	53.3
4-6 acres	24	26.7
7-9 acres	2	2.2
>9 acres	2	2.2
Land tenure		
Private freeholds	23	33.3
Communally owned	21	30.0
Private leasehold	19	26.7
Squatters	7	10.0

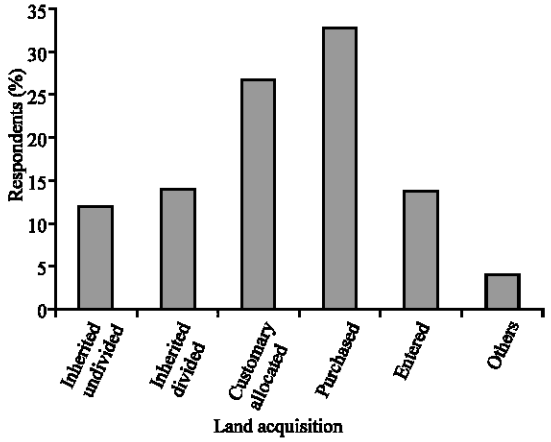

Fig. 1: Sources of land acquisition

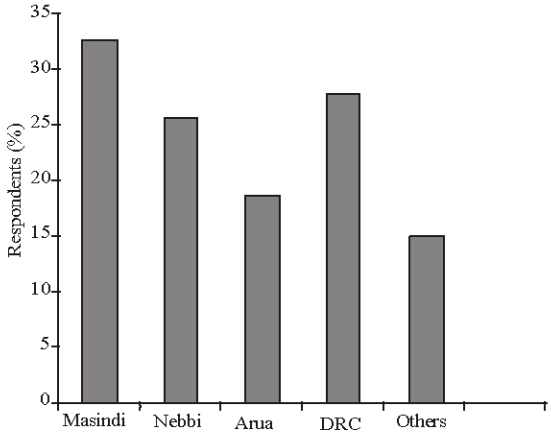

Fig. 2: Region of origin before migration to Masindi district

10% cultivate on part of the forest land and the others obtained land from neighbours and Budongo Saw-mill. Related available literature suggests that the level of dependence upon environmental resources is probably

enhanced by poverty, due to the fact that forest activities are often of low-return and that poor people undertake them as employment of last resort (Vedeld *et al.*, 2004; Jacovelli and Caevalho, 1999). Others argue that poor people make poor land, or said in another way, poor people deplete natural resources more than better off people, that is to say, they extract more per capita.

Masindi district has consequently attracted large numbers of migrants due to unoccupied areas with good soils and climate. It has been noted that most of the migrants have settled in areas close to the forest reserve, which were often unoccupied due to vermin from the forest. In some places, the Banyoro offered land to the immigrants in order to buffer them from the vermins. In this way, several immigrant families settled in the villages adjacent to the forest.

The respondents migrated from Nebbi (21%), Arua (16%), Democratic Republic of Congo (23%) while others came from Kampala, Entebbe, Mityana, Hoima, Lira, Apac and Luwero (13%). This finding confirms the report by MFEP (1991) and Johnson (1993) that Masindi district has some of the most ethnically diverse rural populations in Uganda (Fig. 2).

Some migrants (25%) settled around Budongo forest because they needed land for agriculture and settlement, others migrated to Masindi district (19%) in search of employment especially with Budongo sawmill (Tumuhimise and Kuteesakwe, 2003) and few had migrated (5%) to the Budongo forest area as a result of political insecurity in the northern part of Uganda. The increased influx of people around Budongo forest reserve has exerted pressure on land which has lead to encroachment or part of the forested land that might lead to failure of management of the forest.

Source of income: Majority of respondents (48%) indicated that their income is not enough to satisfy their needs, 30% consented to their income being fairly enough and 22% consented to income being enough. The main source of income for the households is the sale of surplus food crops and cash crops which are now scarce due to poor yields (40%) as a result of the increasing population vis-α-vis the declining land productivity.

