# POPULATION AND ENVIRONMENTAL CHANGE IN AFRICA: EVALUATION OF THE ASSOCIATION OF TANZANIA TOBACCO TRADERS SUPPORTED REFORESTATION PROGRAMME IN URAMBO DISTRICT-TANZANIA

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**BY**

**MANGASINI A. KATUNDU[1] & DISMAS L. MWASEBA[2]**

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Mangasini A. Katundu[1] is an Assistant Lecturer at Moshi University College of Co-operative and Business Studies of Sokoine University of Agriculture.
Dismas L. Mwaseba[2] is Senior Lecturer at Sokoine University of Agriculture.

ABSTRACT

The study was conducted in Urambo District. The objectives of the study were as follows: to examine role played by primary farmer co-operatives in implementing the reforestation programme; to determine the planting rate of trees among co-operative members; to assess the survival rate of planted trees; and to identify constraints faced by farmers in implementing the reforestation programme and their coping strategies. The study applied a cross-sectional research design. Variety of methods including personal observations questionnaires and focus group discussion were applied. Sample size for the study was 60 primary-farmer co-operative members, 20 members from each of the three primary-farmer co-operatives, selected purposively and systematically from the most affected division. Sample size represented 7% of total study population which is 862 co-operative members. Data were analyzed using SPSS, both descriptive statistics and inferential statistics were analyzed. Results from this study show a poor performance of reforestation programme. Furthermore, the results indicate that, the study had a low planting rate and a low survival rate of 39.6 %. This study recommends proper actions to be taken on several constraints that have been identified to course the lower rates. Furthermore, farmers should be separated from livestock keepers to avoid grazing on tree farms. On issues of fire outbreaks, there is a need to introduce strict by-laws, penalties and fines to those who deliberately burn the forests.

## Introduction

Reforestation is not a new concept; its history goes as far back as 1800s when the first reforestation attempts were made in Europe. WWF in 2001 noted that, the first reforestation project in Haute-Province in France started in 1860 and ended in 1930 (WWF, 2001). From 1960 to 1980, African forestry services made major efforts at reforestation, with the help of outside financing. From 1961 to 1975, priority was given to industrial afforestation (61 per cent of the areas planted). From 1976 to 1980, a scaling back of industrial plantations, and therefore of large-scale plantations, was begun as a result of the frequently mixed results of massive plantations, the major drought and the development of more integrated and participatory approaches (DESA,1999).

Reforestation in Tanzania can be traced back as far as 1970s when the Village Reforestation Programme was introduced (MLNRT, 1989b). It was initiated as a strategic approach for improving fuelwood supply in rural areas and reducing pressure on environmental degradation. It was meant to provide enough fuelwood to the rapidly growing population as well as maintaining a sound environmental condition for sustained agricultural production (Misana, 1999: 53-54). This came after realizing that sources of fuelwood supply were being depleted faster than expected. Therefore, the need for tree growing to meet basic needs for fuelwood and poles, while at the same time saving the country from the threat of desertification, was seen as an urgent undertaking (MLNRT, 1989a). A national reforestation campaign was launched in 1980 through the mass media to solve the fuelwood crisis. Slogans such as "*Misitu ni Mali*" (Forests are wealth) and "*Usikate Miti Ovyo*" (Do not cut trees indiscriminately) were used in the campaigns (Misana, 1999: 54-55).

The agricultural policy of 1983 also incorporated aspects of tree planting, with the aim of expanding the reforestation programme especially in tobacco growing areas. Thus by 1983, over 68 000 ha of woodlots had been established by villages, schools, government and NGOs (MNRT, 1989b). This means an average reforestation of about 6500 ha/year, which is relatively low. By 1989, about 80 000 ha of scattered woodlots had been established (MNRT; 1989a). Annual seedling distribution was 15 to 20 million over a ten-year period. At the end of 1989 about 560 nurseries were in operation and more than 10 000 schools had planted trees (ibid).

During 1980s the government of Tanzania initiated Soil Conservation Programmes in which reforestation was taken as a means to conserve land in areas that seemed to have been affected by deforestation and land degradation the programmes were initiated in Dodoma and Shinyanga. HADO started as a reforestation and engineering project aiming to prevent further land degradation in Dodoma especially the Kondoa Irangi highlands (Misana, 1999: 55-58). Overstocking was the major cause of land degradation and the enforcement of a 1988 bylaw of the Kondoa District Council removed all livestock from the Kondoa highlands. Next very important reforestation programme which also employed soil conservation technique was known as HASHI (Hifadhi Ardhi Shinyanga/ Shinyanga Land management programme). It was initiated as a follow up of a national conference held in Shinyanga in 1984 on, "environmental conservation through tree planting"(op.cit.). The aim was to encourage and involve the people in Shinyanga in environmental conservation measures to mitigate the adverse effects of land degradation and to improve the standard of living of the people. The programme capitalized on education, awareness raising and use of indigenous knowledge to achieve its targets. HASHI has a lot of lessons

to learn from for any programme on land reclamation and conservation through working with the people.

