

Project Name: Diversification of Household Livelihood Strategies for Tobacco Small-holder Farmers: A Case Study of Introducing Bamboo in South Nyanza Region, Kenya



IDRC FILE GRANT NUMBER: 103765-001

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Fourth Interim Technical Report for the Period: 21st April - 20th October 2008

Dated: 21st October 2008

Table of contents

Table of contents.....	2
List of Figures.....	2
1.0 Synthesis.....	3
2.0 Research Problem.....	5
3.0 Research Methods and Findings.....	6
3.1 Bamboo growth performance.....	6
3.2 Community Action Planning Process.....	12
3.3 Basic training on bamboo utilization for tobacco and non-tobacco farmers.....	16
4.0 Project Implementation and Management.....	22
5.0 Project outputs and Dissemination.....	23
6.0 Impact of the project.....	25
7.0 Conclusions and Recommendations.....	25

List of Figures

FIGURE 1: STUDY SITES.....	6
FIGURE 2: GENERAL SURVIVAL RATES FOR <i>D. GIGANTEUS</i> AND <i>B. VULGARIS</i>	7
FIGURE 3: MEAN DIAMETER FOR <i>D. GIGANTEUS</i>	8
FIGURE 4: MEAN DIAMETER FOR <i>B. VULGARIS</i>	9
FIGURE 5: MEAN DIAMETERS FOR <i>DENDROCALAMUS GIGANTEUS</i> AND <i>BAMBUSA VULGARIS</i>	9
FIGURE 6: MEAN HEIGHTS FOR <i>D. GIGANTEUS</i>	10
FIGURE 7: MEAN HEIGHT FOR <i>D. VULGARIS</i>	10
FIGURE 8: MEAN HEIGHTS FOR <i>D. GIGANTEUS</i> AND <i>B. VULGARIS</i>	11
FIGURE 9: GROWTH IN NUMBER OF CULMS FOR <i>D. GIGANTEUS</i> AND <i>B. VULGARIS</i>	12

List of Tables

TABLE 1: THE NUMBER OF MALE AND FEMALE PARTICIPANTS IN THE TRAININGS.....	18
TABLE 2: BAMBOO PRODUCTS AND THEIR PRICES.....	20
TABLE 3: MAJOR AREAS OF INTEREST BY DIFFERENT GROUPS.....	21

1.0 Synthesis

This research project is being carried out in the four (4) districts of South Nyanza region (Migori, Suba, Kuria and Homa Bay). The overall goal is the investigation of the sustainability of traditional and modern household livelihood strategies of tobacco farmers and how they would be diversified through the introduction of Bamboo as an alternative crop to tobacco production in the region. Tobacco is a cash crop that is grown widely in developing countries of the world where wealthy multinational companies owe its existence as growers, traders and manufacturers at the expense of small holder farmer. In Kenya, tobacco is grown in four provinces, namely, Nyanza (Migori, Kuria, Suba and Homa bay districts), Western (Bungoma, Busia, Teso and Mount Elgon districts), Central (Kirinyaga, Muranga, and Thika districts) and Eastern (Meru, Kitui and Machakos districts). However, 80% of the country's tobacco production comes from South Nyanza region (mainly in Kuria, Migori and Homa bay districts).

This research has attempted to go into considerable depth in its objectives to promote local enforcement of the Framework Convention on Tobacco Control (FCTC). This study provides first hand information on the potential of bamboo as an alternative crop to tobacco in the study area and Kenya in general. Bamboo has indeed proved to be one of the crops that have the potential to address a multiple of the problems associated with tobacco.

Key research activities supported during the last 30 (April 2006 to October 2008) months include:-

- Training of project staff and farmers on bamboo cultivation and livelihood diversification
- Sensitization of farmers on the negative environmental and human implications of tobacco production
- Acquisition of relevant literature on bamboo and tobacco production
- Continuous/periodical monitoring of bamboo growth performance in 120 field experimentation sites (farms)
- Household surveys on livelihood strategies among tobacco and non-tobacco farmers
- Bamboo existing and potential market surveys
- Capacity trainings for project staff and farmers
- Community Action Plan development to enable the shifting of farmers from tobacco to bamboo production and processing
- Basic trainings on bamboo utilization (treatment, handcraft weaving & furniture processing technologies) by tobacco and non-tobacco farmers who form the study group of this project
- Dissemination of project output through reports, publications, policy briefs, meetings/ events/ workshops and internet.

During the last six months of the project (April 20- October 21st 2008), the research team focused on the last three aspects above, i.e. bamboo growth performance monitoring, development of Community Action Plans (CAPs) which will enable farmers shift from tobacco to bamboo production and undertaking of Basic Training in Bamboo Utilization by the direct project beneficiaries (bamboo farmers).

In terms of bamboo growth performance trends, the number of culms produced by both species on experiment, i.e. *D. giganteus* and *B. vulgaris*, increased steadily over time, with higher rates recorded after twelve months. It is recommended that the bamboo growth performance monitoring should continue to maturity in around September/October 2009 for final conclusions to be made on its economic potential of in the area, despite the preliminarily positive results as indicated in the Third Interim Progress report.