The major source of income to the local communities adjacent to the forest reserve is farming (70%), carpentry and pitsawying (10%), salaries (8%) and trade of merchandise (7%). This finding indicated the importance of agriculture to the local communities in Budongo sub-county. Respondents dealing with carpentry and pitsawying indicates that the depend on forest related goods like pitsawed timber, crafts made from rattan and other forest materials. However, information from the interviewed the resident of Nyakafunjo revealed that there is no ready market for their products, thus, they do not derive much income from the sale of forest products.

According to local leaders of Nyabyeya II, it was very unlikely that the local communities could report illegal pitsawying as their source of income out of fear of being apprehended, however, there observable evidence that there are some local communities who practise pitsawying as timber and cutting saws were found in their homesteads. This has an effect on Budongo forest reserve since timber species will be selectively cut, thus affecting the management of the forest reserve. The majority of local people own poorly maintained homesteads (grass-thatched) an indication that money is not enough to construct good, habitable homesteads. This is proof to show that the different land use types are not economically viable as the economic standards of people living around Budongo forest reserve have remained in a poor state.

According to Tumuhimise and Kuteesakwe (2003) access to formal credits and loans by the local people around Budongo forest is very limited. Households do not have adequate collateral property to acquire these loans. Most of the local people obtain credits and loans informally from friends or relatives based on the social norms, that the borrowers do not default. The form of collateral property in the area was reported to be the standing crops such as coffee and maize only to mention a few. Most people pay back after selling the harvests depending on the amount of credit acquired. The major source of cash income for the households is through the sale of coffee and the surplus food crops. However, cash income from crops is usually not enough and environmental resources supplement the households' cash income.

Available statistics shows that in Masindi district, most of the labour is mobilized from within the household itself although some can be through labour hiring. This labour force is characterized by low skills due to low levels of education. The majority of male farming adults (69%) and women (92%) have not gone beyond primary school and almost 30% of women have received no formal education at all (UBOS, 2002). The implication of this low education levels means that there is a high dependence on the forest reserve sources beyond its carrying capacity.

Land-use types: The results presented in Table 3 show that common land-use types identified during the study were crop production (agriculture), livestock keeping, agroforestry and bee keeping. Agriculture represents the most important source of cash (98%), this is because formal employment is unavailable in the area and self-employment represents a limited opportunity for the

Table 3: Selected land-uses types by the local community

Land use	Frequency*	(%)
Agriculture	88	97.8
Livestock	34	37.8
Agroforestry/forestry	28	31.1
Bee keeping	2	2.2
Do not practice any activity	2	2.2
Total	90	100.0

•= Multiple responses

Table 4: Crop yields over the past and recent harvesting periods

	No. of respondents		
Village	Poor	Fair	Good
Nyabyeya II	11	4	5
Nyakafujo	6	6	3
Marram	7	2	6
Karongo	8	7	5
Kanyege	4	11	5
Total	36	30	24
% Total	40	33.3	26.7

households. Some of them engage in petty business such as local beer production or holding a small shop. The head of household, who often is male, controls the major part of the household cash income being the main persons involved in such activities as well as in the harvesting and sales of the main cash crop such as coffee. Men also take up the collection of the most cash-oriented forest products, while women collect mainly products for subsistence consumption. Many products are collected from the forest reserve and firewood represents the biggest economic value extracted from the forest, followed by medicines and fodder. Alternative sources of forest products are limited to fodder and thatching grass.

The commonly grown crops were cassava (*Manihot esculenta*), maize (*Zea mays*), millet (*Eluesine coracana*), sweet potatoes (*Ipomoea batatas*), pumpkins (*Cucurbita spa*), beans, bananas, groundnuts and pineapples. Tobacco was a dominant cash crop grown and it was observed that most farmers (98%) cultivated more than one crop as a form of insurance measure in case there is diseases outbreak and poor harvest of any particular crop. Multiple cropping pattern is a common livelihood coping mechanism shown in the Table 4 and also in the study area.

From personal observation, maize was performing poorly due to continuous cultivation of the crop on the same land from season to season leading to loss of fertility.

Agriculture: Agriculture is so far the main land use practice in communities living around Budongo forest reserve. Ninety eight percent of the people interviewed depend on agriculture as it provides income to some households with others practising farming for consumption. The majority of these farmers are small scale farmers on subsistence level who live in scattered homesteads and mainly use traditional agricultural techniques. Respondents interviewed at least cultivated one type of crop mainly food crop with few cultivating cash-crops. Crops grown include cassava, maize, millet, sweet potatoes, pumpkins, beans, bananas, groundnuts and pineapples. The common cash-crop grown is tobacco.

