

WOMEN PARTICIPATION IN AGROFORESTRY FARMING SYSTEM: A STRATEGY TOWARDS POVERTY REDUCTION IN MOROGORO RURAL DISTRICT, TANZANIA

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Abstract

Understanding the role of agroforestry in improving the lives of rural women is important for advocating improved management of natural resources and poverty reduction. The role of agroforestry towards women's poverty reduction was assessed. A cross-sectional research design involving focus group discussions, field observations, key informant and household interviews techniques were employed. Results indicated that 72% of women were taking part in various agroforestry practices with boundary planting being the most frequently used practice. The major agroforestry products gained were crops (100%), fruits (77%) and firewood (60%). Almost half (49%) of the respondents participated in agroforestry to improve their household's incomes. Comparatively, of the income generating activities performed by women, the average annual income generated from agroforestry was slightly higher than that accrued from non-agroforestry practices. However, for a more significant impact of the agroforestry practices, there is a need for diversifying agroforestry types and for better market search for agroforestry products.

Key Words: *Agroforestry, poverty, poverty reduction, women*

Introduction

Agroforestry is a practice recognised worldwide and Tanzania in particular, as one of the main strategies for poverty reduction (Garrity, 2006; Mbwambo *et al.*, 2013). It is defined as a land use systems and technologies where woody perennials (tree and shrubs) are deliberately used on the same piece of land as agricultural crops and/or livestock feed, in some form of spatial arrangement or temporal sequence (Nair, 1993). This practice forms an agriculture system that involves the integration of trees in

agricultural landscape and rangeland, diversifies and sustains production for increased social, economic and environmental benefits (ICRAF, 2008; Kiptot and Franzel, 2011). Agroforestry is an important practice for sustainable land use management to support agricultural production with increased livelihood benefits for people such as food security, employment, income generation among others (Semgalawe, 1998). For example, in developing countries, about 1.2 billion people depend on smallholder agroforestry

practices to sustain their livelihood (Garrity, 2006). Several agroforestry technologies have been developed and implemented by farmers all over the world (ICRAF, 2003). These technologies include: i) integrated soil fertility management practices that combine the use of fast growing legumes such as trees, shrubs and crops with inorganic fertilisers; ii) the integration of high value timbers, together with fruit and medicinal trees into the same farm; and iii) fodder trees, grasses and shrubs for subsistence livestock (ICRAF, 2003). The agroforestry technologies in Tanzania include, among others, rotational woodlots, boundary planting, fodder banks, planting of nitrogen fixing trees, improved fallow, traditional grasslands and fodder management system (*ngitiri*), and homegardens (NASCO, 2004; Pye-Smith, 2010). Apart from poverty reduction, agroforestry has also been found to be a tool for natural resource management especially on reducing the pressure on forests (Tscharntke, 2012; Faße, 2014). For example in Tanzania, the practice has been promoted with the aim of increasing trees on farms to reduce overdependence of reserved forests due to firewood collection (Sonwa *et al.*, 2011).

In the developing world, women play a crucial role in agricultural production particularly with regard to agroforestry practices. It is estimated that in developing countries about 60% to 80% of smallholder farmers are women (Garrity, 2003; Garrity, 2004). In particular, women in Tanzania offer 80% of the labour force in agricultural including agroforestry activities while contributing about 60% of food production (Tanzanian Government,

2012). For example, in northern Tanzania both men and women are involved in agricultural activities (Chagga homegarden) particularly in tree planting, but, women (60%) have more tasks in tree management than men (Epaphra, 2001). Eklud (2009) put forward that agroforestry is particularly suited for women, because it is a low cost and low technology system and means a lot of benefits for women whose task in the household is to provide food and water. Also Kiptot (2015), argued that women's involvement in agroforestry are more likely to derive personal benefit from it. Various studies show that agroforestry practices have generally contributed towards poverty reduction and environmental conservation (Semgalawe, 1998; Bonifasi, 2004; Namwata *et al.*, 2012). However, despite women greater role in agroforestry, none of them have given a special emphasis on women's involvement in agroforestry towards poverty reduction. Similarly, studies such as Epaphra (2001) and Njuki (2001) have concentrated on the roles of women in agroforestry with little attention on the contribution to poverty reduction particularly in forest adjacent communities.

The present study was conducted to assess the role of agroforestry in women's life for the community adjacent to Kitulang'halo Forest Reserve in Morogoro Rural District. The specific objectives were to: i) detail all agroforestry practices to which women were involved ii) assert products to which women obtain from their agroforestry farms iii) determine women's reasons for participating in agroforestry iv) compare the differences in incomes accrued from

the agroforestry to those from non-agroforestry activities.