In addition to the areas identified in previous progress reports, *new research problems/challenges* that emerged during Community Action Planning process in the last six months that require further investigation or action include:-

- Group dynamics and leadership competition
- Lack of study groups' physical office infrastructure/ facilities
- Establishment of a marketing system (cooperative or private companies or new bamboo processing groups) for bamboo products
- Provision of protective equipment for all bamboo farmers
- Water scarcity / climate change
- Destruction of young bamboo shoots by termites
- Destruction of bamboo plants by domestic and wild animals
- Local cultural misconceptions and stigma on bamboo
- Limited knowledge on the growth patterns of bamboo
- Limited knowledge on bamboo utilization
- General management and care of bamboo farms by individual farmers
- Presence of snakes in bamboo farms
- Limited bamboo varieties availability
- Bamboo farmers' group identity / publicity
- Lack of local means of transport for bamboo monitoring and evaluation by farmers' group officials
- Project ownership by the farmers

The Basic Training on Bamboo Treatment, Handcraft Weaving & Furniture Processing Technologies was a major impetus to the acceptance of bamboo in the region. This is because it acted as an eye opener on the multiple and wide market potential of bamboo at local, regional and international markets in the long run. It is recommended that the next bamboo utilization should focus more on value addition or quality aspects of bamboo products and development of a sustainable marketing structure.

Despite the few challenges to this action-oriented research project, the project activities are on track as per the set objectives and planned schedules. However, to realize fully the purpose of this study, IDRC should consider funding other research/ development areas identified in the current and previous reports (areas not included in the current phase ending in April 2009). This is considered fundamental to the final success of this research project. As recommended in previous reports, a tier approach should be used by studying further the potential of bamboo while at the same time investigating the key issues in the tobacco production industry.

2.0 Research Problem

Most of the tobacco production in Kenya takes place in the Southern Nyanza region mainly in Kuria, Homa Bay and Migori Districts. Despite the global policies aimed at reducing world tobacco production and use, the Kenyan Government's policies aimed at poverty reduction, seem to encourage more tobacco production in this region. This is evidenced by the current plans by the British American Tobacco Company Ltd (BAT) of expanding its activities to other high-agricultural potential districts in the Nyanza Region, i.e. in Bondo and Siaya in Central Nyanza region, Borabu in Kisii, Bomet, Transmara and Narok south in southern part of Rift valley province. It is also estimated that the number of farmers contracted by tobacco companies in Kenya increased by 67% in the period 1972 to 1991, 36% from 1991 to 2000 and by about 15% from 2001 to 2007. Alongside, the land under tobacco grew in acreage and deteriorated rapidly at the expense of food crops because farmers have been shifting to tobacco production. Due to time and land constraints, traditional crops like cassava, millet and sweet potatoes that were important in periods of drought and famine are scarce in the region. Child labour, increased HIV/AIDs and other human health ailments associated with tobacco production are prevalent in this region. Livestock production activities have also drastically reduced.

The type of tobacco grown in the proposed study area demands a lot of wood-fuel for curing. Consequently, a lot of indigenous trees are felled for curing purposes. Soil erosion is also rampant in these areas. In most instances, eucalyptus *ssp* seedlings are provided to farmers by Tobacco Companies for public relations. Scientific research has shown that this type of trees put a lot of demand on water and soil nutrients, and the result is loss of soil fertility and drying up of water sources. Most of the indigenous trees have disappeared over time due to the high demands for fuel wood in tobacco curing. This has further led to reduction in food crop production, hence, increased poverty levels in the area.

This kind of scenario calls for research that can solve a multiple of problems, i.e. food insecurity, social-cultural conflicts, poverty and environmental degradation. This research project was formulated based on this rationale with an *overall goal of investigating the sustainability of traditional and modern household livelihood strategies of tobacco farmers and how they would be diversified through the introduction of Bamboo as an alternative crop to reduce tobacco production in the South Nyanza region.*

Specific research objectives of the current study are: -

1. To examine the current and historical changes in household livelihood strategies used by tobacco farmers in comparison with non-tobacco farmers.
2. To experiment on the potential and people's attitudes of adopting Bamboo as an alternative crop to tobacco or source of livelihood to tobacco farmers in the region.
3. To undertake an assessment of marketing dynamics as a feedback to investment in the bamboo industry in the region and Kenya, and
4. To develop community action plans to ensure a reduction of tobacco production in the region through livelihood diversification/poverty alleviation strategies.

3.0 Research Methods and Findings

The study is being carried out in the four (4) districts of South Nyanza region (Migori, Suba, Kuria and Homa Bay) (Figure 1). The region is located in south-western Kenya, and covers an area of about 7,778 sq. km, which is 48% of the Nyanza Province's land area.