Forty percent of respondents indicated that yields have been poor over the last harvesting periods. This is due to poor methods of farming and continuous cultivation of the same piece of land with the same crop (maize) and without practising fallowing. We discovered that some farmers had obtained fair yield (33%) and good yields (27%). Low yields are attributed to increasing number of people with little or no land to cultivate, thus continuous cultivation of the same land, which leads to loss of soil fertility. According to Gombya *et al.* (2000), different households have different constraints to improved production and welfare. The fact that 75% of the households depend significantly on agriculture related activities for both subsistence and income generation means that imported household production. Constraints are centred on land productivity, 56.7% of the respondents divide their land for different uses in order to increase on the yields by cultivating different types of crops on different plots. However, this was observed with respondents who had enough land to carry out all their activities. Dividing of land maintains and improves its soil productivity and this can improve on the income.

The local community in the study area faces agricultural problems related to the forest. The interview results show that 73% of the respondents believe that vermin is the major problem while 19% consented to shortage of land and 8% consented to pests and diseases. The results show that wild pigs, baboons, monkeys were the major problem to their crops.

Common animals reared: The data presented in Table 5 shows that the farmers living on the edge of Budongo forestr reserve keep good number of domestic animals that are of economic and cultural importance t the communities. The animals kept include: Chicken, rabbits, goats, sheep, cattle, doves, cats, dogs and pigs. These animals provide farmers with products like meat, milk, cheese, butter, skins and hided and services such as protection (dogs) and time telling (cocks). Some production problems encountered by the farmers include diseases such as swine fever of pigs, chicken pox and coccidiosis of chicken; pests like ticks, worms and tsetse flies. The farmers own small landholdings therefore, prefer to rear goats on the small pieces of land owned. Goat rearing is carried out on part of their land and roadways. They cannot graze them along the forest boundary

Table 5: Common animals reared by the farmers

Animal type	No. owned	(%)
Cattle	15	25.8
Poultry	9	24.3
Pigs	3	14.5
Goats	10	30.6
Sheep	2	4.8
Source of animal feed		
Pastures on own farm	30	31.1
Pastures produced elsewhere	30	33.1
Agricultural residues	28	31.1
Fodder (Tree/shrubs)	4	4.1

Table 6: Different tree species planted by the respondents N = 90

Tree species	Frequency	(%)
Eucalyptus sp.	18	20.0
Maesopsis eminii	15	16.7
Melicia excelsa	10	11.1
Pine sp.	8	8.9
Terminalia sp.	7	7.8
Khaya anthotheca	6	6.7
Ficus sp.	5	5.6
Acacia sp.	5	5.6

because of fear of the wild animals attaching. However, since goats are considered as browsers and since there is shortage of land, there will soon be grazing of goats along the forest boundary which will have an effect on the forest diversity (loss). Kamugisha (1993) indicated that, grazing lands have shrank to a half of what they used to be almost 40 years ago given the observed proliferation of cultivation in all parts of Uganda.

The farmers interviewed (31%) reported that they collect the pasture to feed their animals from their own farms, while 33% got pasture elsewhere mostly in their neighbors farms. Agricultural residues such as maize cobs, sweet potatoes and cassava shavings were also a common source of livestock feeds (31%) and only 4% use fodder collected from tree/shrub cuttings.

Tree planting: The study results revealed that shows that 40% of respondents had planted tree whereas 60% did not practise tree planting. The trees that were planted include *Eucalyptus* sp., *Maesopsis eminii*, *Pine* sp., *Terminalia* sp., *Ficus* sp., *Acacia* sp., *Melicia excelsa* and *Khaya Anthotheca*. Generally, it is believed that with increased planting of trees, there will be little dependence on the forest reserve thus reducing on the impact the local community presses on the forest reserve in search of fuel wood, timber and building materials. There were also fruit trees that were planted or left in homesteads and these include papaw (*Cariea papaya*), mangoes (*Mangifera indica*), passion fruits (*Pacsiflora edulis*) and jack fruit (*Artocarpus heterophyllus*). This indicated a high potential for agroforestry which is important to the local community surrounding Budongo forest if proper management of Budongo forest is to be achieved because it will ensure food, fuelwood and medicine supply. The excess of which can be sold to get some income.