Study Area

This study involved the villages of Lubungo A and Maseyu, Morogoro Rural District, Morogoro Region. The Morogoro Rural District is located northeast of Morogoro Region, between Latitudes 8°00' and 6°45' S, and between Longitudes 37°00' and 38°30' E (Figure 1). The study area is located to north of the Morogoro District and they border the Kitulang'halo Forest Reserve. This region of Tanzania is of particular interest because there are many ongoing agroforestry practices, and most of them involve the participation of local women.

Materials and Methods

Research Design and Data Collection

A cross-sectional research design that the data was collected at a single point in time without repetition was employed (de Vaus, 1993). Purposive and simple random sampling were utilised in the selection of the study villages and households respectively. 10% intensity (Boyd *et al.*, 1981) of households were randomly selected to conduct the interviews, thus, a total of 108 households were selected for interview.

Both qualitative and quantitative data was collected through primary and

secondary data sources. Primary data was collected through participatory rural appraisal (PRA) approaches including household interviews, focus group discussions (FGDs), key informants interviews (KIIs) and field observation. The household interviews were conducted using structured questionnaires. The FGDs were conducted after the interviews and involved a total of six groups comprised of eight people (three groups of men, women and institutions from each village). Groups of men and institutions were included to verify information from women. The KIIs followed and it involved 12 key informants (six informants from each village). Field observations were carried out by taking notes and pictures in the field. Secondary data were collected by reviewing relevant literatures. According to Rocco *et al.*, (2003) the triangulation of techniques in data collection helps to verify or compare results and/or information obtained through different techniques thus increasing the reliability of the findings. All the methods used in the study to gathering the data only considered the women (except in FGD for men and institution) because we were interested in assessing the role of agroforestry practices for women poverty reduction.