In the wake of declining natural forest resources the major source of firewood for curing tobacco in Tanzania, tobacco companies initiated a "Tree Planting Policy" in 2001 and implemented by ATTT on behalf of Tanzania Leaf Tobacco Company (TLTC) and DIMON. This programme was set to cover all tobacco producing regions with severe deforestation including Tabora, Urambo, Kahama, Mpanda, Chunya and Manyoni (ATTT, 2006: 2).

The main objective of the programme was to achieve long term sustainability for tobacco production in Tanzania by providing enough firewood for curing tobacco and promoting curing barns that have higher fuel efficiency (ibid). Other objectives include: to plant and grow as many trees as possible by individual members of primary farmer co-operatives; to improve natural woodland productivity through proper management and conservation of the existing natural forests, woodlands and trees; and to ensure efficient utilization of the available forest resources.

However, since its establishment, very little is known about the effectiveness of this reforestation programme that is being supported by the Association of Tanzania Tobacco Traders in Urambo District. Hence, it is the intention of this study to evaluate the effectiveness of this reforestation programme in Urambo District.

**Objectives**

The study aimed to examine role played by the primary farmer co-operatives in implementing the reforestation programme, to determine the planting rate of trees among co-operative members per year, to assess the survival rate of planted trees since the inception of the programme, to identify constraints faced by farmers in implementing the reforestation programme and their coping strategies

**The conceptual framework for the study**

Programme evaluation is a management tool. It is a time-bound exercise that attempts to assess systematically and objectively the relevance, performance and success of on-going and completed programmes and projects. Evaluation is undertaken selectively to answer specific questions to guide decision-makers and/or programme managers, and to provide information on whether underlying theories and assumptions used in programme development were valid, what worked and what did not work and why (UNFPA, 2004: 1). Key approaches used in evaluating projects/programmes include, assessment of project relevance, efficiency, effectiveness, impact and sustainability. Each of these is defined below:

Project relevance concerns whether the rationale behind a project is in keeping with priorities of the local community and society in question (Kajembe et al, 2003: 21). On the one hand project relevance is seen as a matter of the direction of the project in relation to its purpose. On the other hand it means looking at the societal changes that may have taken place while the project has been in operation and asking to what degree this may alter the rationale for the project.

Efficiency of project is the measure of the outputs of the project, qualitative or quantitative in relation to the total inputs. In other words, it is a measure on how economically the various inputs of the project are converted into outputs (Ngasongwa, 1988: 64).

Effectiveness of project is the extent to which the project objectives have been achieved or can be expected to be achieved (Ibid). Assessing effectiveness presupposes that the project objectives have been unambiguously and operationally defined with clear and appropriate outputs/indicators so as to make verification possible (Kajembe et al, 2003: 20).

Project sustainability is an overall assessment of the extent to which the positive changes achieved as a result of project can be expected to last after the project has been terminated (Kajembe et al, 2003: 21). In many cases this is a question of the relation between the necessary use of local resources and how recipients view the project. Sustainability is the final test of project success (Ibid).

In evaluating the reforestation programme in Urambo District the study aimed at assessing effectiveness of the project/programme. This was done based on the number of tree seedlings planted as compared to what was supplied and the number of trees that survived at the end of the rain season compared to what was planted at the beginning or at the start of the rain season.

## Methodology

The study was conducted in Urambo District which is one of the six districts of Tabora region. Other districts are Tabora, Uyui, Nzega, Igunga and Sikonge. Urambo was selected for the study because is the major producer of tobacco and is severely affected by tobacco-related deforestation out of all the Districts involved in ATTT supported reforestation project countrywide.

The study population consisted of all primary farmer co-operative society members dealing with tobacco production in Urambo District. The sample size for the study was 60 primary-farmer co-operative members which were selected systematically.

Primary data were obtained using structured questionnaire with both closed and open-ended questions, focus group discussions (FGDs) and direct observation. The importance of FGD is shown clearly by Wolff *et al* (1993) who observed that it is a complementary data collection method, which facilitates the presence of interaction between respondents and researcher's questions.