Most farmers (60%) were reluctant to plant trees on their farmland and they depend on the forest reserve for fuelwood, fruits, timber, building materials. This shows that there is increased demand for survival with people encroaching on forests and thus reducing on their sizes and hence affecting the management of the forest reserve.

The respondents who consented to planting trees say that they obtained building poles, firewood from Eucalyptus, timber from *Maesopsis eminii*, hence improving on their income. They also believe that trees protect their soils from erosion and improve on the fertility. The other species preferred to by respondents were fruit trees and these included trees like papaw (*Carica papaya*), jack fruit (*Artocarpus heterophyllus*), mangoes (*Mangifera indica*) shown in Table 6.

The benefits of employing local communities living adjacent to forest resources in forest related activities has been widely documented (Mupada, 2002; Place and Otsuka, 2000). If local communities can be encouraged in the use and maintenance of the forest reserve then the local community will support the conservation and management of the forest reserve. It was reported that the forest department through it field staff in forest reserve still impose restrictions on harvesting products like timber, building poles (MWLE, 2002). Limiting local communities access to forest resources is one of the measures being applied to forest conservation by the forest department to avoid over exploitation of forest resources. Restricting local people from use of such resources, which they had traditionally harvested, is one of the major sources of conflict in resource management. It is therefore, suggested that the management of Budongo forest reserve should meet the needs of local communities in order to ensure long term conservation of the forest.

From the focused group discussions held, we discovered that there is a difference in perspective between NFA and the Masindi local government. While the former pursue the long-term conservation goals, the latter are more inclined to tolerate encroachment and exploitation of protected areas due to local political pressures and economic interest. This finding implies that Budongo forest reserve was originally established with little regard for the survival of the surrounding local communities. Conflicts of interest have thus arisen between managers of forest reserve and the surrounding communities who depend on the forest for their livelihood. Government should desist designing a

management plan which will exclude and restrict the local people from access to the forest products, without providing alternative sources of livelihood.

Traditional agroforestry practices: Traditional agroforestry is not a new practice in the villages adjacent to Budongo forest reserve. Farmers have always cultivated fruit trees such as avocado, citrus sinensis, paw paws and mangoes together with annual crops in their home gardens. But the tree density constituting one form of agroforestry is increasingly reducing. Most farmers had trees planted around the home compound (especially fruit trees) as can be seen from the Table 7. A few of the farmers interviewed (3%) planted oranges and others had planted mangoes (13%). Seedling sources for most of these trees are wildings. Most trees especially mangoes found in courtyards regenerate naturally. The farmers had trees planted in home gardens (27%) which provide mainly firewood, building poles and food (fruits, seeds, leaves). Some farmers have tried to plant eucalyptus, but suffered losses from termite attack. From the study the most practiced forms of agroforestry are seen to be homegardens (27%) and trees on cropland (7%) and planting trees on home compounds (50%). However, many homestead had different species of trees their farmland. The species planted depended on the objective of the farmer, however, citrus species was found to be the most popular and therefore planted in most homegardens. This is because citrus is a multipurpose tree species used as a source of food (fruits), fire wood as well as source of income through sale of the fruits.

Constraints to the practice of agroforestry around Budongo forestry reserve: The farmers reported that land scarcity was the biggest constrain to agroforestry practices (Table 8). This finding is surprising because principally, agroforestry is a land-use system that fits where land is scarce by allowing the optimum utilization of the scarce land resources. It is most likely that the critical constraints is farmer's lack of knowledge. Farmers lack the technical silvicultural knowledge to manage especially tree components in an agroforestry system. To them, once a tree is planted, it does not need any tending operations.