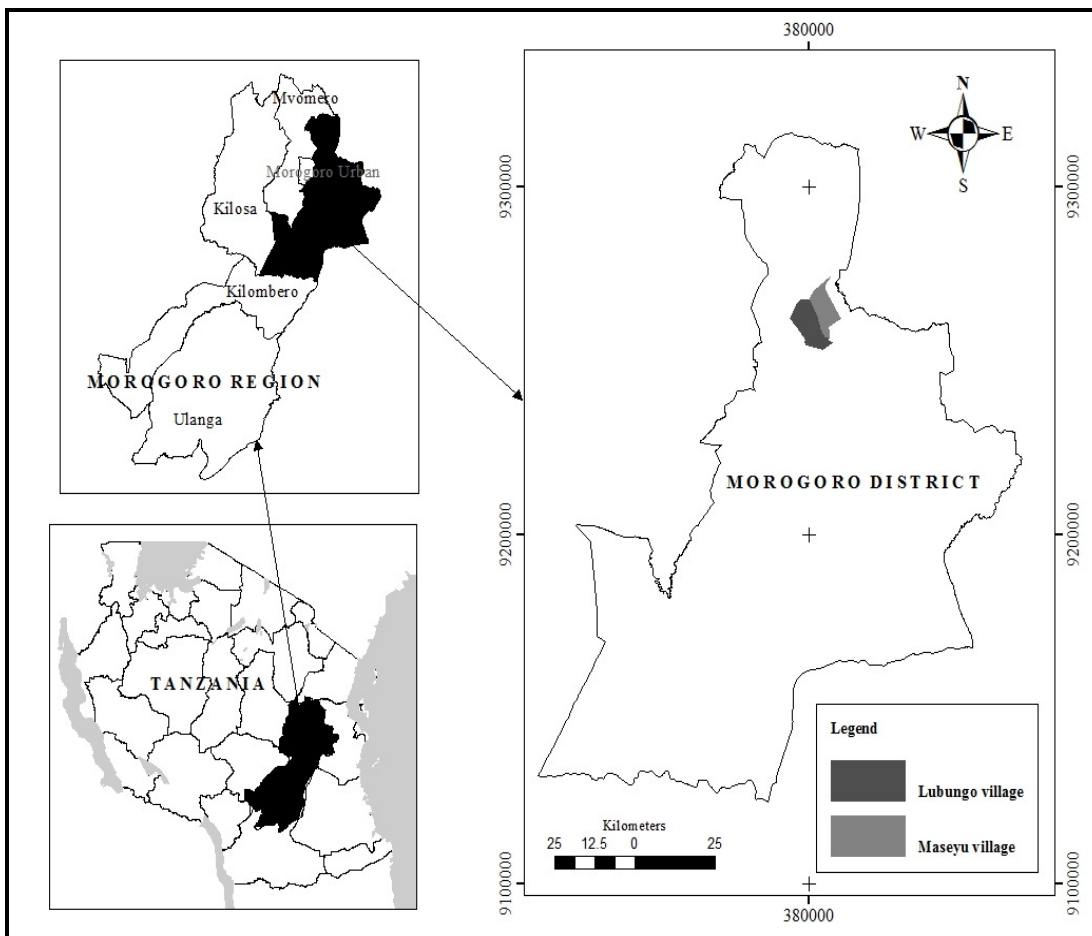


Figure 1: Location of the study sites
Source: Ernest, (2013)

Data Analysis

The data collected during the survey were organised and analysed using quantitative and qualitative approaches. The Spearman’s Rank Order Correlation Test was used to correlate income generated by agroforestry and non-agroforestry activities. Qualitative data was analysed using content analysis method. Content analysis is a systematic qualitative analysis for making inferences about a study population based on content of written documents or transcription of recorded discussion (Patton, 2002). It involves the analysis of

the content of the message in terms of who says what, to whom, why, to what extent, and with what effect.

Results and Discussion

Agroforestry Practices in which Women are Involved

It was observed that almost three quarters (72%) of the respondents were involved in planting trees along farm boundaries. It was also realised that only a few respondents (7%) practiced alley cropping (trees and grass were planted in rows in the farm with crops) and agrosilvopastoral (crops, trees and

livestock were integrated in the same farm) (Table 1). It was noted during FGDs and KIIs that some farmers were reluctant to practice alley cropping and to scatter trees in their farms; instead the farmers planted trees along their farm boundaries, to avoid shade and root competition effect on their food crops. They believed that “miti inasesera mazao” (in Kiswahili), meaning that trees can cause crop failure thus decreasing crop yield. Few respondents reported to plant tree on area prone to soil erosion could be related to the nature of the topography in the area which is characterised by gentle slopes and flat areas. Similarly, the low percentage of agrosilvipastoral practices could be explained by the Luguru culture of not keeping livestock. Those who practice agrosilvipastoral were immigrants to the area. A study conducted elsewhere had earlier reported that trees in farmland compete with the food crops thus reduce agricultural production (Kang and Akinnifesi, 2000). Bankole *et al.*, (2012)

reported that the constraint to the practising of alley cropping in farms is the shade casts on the crops when trees matured. It has also been reported that some trees like *Dalbergia sisoo*, when combined with crops have a negative impact on crop yield (Puri *et al.*, 1995). However, some other studies have proven the contrary – that crop mixing has actually contributed to improved crop yield (Barnes and Fagg, 2003; ICRAF, 2009). In trying to determine the types of agroforestry most common in the study area, it was found out that there existed a number of them (Table 1). From the various interviews it was realised that most (91%) of respondents were engaged in more than one type of agroforestry practice while very few (9%) were involved in only one type. During field visits, the main types of agroforestry practices as indicated in Table 1 were noted. The boundary type was also proved as the most common agroforestry compared to other reported types, as presented in Table 1.

Table 1: Agroforestry types in the study villages

Agroforestry practices	Percentage (%)
Trees planted along farm boundary	72
Scattered trees on cropland (planted)	43
Scattered trees on cropland (retained)	28
Scattered trees on cropland planted and retained	25
Tree planted on soil erosion control structures	23
Alley cropping/hedgerows	7
Agrosilvopastoral (crops + trees + livestock)	7

The study also assessed the relationship between age, household size and size of dependants with the number of agroforestry practices practised by women. The Spearman’s Rank Order Correlation Test indicated a significant negative relationship between age and

number of agroforestry types ($r = -0.300$; $p = 0.002$). This indicates that younger people had higher chances to get involved in more types compared to the older ones. The reason for such trend could be the fact that younger people are considered to be more active and

productive than the older ones. Further analysis showed no significant correlation between the number of agroforestry practices, and household size and size of dependants in a household. These findings show that the number of agroforestry types did not depend on whether the household had many or few members or dependants.