Secondary data were obtained by reviewing various secondary sources, that is publications and reports obtained from local authorities (village, ward, divisional and district officials) and cooperative officials (primary-farmer co-operative officers and ATTT officers especially at Urambo).

Quantitative data from the respondents were verified, compiled, coded and summarized before analysis using Statistical Package for Social Sciences (SPSS). Inferential analysis of the quantitative data was done using ANOVA because this technique is useful when there are more than two uniform samples to be compared (Kothari, 2004: 256). With respect to qualitative data analysis, this was done based on themes of the discussions extracted from the notes taken. The process proved to be complicated, difficult and time consuming.

## Results and Discussion

### Respondent's age

Table 1 presents the distribution of respondents by age. The range of age of respondents is 43 years and the mean age is 42 years. The results show that the majority (28.3%) of the respondents were in the age category of 31-37 years, followed by the age category of 54 years and above (23.2%), 46 -53 years (18.4%), 38 -45 years (15.1%) and the age category of 23 -30 year (15%). This implies that a large number of people are within the productive age. These results are comparable with other similar findings by Njuki (2001) and Nduwamungu (2001). Generally, the authors observed that the majority of respondents lay within the active and old ages and therefore are likely to provide relatively more accurate (current historical) data.

**Table 1 Distribution of respondents by age (N=60)**

| Age category in years | Frequency | Percentage (%) |
|---|---|---|
| 23 – 30 | 9 | 15.0 |
| 31 – 37 | 17 | 28.3 |
| 38 - 45 | 10 | 15.1 |
| 46 – 53 | 11 | 18.4 |
| 54+ | 13 | 23.2 |
| Total | 60 | 100 |

Source: Survey Data (2006)

**Sex of the respondent**

The results shows that, 91.7% of all respondents were males and only 8.3% were females. These results reflect the fact that most of members of the co-operative societies within tobacco growers are men. The results also reflect the nature of activities involved in tobacco production which require a lot of physical work include cutting trees using axe and carrying them on shoulders. As a result women find it difficult to participate in this type of agriculture.

**Size of the household**

Table 2 shows that (50.8%) of the respondents belonged to household with 6 – 10 members followed by 28.8% respondents with 11- 15 members and 10.2% in each category, that of 1-5 persons per household and the one with 16-20 persons per household. The average household size in Urambo is 9.6 persons per household. While nationwide household size is decreasing from 5.2 persons per household in 1988 to 4.9 persons per household in 2002 (URT, 2003) the average household size of 9.6 persons per household recorded in Urambo is above national average as well as Tabora region's average household size of 5.9 persons recorded in 2002 (ibid). More number of people per household in Urambo may be either due to higher birth rates or due to the increased tendency of tobacco farmers to hire laborers from other places in and outside the district. The reasons why people prefer many children is possibly the fact that in small holder farms, the family is the main source of labour for agricultural production (Njuki, 2001; Epaphra, 2001; Kingazi, 2002; and Maenda, 1999).

**Table 2: Distribution of respondents by household size (N=60)**

| Household size | Frequency | Percentage (%) |
|---|---|---|
| 1 – 5 | 6 | 10.2 |
| 6 – 10 | 30 | 50.8 |
| 11 – 15 | 17 | 28.8 |
| 16 – 20 | 6 | 10.2 |
| Total | 60 | 100 |

Source: Survey Data (2006)

**Education level of the respondent**

Table 3 presents the distribution of respondents by education level. The table shows that 78.3% of the respondents had primary education, while 5%, 5% 5% 5% and 1.7% had secondary education, technical education (vocational training), adult education, no formal education and other type of education (like *madrasa)* respectively. Generally, the study shows that the majority of the respondents had primary education. These results could be due to the implementation of the Universal Primary Education (UPE) of 1970s which provided educational opportunity to all school going children all over the country.