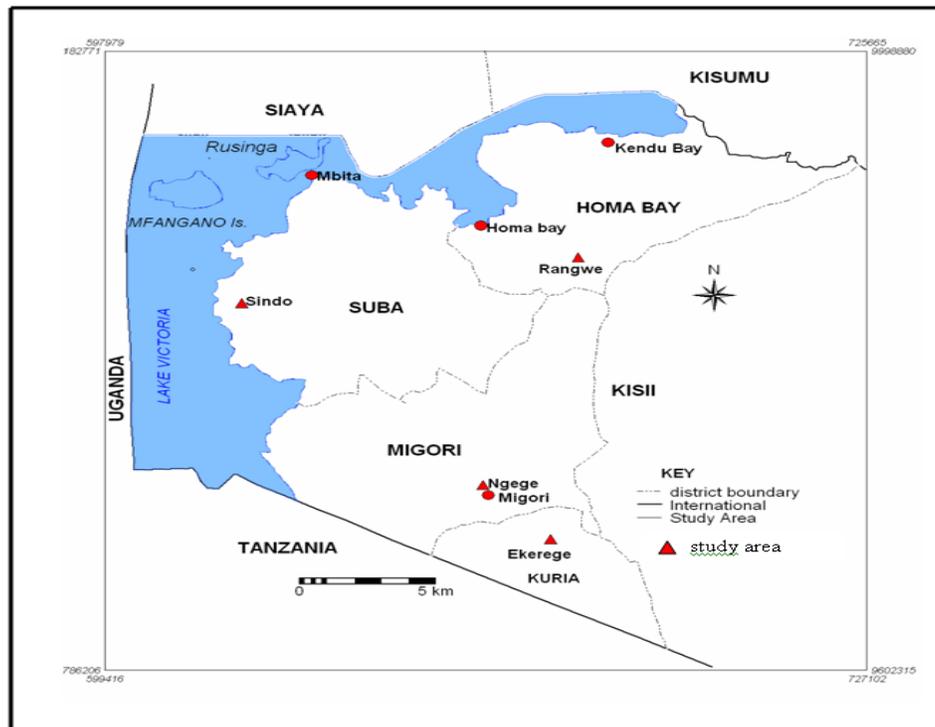


Figure 1: Study Sites

The last half-year project period (21st April to 20th October, 2008) was basically utilized in undertaking four major activities:-

- Regular monitoring of bamboo growth performance in 120 field experimentation sites (farms),
- Community Action Plan development to enable the shifting of farmers from tobacco to bamboo production, processing and utilization,
- Basic training on bamboo treatment, handcraft weaving & furniture processing technologies for tobacco and non-tobacco farmers who form the study group of this project,
- Dissemination of project outputs through reports, publications, meetings/ events/ workshops and internet.

The specific methods used for each activity above and project achievements so far are outlined in the following sections;

3.1 Bamboo growth performance

The study is being carried out on 120 field experimentation sites (30 in each District in South Nyanza) where 2420 bamboo cuttings were planted under the same natural tobacco

growing conditions in five different zones (that is, zone A = hillside/steep sloping farmland, B = hillside/gentle sloping farmland, C = flat farmland/not wetland/ riverbank, D = flat farmland/wetland and E = homestead) based on each farmer's preference during the short rain season between September and October 2006. The experiment comprised of 1210 giant bamboo (*Dendrocalamus giganteus*) and 1210 common bamboo (*Bambusa vulgaris*). Each cutting was planted in a cubical hole measuring 0.6 x 0.6 x 0.6 m. Each farmer was given 20 bamboo cuttings (that is, 10 each of giant bamboo and common bamboo). Out of the 20 cuttings planted, five clumps of each species were randomly selected and tagged for monitoring survival rates, number of culms, culm heights and diameter. The trend results of the monitoring data for the last 18 months are outlined below;

a) Survival Rates

The survival rate of both *D. giganteus* and *B. vulgaris* initially dropped from the third to the ninth month, a trend that was common in all the sites (i.e. Homabay, Migori, Kuria and Suba) (see Figure 2). This is a normal behaviour for young plants that are still acclimatizing to the new environment. Specific factors that may have contributed to these results include; insufficient water, harsh temperatures, poor handling of seedlings during transportation and planting and seedling attack by termites.

Once the seedlings stabilized in their environment, no further declines in survival rates were recorded from the ninth to the eighteenth month. The same trend is expected to continue. *B. vulgaris* was however observed to have higher survival rate compared to *D. giganteus*. *D. giganteus* was more affected by the waterlogged conditions under which they were planted especially in Kuria and this may have contributed to their lower survival rates.