Products Obtained from Agroforestry Practices

Agroforestry with its three components (tree/shrubs species, crop species and livestock species) in the study area the products obtained by respondents were crops, building poles, timber, medicine, firewood, logs for charcoal production, fruits, fodder, meat and animal skin from the livestock kept. All respondents (100%) affirmed that they were obtaining crops (products other than trees and livestock such as maize, beans, cassava etc.) from agroforestry activities, and only (6%) said they were benefiting from meat and animal skin (Table 2). Although household interviews didn't capture milk as product obtained from agroforestry, this was mentioned during various discussions. Respondents and discussants who said they were benefitting from animal skin admitted that this was a result of good fodder trees and grass planted on the agroforestry farms, which were being used to feed own animals. Furthermore, some discussants and key informants reported that after harvesting, they used crop residues to feed their animals. The high percentage of respondents who access food (crops and fruits) and firewood from agroforestry indicates that the practice could increase food security as well as reduce pressure from the Kitulang'halo Forestry Reserve. This is in line with

findings by Ramadhani *et al.* (2002) who suggested that when agroforestry provides fuelwood for household consumption, this can directly reduce pressure on the existing forests and community woodlands. Also, as expected the respondents were much concerned with firewood as benefit obtained from agroforestry as women often have to go long distances to collect firewood, which can be gathered in their farm if agroforestry is practiced. The low percentage of respondents reported to benefit from fodder, meat and animal skin could be explained by the responses analysed in the previous section, where we found that very few respondents were practising agrosilvopastoral. Generally, the products obtained from the agroforestry landscape are important indicator of whether the agroforestry have value to the rural women in the study area.

Table 2: Products obtained from agroforestry practices

Products	Percentage (%)
Crops	100
Fruits	77
Firewood	60
Medicine	16
Timber	13
Building poles	9
Charcoal	7
Fodder	7
Meat	6
Animal skin	6

Women's Reasons for Participating in Agroforestry Practices

Reasons as to why women in the study areas were participating in agroforestry were explored during field visits. Among the widely reported reason for participating in agroforestry was to

improve income and yields of both tree and crops (Table 3). The respondents admitted that they were trying to diversify agricultural practices so that they could raise their income through improved crop and tree yields. They believed that they could generate cash income through sale of various agroforestry products including tree products (products earlier mentioned in the previous section). World Forest (2005) also reported that farmers practice agroforestry as influenced by income generated from the same. Other studies, for example, Elevitch and Wilkison (1998) have reported that farmers get

engaged in agroforestry as it contributes to food security, energy and cash income through selling of tree products. Another study by Akhter *et al.* (2010) further indicated that women participate in agroforestry activities mostly to reduce biotic pressure on forests (97%), shade (94%), preserving the environment (85%), soil stabilisation (67%), save money (56%) and source of food and food security (44%). Almost similar reasons why women participate in agroforestry practices were reported during various discussions and interviews of this study (Table 3).

Table 3: Why women participate in agroforestry activities

Reasons	Percentage (%)
Improved income and yields	49
Tree and crop diversification (enhance biodiversity)	27
Environmental conservation (preserve and protect environment)	11
Easy management of farm	9
Farm boundary demarcation	6
Reduces chances of complete crop and tree failure	5
Increase soil fertility through mulching and nitrogen fixing trees	4
Trees provide shade	4
Wind breaker (control wind)	3
Control soil erosion	3
Land scarcity	3
I don't know	3

Women's Income from Agroforestry and Non-Agroforestry Practices

Agroforestry has been recognised to be a major source of income to farmers (Neupane and Thapa, 2001) and can increase household income (Khanal, 2011). Various discussions that were held during this study confirmed that most women in the study areas have been engaged in both agroforestry and non-agroforestry activities, to cater for their daily requirements and for income generation. According to these women,

income from agroforestry practices was obtained through selling of food and cash crops, charcoal, livestock (goats, sheep, pigs and cattle) and milk from cattle. Income from non-agroforestry activities was obtained through activities such as small businesses (local brew bars, small shops, restaurants, and charcoal stalls), casual labour, formal employment and remittances. It is important to note that charcoal were mentioned in both agroforestry and non-agroforestry activities as they said obtained trees for

making charcoal both from open forests and others from agroforestry farms.

Considering the income obtained from agroforestry practices, the survey further indicated that the income generated by women from agroforestry activities ranged from Tanzanian Shillings 40,000 to 1,600,000 (US\$ 25 to US\$ 1,000) per year with an average income of Tanzanian Shillings 330,694 (US\$ 206.6) per year. Almost a three quarters (72%) of the respondents earned income between Tanzanian Shillings 0 and 360,000 (US\$ 0 and 225) per year while few respondents 10% earned income higher than Tanzanian Shillings 720,000 (US\$ 450) per year (Table 4). This result shows that most (90%) of the respondents earn income which is less than Tanzanian Shillings 1,950 (US\$ 1.25) per day (agreed poverty line) (UN, 2012). This has more adverse effects for unmarried women who are the only source of income for the household. Women farmers, through various discussions, claimed that their income would have been higher had there been good markets for agroforestry products, quality seeds and seedlings, fast growing trees, modern agriculture equipment and accessible loans for agroforestry.