**Table 3: Distribution of respondents according to the level of education (N=60)**

| Education level | Frequency | Percentage (%) |
|---|---|---|
| Primary | 47 | 78.3 |
| Secondary | 3 | 5.0 |
| Vocational training | 3 | 5.0 |
| Adult | 3 | 5.0 |
| No formal education | 3 | 5.0 |
| Others | 1 | 1.7 |
| Total | 60 | 100 |

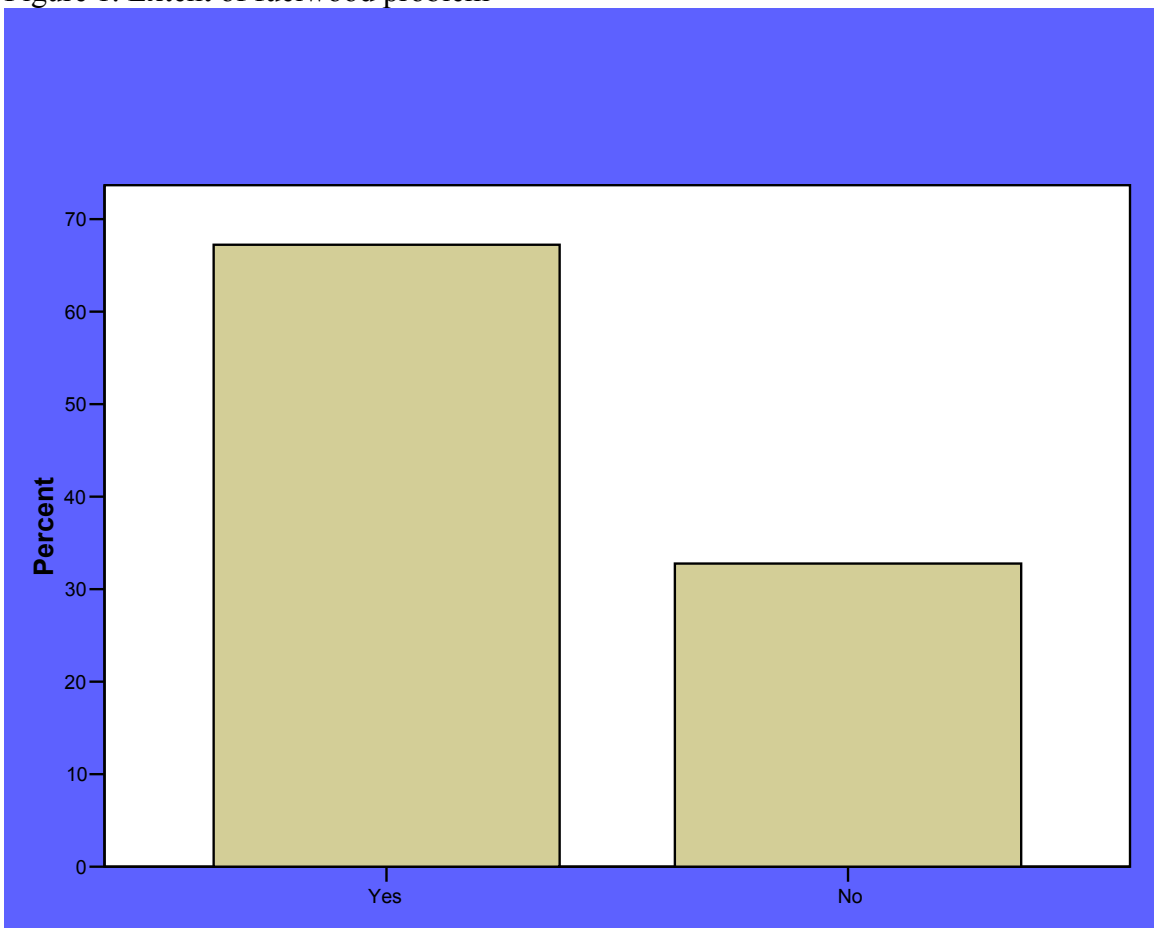
Source: Survey Data (2006)

**Tobacco processing and the problem of fuelwood**

Farmers in Urambo grow fire-cured tobacco. They cure tobacco in barns using fuelwood. Therefore fuelwood in tobacco production is one of the most important inputs in tobacco production. This study shows that all respondents (100%) in the study area depend on

natural forests as the main source of energy for tobacco curing. Furthermore Figure 2 indicates that the majority (67.2%) of respondents indicated that they faced the problem of fuelwood shortage. Only 32.8% of them said they did not face this problem. Misana (1999), on the other hand, observed that scarcity of fuelwood caused by deforestation has also been a major problem to the majority of people, who, poor as they are cannot afford to use alternative sources of fuel.

Figure 1. Extent of fuelwood problem




Source: Survey Data (2006)

**The role of primary-farmer co-operatives in reforestation**

Reforestation programme in Urambo District is done by individual farmers who are members of primary co-operatives also known as associations. ATTT supports

reforestation through primary farmer co-operatives. Therefore primary co-operatives provide the link between farmers and the ATTT. The study shows that, primary farmer cooperatives in Urambo perform several functions to promote reforestation. The most prominent ones includes raising of tree seedlings, supplying inputs, provision of technical know-how, running a demonstration farm, supervisory duty, provision of education to members and awareness creation.