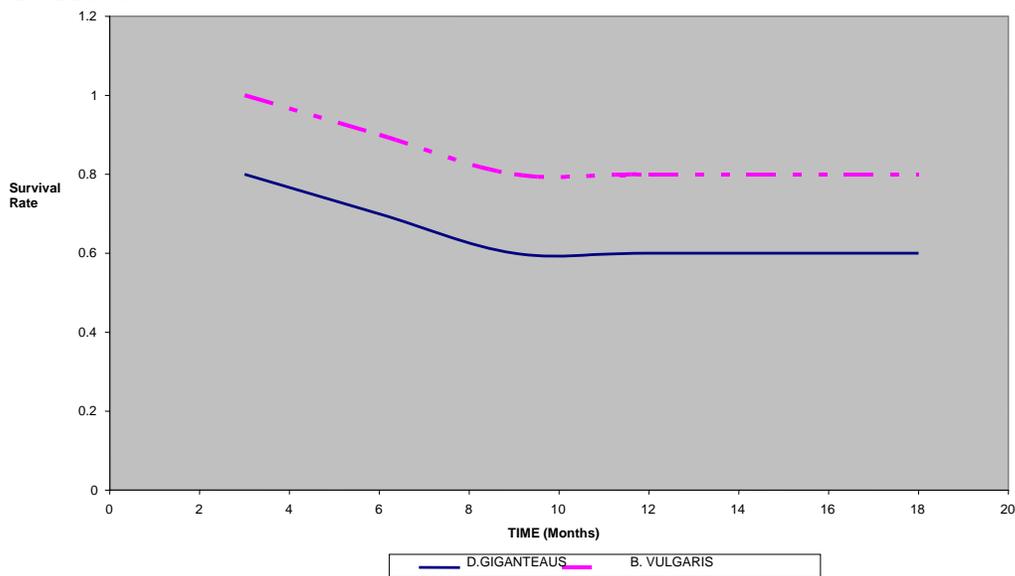


Figure 2: General Survival Rates for *D. giganteus* and *B. vulgaris*

b) Culm Diameter

At the initial stages, the mean diameter of *D. giganteus* rose steadily (see figure 3). Between the twelfth and the eighteenth month, the species diameter increased more than twofold its previous diameter. By the eighteenth month, the giant bamboo of Kuria had the largest diameter followed by Homabay while Suba had the smallest.

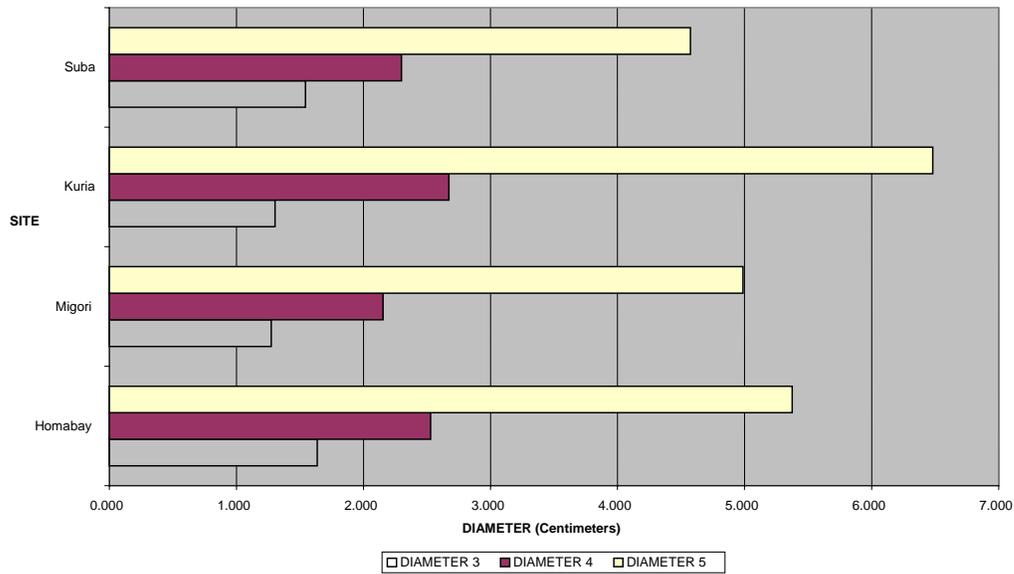


Figure 3: Mean diameter for *D.giganteus*

There was a steady increase (see Figure 4) in the mean diameter for *B. vulgaris* with a higher increase noted in the eighteenth month (i.e. fifth monitoring). By the eighteenth month, Suba and Kuria had the largest diameter while Homabay had the smallest. Suba had the highest increase in diameter while Homa bay had the lowest from twelfth to eighteenth month. The black cotton soil found in Suba but not in the other sites may be favourable for the growth of *B.vulgaris*.