Table 4: Women’s income from agroforestry practices

Income range	Percentage (%)
0 – 360,000	72
360,001 – 720,000	18
>720,000	10

Furthermore, by considering the annual income generated from non-agroforestry activities by respondents, the minimum income was Tanzanian Shillings 10,000 (US\$ 6.25) and the

maximum was Tanzanian Shillings 2,000,000 (US\$ 1250), with an annual average income of Tanzanian Shillings 311,333 (US\$ 194.6). More than three quarters (76%) of the respondents earned income between Tanzanian Shillings 0 and 360,000 (US\$ 0 and US\$ 225) while only few respondents (10%) earn income higher than Tanzanian Shillings 720,000 (US\$ 450) (Table 5). Like income earned from agroforestry activities, the majority (90%) of respondents earned less than Tanzanian Shillings 1,950 (US\$1.25) per day (agreed poverty line) (UN, 2012).

Table 5: Women’s income from non agroforestry practices

Income range	Percentage (%)
0 – 360,000	76
360,001 – 720,000	14
>720,000	10

The annual average incomes between agroforestry and non-agroforestry activities indicated a small difference of Tanzanian Shillings 19,361 (US\$ 12.1), with the average income from agroforestry being higher. Income disparity has also been expressed by other studies; for example, Mtuya (2006) found out that farmers’ income from agroforestry activities was higher than that from non-agroforestry practices, by Tanzanian Shillings 95,324 (US\$ 59.6). Also, Regmi (2003) revealed that income from agroforestry farms contribute about 60% of the total income whereas 40% is contributed by off-farm activities.

These results also indicated that there was no correlation between income from agroforestry and non-agroforestry activities (Spearman’s Rank Order Correlation Test). This means that those

who did not have high income from agroforestry had necessarily higher income from non-agroforestry activities, and vice versa.

Women's average income from agroforestry and non-agroforestry activities amounted to Tanzanian Shillings 642,027 (US\$ 401.3) per year, per woman. This means that their income per month was about Tanzanian Shillings 53,502 (US\$ 33.4), which is smaller than the minimum salary for a government employee, which is Tanzanian Shillings 170,000 (US\$ 109) (URT, 2012). However, the discussants in FGDs perceived that income obtained by women from both agroforestry and non-agroforestry activities had some significant contribution to the total household income.

It was further indicated that with regard to poverty reduction, agroforestry contributes more compared to non-agroforestry activities in terms of food security. Apart from provision of cash income as is the case with non-agroforestry, agroforestry activities also provide food (crops and fruits). During the FGDs, one of the strong claims that were given stated: "Apart from generating income, agroforestry activities can directly supply food to the households. Therefore, improved agroforestry practices and increased women participation in agroforestry would have a positive impact towards income generation, employment creation and food security that contribute to poverty reduction". This was further confirmed by household interviews, that agroforestry provides access to food and improves crop yield, which eventually contributes to poverty reduction. Along the same view Regmi (2003) claimed that

agroforestry practices supply farmers with food and cash, therefore, the practice plays multiple roles to the rural farmers.

Conclusion and Recommendations

Women involvement in agroforestry practice with its three components (tree/shrubs species, crop species and livestock species) plays a significant role in improving rural livelihoods particularly in developing countries. The scenario for rural Tanzania is not different as we noted that a large proportion of women in the study area were involved in various agroforestry activities. Boundary tree planting emerged the most common agroforestry practice in which most women were involved. Among the major reasons for their involvement in agroforestry was improving income through selling of major products. Most women practicing agroforestry in the study area acknowledged that the practice does improve crop yield although a few still thought that planting trees on the farm had reduced crop yield due to competition for soil nutrients and sunlight. This small group preferred planting trees along the farm boundary which is one form of agroforestry. Certainly, women farmers need to be trained on the types of agroforestry practices and appropriate trees species that have no shade and root competition effect on crops to encourage inclusion of trees on farms. Despite the higher contribution of agroforestry to poverty reduction compared to non-agroforestry activities income from both sources was generally low and therefore efforts are needed to improve these activities to have more impact on reducing poverty. From

the various discussions and feedback from our interviewees, it would appear that the most effective way to improve and increase income from agroforestry is to diversifying agroforestry types/technologies, to link farmers to good markets for agroforestry products, provide quality seeds and seedlings, fast growing trees, modern agriculture equipment and accessible loans for agroforestry.

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