In terms of raising tree seedlings, the primary farmer co-operatives own and manage tree seedling nurseries. Two out of the three primary farmer co-operatives that the researcher visited had their own seedlings nurseries. For example, Usaguzi had two nurseries at Tuombemungu and at Kasungu while Chimbuko had one tree nursery at Mtakuja. During this season Usaguzi had raised 41 860 tree seedlings in the two nurseries to be supplied to farmers free of charge. While Chimbuko had managed to raise about 32 230 tree seedlings to distribute to farmers during the rainy season, Igwisi primary co-operative was in the process of establishing a tree nursery.

Regarding the supply of inputs, all farmers get inputs such as watering cans, seeds/seedlings, and fertilizers from their primary co-operatives. This started earlier before the reforestation programme began. As with tobacco production, all inputs are supplied by tobacco buyers through primary farmer co-operatives on credit basis. But inputs used in reforestation such as seeds, seedlings, and tubes are freely supplied to farmers. When asked to name the sources of seedlings, majority (79.7%) of the respondents said they got seedlings from their respective primary farmer co-operatives (Table 4). Besides, the table also shows that only 1.4% said they got their tree seedlings from private suppliers while 18.8% said they obtained their seedlings from their nurseries. This shows that majority of the farmers got seedlings from primary farmer co-operatives.

Fertilizer was supplied using the policy of "one sack of fertilizer to nine tree seedlings". Every farmer in need of fertilizer had to comply with this policy. The policy was initiated in the cropping season of 2004/05 when the ATTT realized that, most farmers were not fully participating in the programme. The policy was set to make sure that farmers plant more trees. But the reverse was true, that, most of tree seedlings farmers took were not planted at the end of the rain season most of which were not planted. These results reveal the failure of "one sack of fertilizer to nine tree seedlings policy." This policy was introduced in 2004/05 after discovering that many people were not participating fully in the reforestation programme. Majority responded but again tree seedlings were not planted. Many farmers said they did so because fertilizers are normally given on loan basis so planting tobacco early would guarantee loan repayment hence majority started to plant tobacco instead of trees which do not pay back so early.

**Table 4: Sources of tree seedlings planted by farmers**

| Source of Seedlings | Frequency | Percentage |
|---|---|---|
| PFCs | 55 | 79.7 |
| Private suppliers | 1 | 1.4 |
| Own seed farm | 13 | 18.8 |
| Total | 60 | 100 |

Source: Survey data (2006)

Regarding technical know-how, ATTT provides technical know-how to the farmers through primary farmer cooperatives in the form of extension services. In fact, every village in Urambo is supposed to be served by at least one leaf technician and an agro-forest officer employed by ATTT. But some villages like Igwisi do not get the services of the technician. This is because roads are impassable during the rainy season which limits the frequency of visits by ATTT experts. In addition, ATTT has supplied agro-forest officers with motor bikes but the problem is that, they are few in number and as a result the whole district is being managed by a single officer.

Furthermore, primary co-operatives in Urambo manage a demonstration plot. It was assumed by the ATTT that farmers will learn from their respective associations if the association performs well in their demonstration plots in line with Mnyenyelwa (2005:82) observation that "…establishment of demonstration plots of agro-forestry practices will motivate farmers to adopt the practice…"

Also, primary farmer co-operatives perform day to day management and implementation of the reforestation activities. Associated with this activity is that of carrying out internal evaluation here known as survival counts. The major aim of making survival counts is to ensure that those trees which die are being replaced. Due to lack of qualified technicians survival counts is done when the agro-forest officer is available, and sometimes during the dry season. For example survival count in the cropping year 2005/06 was done in at the end of the rainy season in May 2006. This made it difficult to replace trees that didn't survive.

The primary farmer co-operatives, in addition to their activities, send their members for short course in order to increase their knowledge and improve their performance. During an FGD it was discovered that some primary associations had sent their members for short courses. For example, Usaguzi sent five farmers for short course training at Tumbi. This was made possible by two factors namely willingness of members to go for training and availability of resources. On the other hand, Chimbuko and Igwisi co-operative societies didn't manage to send their members for short courses and this might be the possible explanation on their poor performance.

Lastly primary societies perform the duty of awareness creation using various means including conducting meetings, seminars and workshops. Indeed, when respondents were asked to name sources of knowledge of reforestation they mentioned ATTT in collaboration with their respective primary farmer cooperatives as the main source of their knowledge.