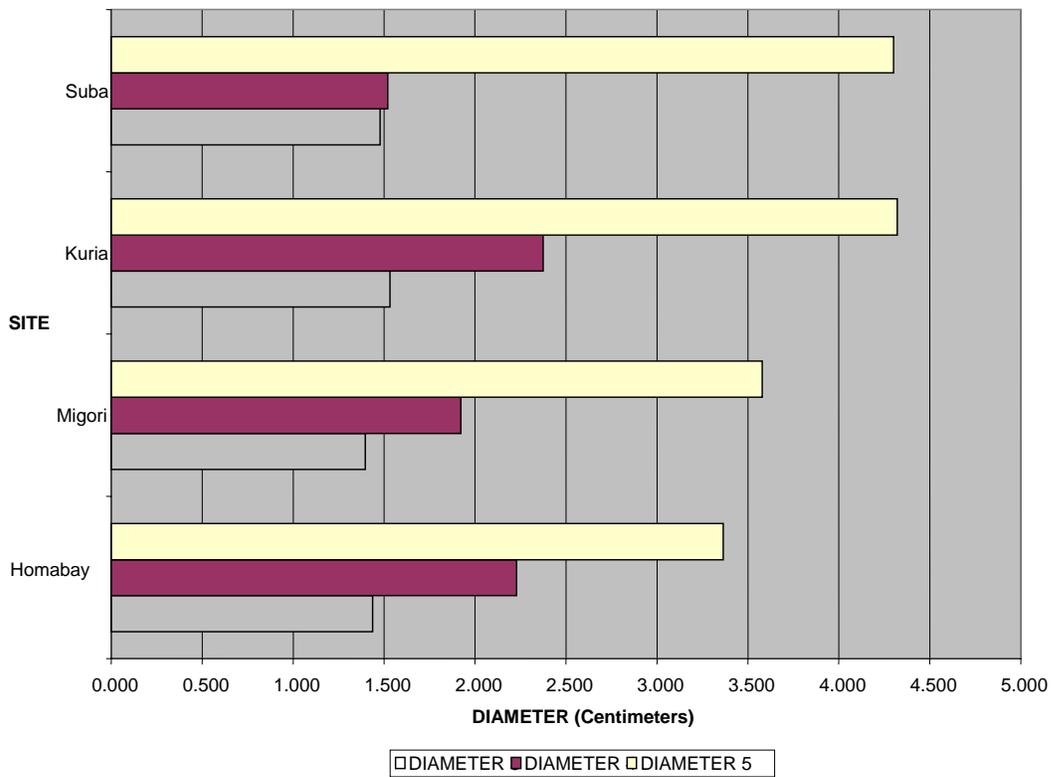


Figure 4: Mean diameter for *B. vulgaris*

Initially both *D. giganteus* and *B. vulgaris* had similar diameters; they both had a gradual increase in diameter over time, with *D. giganteus* increasing slightly faster (see Figure 5). As from the ninth month, the rate of growth became distinct with *D. giganteus* clearly having a higher rate than and *B. vulgaris*. *D. giganteus* is genetically bigger in size and this shows that they are still gaining in diameter as new bigger culms are produced.

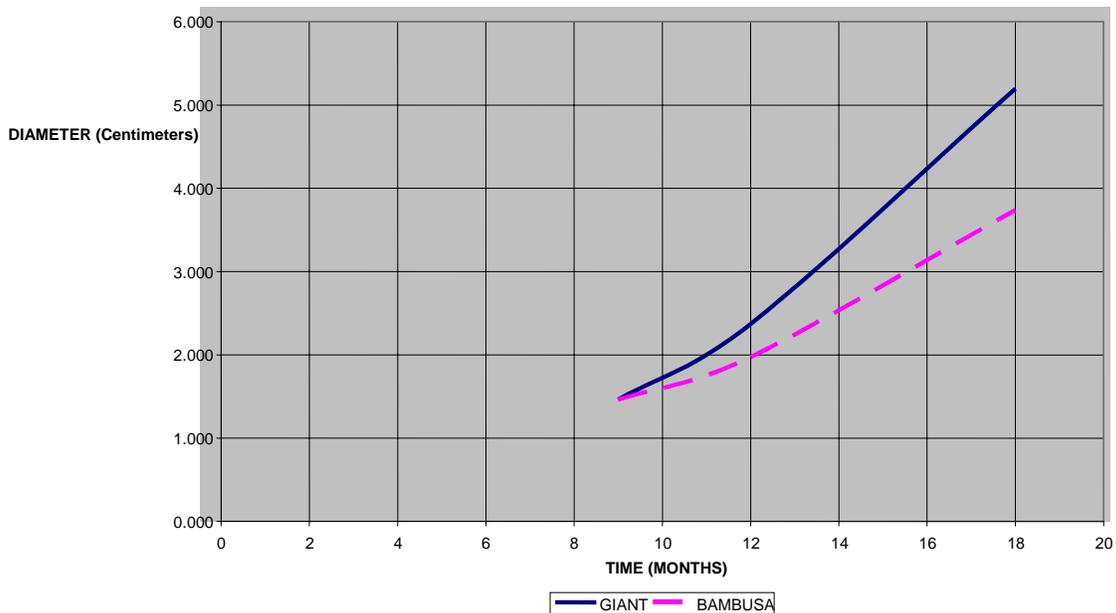


Figure 5: Mean Diameters for *D. giganteus* and *B. vulgaris*

c) Culm Mean Height

Mean Height for the sites over the 18 months monitoring period indicates that there was a steady increase in height with Kuria having the tallest *D. giganteus* between the twelfth and eighteenth months (see the Figure 6).