Lack of knowledge is aggravated by the inadequate extension services to teach the people about tree planting and crop management. This fact is supported by the fact that 90% of the respondents reported that there are no extension services while 10% said they were aware. This finding concurs with those reported by Masangano (1996), that when people adopt new technologies, there are often critical items such as seeds of preferred species and technicians to guide farmers in the new farming

Table 7: Location of trees

Place	Frequency	(%)
Home garden	19	27.1
Crop land	5	7.1
Home compound	35	50.0
Boundaries	4	5.7
Woodlots	4	5.7
Roadsides	2	2.9
Fences	1	1.4
Grazing land	0	0.0
Public places	0	0.0
Total	70	99.9

Table 8: Limitations to tree growing

Problems limiting tree planting	Frequency	(%)
Seedling supply	14	20.0
Lack technical knowledge	15	21.0
Land scarcity	17	23.0
Land ownership	4	5.0
Cultural constraints	1	1.0
No capital	3	4.0
Lack of interest	2	3.0
Tree tenure rights	7	10.0
Pests, especially termites	4	5.0
Seasonal rainfall	1	2.0
Competition from food crops	4	6.0

system may be severely limited and they constrain wide scale adoption. It is necessary to point out that any undertaking in the community in as far as agro forestry is concerned, must consider critically the issue of extension services in order to teach people about the intended innovation.

The supply situation of improved seedlings of recommended tree species for agroforestry and any other tree is frustrating. NFA and local NGO's do raise seedling but they are not readily availed to the farmers, most of whom are not aware of these sources of seedling. Some farmers interested in tree planting say it is the seedling price discouraging them and others are interested in plant wildings.

The necessary information especially technical knowledge that farmers need most for proper management of trees is lacking. We observed that generally there was lack of an effective extension service delivery system for both tree and agricultural crops in the study area. To reap agricultural benefits fully, agronomic, silvicultural and animal husbandry knowledge is a pre-requisite. A big proportion of the labor requirements (96%) are obtained from the family and 4% hired labor. The other labor sources like oxen, tractors and vehicles were reported scarce. Agroforestry being labor intensive (compared to the low level of labor supply), farmers cannot readily develop the initiative for practicing it. Although hired labor is available, poor as the people are, they can not spend the little income they get on it, but rather on something else. This affect both reared animals and cultivated plants. These always lower expected yields and in the end frustrate the adoption of agro forestry as some

of the crops, trees and livestock are destroyed, hence reducing drastically the benefits that could be realized.

The main problems that the farmers face in marketing are the low prices for their produce and lack of transport to ferry their produce to suitable markets. This is in accordance with ICRAF (1992), that reported that farmers lack the economic incentives due to poor transport and marketing facilities and in such a situation farmers are reluctant to practice of agroforestry.

CONCLUSION

From the results of this study, it was observed that agriculture is the major land-use practice and the major source of income to the local communities along the edges of the forest, followed with livestock keeping, agroforestry and bee keeping. There was a high response of low agricultural crop yields and therefore, agriculture as a land-use was not economically viable.

The alternative land-use practices such as agroforestry, bee keeping were also found not economically viable as they have failed to improve on the incomes of the local communities where the majority live in pathetic grass thatched houses. Based on these findings, we can conclude that NFA should embrace a proactive approach and work with local communities to address their socio-economic concerns. Secondly, to develop agroforestry technology in the area, there is a need for full participation of the local people.

The constraints to development of agroforestry around Budongo forest reserve can be grouped under institutional, legal, ecological, social and cultural factors. The major constraints identified included lack of quality planting materials (seeds and seedling), lack of technical knowledge, land scarcity, insecure land ownership, cultural constrains, capital, lack of interest, tree tenure rights, pests, seasonal rainfall and crops favored.

Based on these challenges presented, there is a need for training of district technical staff in participatory conservation approach with a focus on socioeconomic development among the communities bordering the forest reserve. The local community should be encouraged to practice income generating activities such as bee-keeping since this type of land-use can be economically viable through the sale of honey. Furthermore, they should be encouraged to plant multipurpose trees, which will provide fuel wood, timber, building poles and this will reduce community reliance on the forest reserve. Intensive research should be carried out on the possible combination of trees and shrubs with crops. Emphasis should be put on indigenous trees and shrubs that have proven compatible with agricultural crops in the farming system.

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