**Effectiveness of the reforestation programme**

As earlier indicated, in this study, effectiveness was assessed based on the number of tree seedlings planted as compared to what was supplied and the number of trees that survived at the end of the rainy season compared to what was planted at the end of the rainy season.

**Assessment of the number of tree seedlings planted**

Table 5 below shows that, 28.6% of all respondents planted between 41-66 tree seedlings per year. Others planted 93-118 tree seedlings (25%) while 12.5% of them planted 15–40 tree seedlings per year. Furthermore, the results show that 1.8% of all respondents planted 119-144 tree seedlings and 7.1% planted 145-170 tree seedlings per year, and only (21.4%) of them planted more than 170 tree seedlings per year. At a spacing of 2.5 x 2.5m it was observed that, many farmers plant less than 1 hectare annually. Even the primary societies themselves planted less than 2 hectares. For example, Usaguzi planted 3 acres which is equivalent to 1 hectare, while Chimbuko planted 1.5 acres and Igwisi planted 1 acre annually. Generally, farmers in these three primary co-operatives planted 6480 trees within 3.3 hectares in 2006/07 cropping year. These results show that most of the respondents planted few tree seedlings. At this rate of tree planting it is difficult to meet the annual target of planting 2 701 000 tree seedlings. Similar findings were reported by

Misana (1999) who observed that "tree planting in Kahama District has been rather low. On the average, about 69 hectares were being planted with trees annually". Overall, the researcher noted that, reforestation rate is lower than the deforestation rate. Indeed, despite the establishment of woodlots at community level, the survival rate of the planted trees was very low, averaging between 40 and 50%.

**Table 5: Average number of tree seedlings planted per year (N=60)**

| Tree seedlings | Frequency | Percentage (%) |
|---|---|---|
| 15–40 | 7 | 12.5 |
| 41-66 | 17 | 28.6 |
| 67-92 | 2 | 3.6 |
| 93-118 | 15 | 25.0 |
| 119-144 | 1 | 1.8 |
| 145-170 | 5 | 7.1 |
| 170 and above | 13 | 21.4 |
| Total | 60 | 100 |

Source: Survey Data (2006)

**Tree survival assessment**

Table 6 presents data on survival counts by PFCs. Generally, the overall survival count is 39.6 % of all tree seedlings planted in the study area. Regarding the performance of each primary farmer co-operative in reforestation, the results indicate that Chimbuko planted 2905 tree seedlings and about 1172 (40.3%) survived. On the other hand, Usaguzi planted 1099 while only 457 (41.6%) survived and Igwisi planted 2476 tree seedlings where 934 (37.7%) survived. Respondents were asked to comment on the performance of the ongoing reforestation programme in their area. According to the study most of them (81.6%) said the reforestation performed poorly while 13.3% said the programme had performed well

and 5% said the programme performed very poorly. Similar findings have been reported by App (2004) and Senkondo (2000) based on a study on reforestation in Cameroon and Babati respectively, Based on these studies many reforestation projects didn't perform well as more than 50% of trees planted didn't survive. It is difficult to establish whether the reforestation project in Urambo was effective or not as objectives of the project were unclear and didn't set specific criterion regarding survival rate. Based upon the field data, the definition for project effectiveness and comparison with other projects such as the "Uluguru Mountains Biodiversity Conservation Project (UMBCP); tree planting in the Uluguru, 2000" and the "Participatory Evaluation Report for the Ugalla Community Conservation Project (PERUCCP)," which together suggest that, the project is considered to be effective if the survival rates are more than 50%. This study suggests that the reforestation project in Urambo was not as effective as expected.

**Table 6 Survival count**

| PFC | Tree Planted | Tree Survived | Survival Rate |
|---|---|---|---|
| Chimbuko | 2905 | 1172 | 40.3 |
| Usaguzi | 1099 | 457 | 41.6 |
| Igwisi | 2476 | 934 | 37.7 |
| Total | 6480 | 2563 | 39.6 |

Source: Survey Data (2006)

**Performance of the reforestation programme in three PFCs**

One way ANOVA was done at 0.05 significance level to establish whether there was significant difference in terms of performance of the reforestation programme implemented in three primary farmer co-operatives (PFCs) namely Chimbuko, Usaguzi

and Igwisi in reforestation. In terms of tree seedlings planted an F value of 6.939 was obtained which was high statistical significant at p= 0.003 and 56 degree of freedom. The ANOVA for surviving trees was also statistically significant at a probability level of p=0.021 and 4.135 degree of freedom with an F value of 56 (Table 7). Results show that, there were differences in performance between PFCs regarding tree planting and survival rates.. In terms of tree seedlings planted Chimbuko performed better than others while based on tree survival rates Usaguzi achieved the best performance compared to the other two.