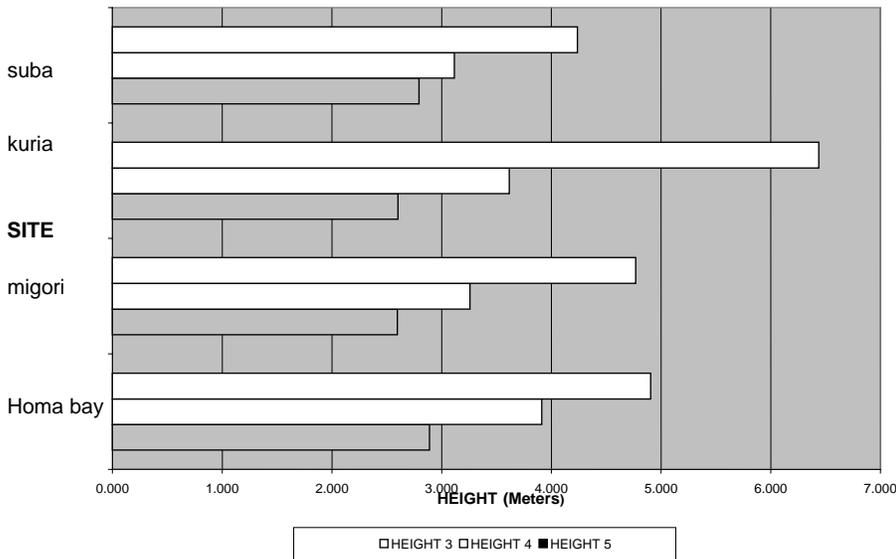


Figure 6: Mean Heights for *D. giganteus*

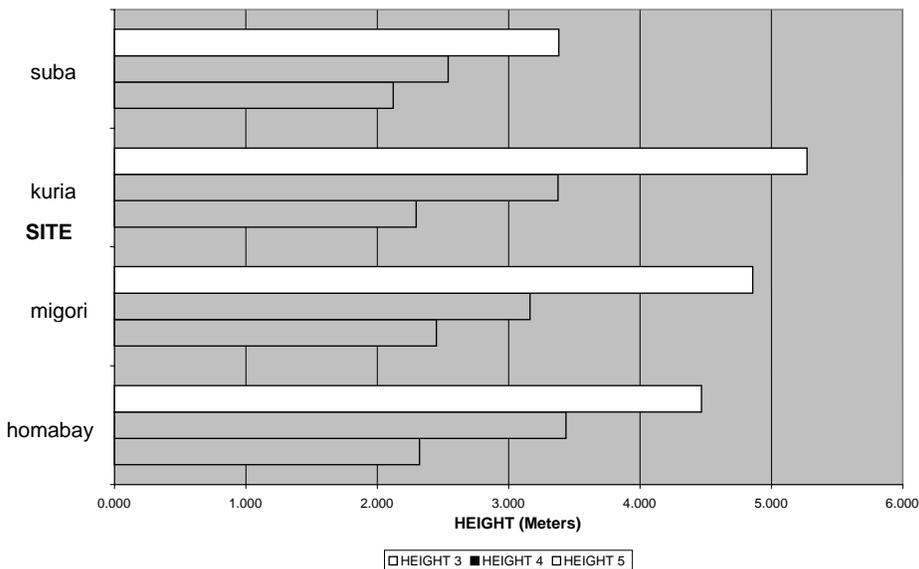


Figure 7: Mean Height for *B. Vulgaris*

No glaring difference in height of *B.vulgaris* was noticeable among the four sites during the various monitoring periods (see the Figure 7). Plants of Kuria were the tallest at the eighteenth month of monitoring while those of Suba were the shortest.

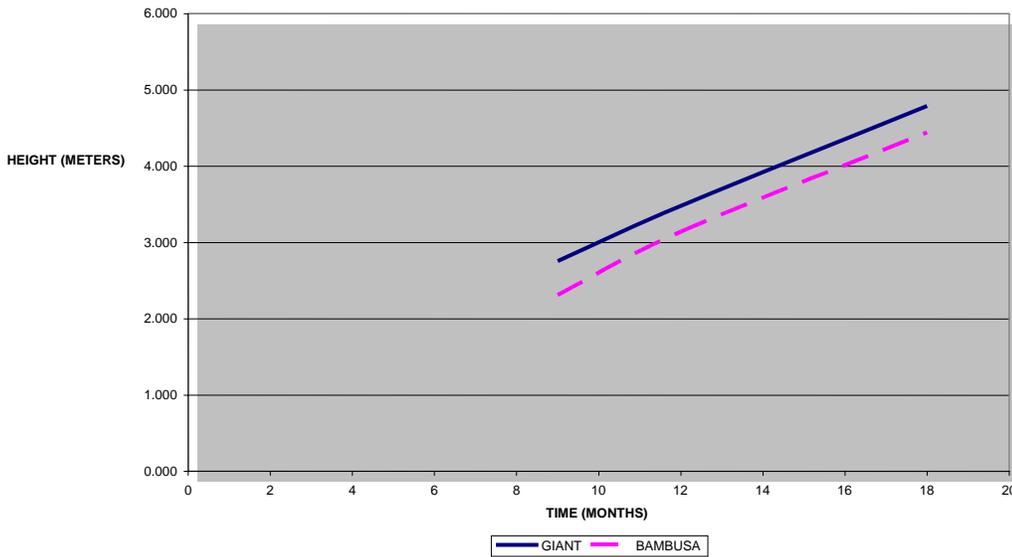


Figure 8: Mean Heights for *D. Giganteus* and *B. Vulgaris*

The gain in height was generally similar in the two species with *D. giganteus* being generally taller than *B. vulgaris* (see figure 8). This may be attributed to the fact that the two species are genetically different with *D. giganteus* being genetically bigger than *B. vulgaris*. It is expected that when they reach their optimum height this will be evident.

d) Growth in number of bamboo culms

As the Figure 9 indicates, there was a general increase in the number of culms with time indicating that the seedlings generally responded positively. The initial increase between the third and ninth month was slow as the seedlings were still acclimatizing to their new environment. There was a remarkably slow increase in the number of culms between the ninth and the twelfth month that may have been caused by the dry conditions that prevailed between the months of June and September. This is the dry spell between the two rain seasons. From the twelfth month to the eighteenth month there was a steep increase in the number of culms because the plants had adapted to their environment.