**Table 7: ANOVA**

| | | Sum of Squares | Df | Mean Square | F | Sig. |
|---|---|---|---|---|---|---|
| Trees planted | Between Groups | 89558.569 | 2 | 44779.284 | 6.365 | .003 |
| | Within Groups | 379918.694 | 54 | 7035.531 | | |
| | Total | 469477.263 | 56 | | | |
| Trees survived | Between Groups | 12890.405 | 2 | 6445.202 | 4.135 | .021 |
| | Within Groups | 84179.525 | 54 | 1558.880 | | |
| | Total | 97069.930 | 56 | | | |

To establish the source behind the significant difference between groups, post-hoc comparisons were made using Turkey's HSD test at 0.05 level of significance (Table 8). A Turkey's HSD test shows that there are statistical significant differences in trees planted as well as trees that survived between Chimbuko and Usaguzi as well as Igwisi and Usaguzi. Results show that the sources of difference as being between the groups and specifically between Chimbuko and Usaguzi and Igwisi and Usaguzi. There was a high statistical significant difference between Chimbuko and Usaguzi at p=0.004 while concerning trees

that survived the test yielded a result of p=0.023 implying statistically significant difference. In terms of trees planted the Turkey's HSD test revealed significant differences at p=0.023between Igwisi and Usaguzi while concerning trees that survived the test showed that results were not statistically significant at p=0.091. The test also showed that there were not statistically significant differences in the number of trees that survived and trees planted between Chimbuko and Igwisi with p=0.860 and p=0.843 respectively.

Generally within groups Turkey's HSD test presented non statistical significant differences in all cases. This implies that differences are only observed between rather than within the primary farmer cooperatives. For example, comparison between groups shows that, Usaguzi recorded the best results with survival rate of 41.6% while Igwisi recorded relatively poor results with a survival rate of 37.7%. During FGDs with co-operative officials and members revealed the possible reasons behind the best performance of Usaguzi. These were the establishment of a demonstration plot. Also Usaguzi officials had sent five members for short course training at Tumbi.

**Table 8: Post Hoc Tests**. Multiple Comparisons. Turkey HSD

| Dependent Variable | (I) Name of Primary cooperative | (J) Name of Primary cooperative | Mean Difference (I-J) | Std. Error | Sig. |
|---|---|---|---|---|---|
| Trees planted | Chimbuko | Usaguzi | 90.25000(*) | 26.87132 | .004 |
| | | Igwisi | 15.19444 | 27.25141 | .843 |
| | Usaguzi | Chimbuko | -90.25000(*) | 26.87132 | .004 |
| | | Igwisi | -75.05556(*) | 27.58902 | .023 |
| | Igwisi | Chimbuko | -15.19444 | 27.25141 | .843 |
| | | Usaguzi | 75.05556(*) | 27.58902 | .023 |
| Trees survived | Chimbuko | Usaguzi | 34.54737(*) | 12.64873 | .023 |
| | | Igwisi | 6.71111 | 12.82764 | .860 |
| | Usaguzi | Chimbuko | -34.54737(*) | 12.64873 | .023 |
| | | Igwisi | -27.83626 | 12.98656 | .091 |
| | Igwisi | Chimbuko | -6.71111 | 12.82764 | .860 |
| | | Usaguzi | 27.83626 | 12.98656 | .091 |

* The mean difference is statistically significant at the .05 level.

**Constraints facing farmers in implementing reforestation programme and their coping strategies**

Table 9 below summarizes the constraints facing farmers in implementing reforestation programme and their coping strategies. The results indicate that (28%) of all respondents face the problem of cattle grazing. While fire outbreaks seem to be a problem to 21% of the respondents. Other 21.5% indicated that poor supply of implements was a problem followed by pests and disease 20% and 9.5% who named shortage of rains as a problem. However, 4.5% of the respondents reported poor knowledge of the soil as the being among

main problems affecting the development of the reforestation programme. These results supports Senkondo (2000) who pointed out that, grazing animals in the fields and fire incidents discourages farmers to plant trees at distant plots. Mnyenyelwa (2005) on the other hand reported that in most cases grazed livestock can escape the pastoralists and go into crop farms eating both plants and trees. Due to land pressure, there are considerable frictions between agro-forestry and pastoralist (Monela, 1995). There are many reasons as to why people burn the forests. Basing on the findings of this study, pastoralists are to be blamed for causing most of fire incidences in the study area. Pastoralists burn forests so that they can regenerate and produce new pastures and to kill pests such as ticks. Farmers also burn the forests to clear land for agricultural cultivation, smokers burn forests when they throw away burning cigarettes, in other cases villagers burn forests in their attempt to scare dangerous wild animals, and honey harvesters burn forests when they want to kill harmful bees.