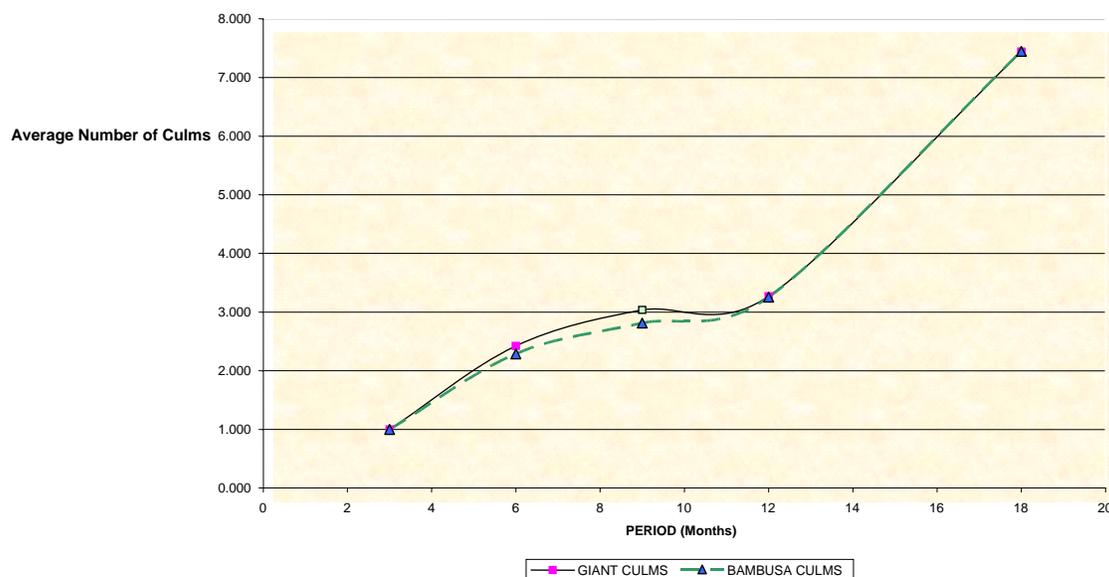


Figure9: Growth In Number of Culms for *D. giganteus* and *B. vulgaris*

3.2 Community Action Planning Process

A Brief Profile of the Bamboo Farmers' groups

Four farmers' groups were formed in the year 2006 (i.e. Homa Bay bamboo (Modi) Farmers Group, Migori Bamboo (Modi) Farmers Group, Kuria Bamboo (Imiere) Farmers Group and Suba Bamboo (Modi) Farmers group) and formally registered by the Kenyan Government Ministry of Gender, Sports, Culture and Social Services. Each group has 30 tobacco and non-tobacco farmers and officials elected as per their constitution/ by-laws. The groups are mainly engaged in bamboo farming/ production as an alternative crop to tobacco and as a long-term strategy of livelihood diversification, poverty alleviation and environmental conservation in the region. Each member of the group has planted averagely 20 (10 *Bambusa vulgaris* and 10 giant (*Dendrocalamus giganteus*) bamboo seedlings. Due to the positive results obtained from the bamboo growth and market surveys, there is dire need to develop a plan for up-scaling the experimental farms to averagely one acre each and expand the group membership in order to realize more impact of the project.

These Community Action Plans (CAPs) were developed through a consultative process, which involved meetings and discussions with members of each of the groups and some key stakeholders (i.e. Ministry of Agriculture, Maseno University Tobacco to Bamboo Research Team, and Office of the President-Provincial Administration representatives and local NGOs during workshops for each farmer's group. The farmers and the stakeholders identified some key issues which the farmers' groups needed to address during the plan period. The CAPs process also identified who to undertake the tasks identified and when the implementation should start. Supplementary information was also collected from the existing bamboo monitoring reports, household interviews data bank and Focused Group Discussions. Maseno University Research Team collated all the information and produced a draft of CAP for each group. An action plan for each group

was subsequently discussed by the farmers' group members. Finally, the research team harmonized all the comments and produced a final document which was discussed and adopted by the four farmers' groups.

Common Key Issues identified during the Action planning process

Group Dynamics and Leadership: Leadership positions among some farmers group is mainly held by the older members and in other groups the positions are held by members from a close locality. This does not give way to the youth, who are more energetic to exercise their leadership skills and does not give a chance for the youths to learn and exchange ideas with the old. There is hence need to train the farmers on leadership skills that will allow for equal representation of all members of the group. This issue should be addressed immediately with the support from the Maseno University Research Team, Ministry of Gender, Sports, Culture and Social Services Constituency Development Fund, Non Governmental Organizations and Government Ministries of Agriculture, and Cooperatives Development and that in-charge of Youth Affairs.

Development of Office Infrastructure: Office and office equipments are very important for smooth operations of the farmers' groups. There is need to have good offices that are equipped with modern office facilities. Focus will be on buying land, building offices and purchasing necessary office equipment and stationery for the groups. Resources required to address these issues are to come from the Farmers themselves, Government ministries such as the Ministry of Agriculture and Local Authority, Constituency Development Fund (CDF), Donors and Non-governmental Organizations. To ensure smooth running of groups' activities, the issues need to be addressed immediately.

Bamboo Processing and Tobacco Control Training Centres: This is partly related to the above issue but in a wider perspective. The farmers expressed need for the establishment/ construction of 4 small-scale Bamboo Processing and Tobacco Control Training Centres (i.e. one for each farmers group). This will be an upscale of the existing capacity building activities currently on-going in project. Most parts of the building should be of bamboo materials. Farmers learn on bamboo house construction by participating in the exercise. Extra bamboo materials can be sourced from the existing government bamboo forest resources. The Centre should have space for (a) working area with simple machines and tools (b) Store for bamboo materials (c) store for tools (d) store for finished products (e) Showroom of finished products well-displayed (f) Office for group officials (g) Room for seminars/ training (h) Kitchen (i) A few bamboo rooms for research visitors (j) Office furniture and other items made of bamboo. This will greatly promote bamboo in our study region. The Centres can also be used by local and international research students who will be studying Tobacco Control and Bamboo Production in future. The Centres will also train farmers on cultivation and marketing of other alternative crops to tobacco that can supplement bamboo.