The study indicates that many respondents mentioned weeding as the effective means they have been using to escape from bush fires. To avoid land use conflicts between farmers and pastoralists respondents said, the village governments have been making efforts to separate farmers and livestock keepers. Other respondents said in order to avoid animals farmers normally build fences, but this activity is possible only if trees are fewer in number and provided it is not during farming season. On the other hand some respondents named planting trees on low land as a better means of ensuring tree survival, as it has been noted that trees which were planted on low lands survived than those planted on highlands while others respondents practice watering during dry seasons. Other measures includes: Drilling wells, trying to plant on time and grow few trees that can be easily managed.

**Table: 9 Constraints farmers face in implementing reforestation programme and** their coping strategies.

| Constraints | Percentage (%) | Coping strategies |
|---|---|---|
| Poor rainfall | 9.5 | Planting trees on low lands, plant on time, watering during dry seasons and drilling wells. |
| Fire outbreak | 21 | Weeding around borders |
| Cattle grazing | 28 | Build fences and to separate farmers and livestock keepers |
| Pests and disease | 20 | Use pesticide supplied for tobacco |
| Poor supply of inputs (pesticide and watering cans) | 21.5 | Use the inputs meant for tobacco |
| Total | 100 | |

Source: Survey data (2006)

**Conclusions**

Based on the key findings of this study the following conclusion can be drawn: primary farmer co-operatives play a great role in implementing the reforestation programme. The notable ones include rising of tree seedlings, supplying inputs, provision of technical know-how, running a demonstration farm, supervisory duty, provision of education to members and awareness creation.

Regarding the planting rate, this study concludes that, planting rate is low. The planting rate is even lower than the national average planting rate. The study shows that most respondents collected tree seedlings from the PFCs but they didn't plant for several reasons including concentrating on tobacco production.

Furthermore the study concludes that, the reforestation project in Urambo was not effective as more than 50% of all tree seedlings planted didn't survive due to several setbacks including: pests and disease, fire breaksout, animal grazing and drought.

On the issues of constraints facing farmers in implementing reforestation programme the study concludes that, many respondents face the problem of cattle grazing and fire outbreaks. Furthermore, the study shows that, that (27.5%) of all respondents face the problem of cattle grazing. While fire outbreaks seem to be a problem to 20.9% of the respondents. Other 20.3% indicated that poor supply of implements was a problem followed by pests and disease 19.6% and 7.2% who named shortage of rains as a problem. However, 4.5% of the respondents reported poor knowledge of the soil as the being among main problems affecting the development of the reforestation programme. Farmers used several means to cop with the situation these include: watering during dry seasons to avoid rainfall shortages, weeding around borders to avoid fire and fencing around tree farms to avoid animal grazing.

**Recommendations**

The study recommends that field extension workers should be increased in order to train and help farmers to establish their own tree nurseries according to their needs. It is further recommended that every village should have one or two extension officers responsible for day to day management of the reforestation programme.

On planting rates the study recommends that, the "one sack of fertilizer to nine tree seedlings policy" be reviewed. The success of the reforestation programme must be measured on survival rates and tree seedlings planted not on the number of tree seedlings given to farmers as they are currently doing.

Regarding the survival rate, this study recommends proper actions to be taken on several constraints that have been identified to cause the lower rates. Furthermore, the study recommends that there is a need for proper land use planning to avoid pastoralists to graze on tree farms. On issues of fire outbreaks, there is a need to introduce strict by-laws, penalties and fines to those who deliberately burn the forests. On termites attack there are some tree species that are not easily attacked by termites example *senna siamea* should be given first priority in reforestation. Also timely tree planting will reduce the termite attack as trees seedlings will have established good root systems at the onset of the dry season. Attention should be given to increasing the number of indigenous species which can resist or adapt to the problems. Farmers must treat trees as a crop and individual tree planting should be encouraged to develop the sense of ownership. Proper selection of tree species for different sites and purpose must be encouraged for example trees with high catchment values should be planted at water sources while those that are evergreen all the year should be planted around homestead for shade and boundary marking.

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