Marketing system for bamboo products: A marketing system is essential in guiding market decisions on types of goods to produce desired quality and their prices. There is need to have a pattern of institutions and physical facilities that link the bamboo farmers and other marketing elements involved in the production and sale of bamboo items. The most possible way is to facilitate the formation and registration of Four Bamboo Farmers Co-operative organizations. The other option is to promote local private enterprises that

will act as outlets of bamboo culms/ poles. Another option is the use of local NGOs in marketing the bamboo products on behalf of the farmers. Formation of new bamboo processing groups was also suggested by the farmers. Marketing outlets identified include promotions in Annual Regional Agricultural Shows, Street and Shopping Malls Exhibitions, Online marketing, etc. All these approaches are recommendable to ensure competition, hence higher benefits for farmers. This can be achieved by the farmers themselves with the support of the Ministry of Cooperatives, Ministry of Agriculture, Media houses, NGOs, Donors and other project supporters. This exercise should commence immediately because the farmers have already started producing some products on a smaller-scale.

Provision of protective equipment to bamboo farmers: Bamboo leaves are prickly and can scratch human skin especially during weeding. This causes itching of the skin. Focus is on the provision of necessary protective clothing for the bamboo farmers. This matter should be addressed immediately by the farmers with the help of project supporters, Non Governmental Organizations (NGOs), Constituency Development Fund (CDF) committee and the Kenya Ministry of Agriculture.

Water Scarcity and Climate Change: A young bamboo (especially in the first 6 months) needs adequate and constant water supply for its survival and luxuriant growth. Focus should be on ensuring adequate and sustainable water supply for the bamboo farms. Since this is an urgent issue, Non-Governmental Organizations (NGOs), Constituency Development Funds (CDF) committee, the Ministry of Agriculture and other project supporters should immediately assist the farmers in digging boreholes and building water storage tanks where there is need. Though farmers are encouraged to plant bamboo during rainy seasons, current global climate change has made rain periods unpredictable.

Destruction of young bamboo shoots by termites: Termites tend to attack bamboo shoots especially during rainy seasons. Though the problem is minor, there is need to find a sustainable way to control the termites such as use of approved pesticides and training of farmers on farm management skills. Resources required to handle this case should come from the Farmers, Project supporters and the Ministry of Agriculture. This exercise requires urgent attention and should be a continuous activity throughout the project period.

Misconceptions and stigma on bamboo: Though traditional bamboo utilization mainly in housing and fencing is practiced by a few people in the South Nyanza region, some community members especially among the Luo community associate bamboo farming with witchcraft. However, among the Kuria (major producers of tobacco in Kenya), bamboo is culturally perceived positively as pillar of family unity. The Luo community negative perception constrains the adoption of bamboo as a source of livelihood. It is therefore important for the farmers and media houses to sensitize the community members on the significance of bamboo production and its related activities. Bamboo positive perception promotion outlets identified include periodical Regional Agricultural Shows, Street and Shopping Malls Exhibitions etc. This has already picked up but it should be a continuous process by farmers themselves, development NGOs and the Maseno University Research Team.

Knowledge on the growth patterns of bamboo and management of the bamboo farms:

It was noted that some bamboo farmers are unable to distinguish between various growth patterns of bamboo and they lack modern/ advanced bamboo farm management skills. There is need for trainings on bamboo growth patterns and farm management skills. Local, regional and international research visits were also proposed. This issue requires urgent attention by the farmers themselves, project supporters, NGOs, Media houses, Government institutions e.g. Kenya Forestry Research Institute, Ministry of Agriculture and the Kenya Forestry Services.

Long bamboo maturity period: Bamboo takes 3-4 years to mature, this makes farmers impatient and discouraged while waiting for maturity. Focus should also be on suitable early maturing crops (e.g. horticultural crops) on the same piece of land so that as the farmer takes care of the crop, bamboo will also be receiving the same care. Tackling this issue requires a farmer's patience, trainings on bamboo utilization at various stages of its growth cycle and financial assistance to the farmers when intercropping stops especially when the bamboo are 18 months old. The bamboo clump shades do not allow undergrowth after 18 months. This issue requires the farmers' efforts with financial assistance from the Project supporters, Ministry of Forestry, Ministry of Agriculture, Constituency Development Fund, Non Governmental Organizations, World Health Organizations (WHO) and the Food and Agriculture Organization (FAO) among others. This is an agent matter that needs immediate and continuous attention of the farmers and project supporters.

Vulnerable Groups: Vulnerable groups such as the aged and the HIV/AIDS and malaria affected people are unable to properly manage their bamboo farms. Such special groups should be assisted since the project area has the highest HIV/AIDs infection in the country. The National AIDS Council, WHO, NGOs and project supporter should mainstream the vulnerability aspect into the research program as soon as possible to ensure improved project performance.

Snakes attraction: Bamboo shades leaves especially during the dry season. Such leaves tend to harbor rats that attract snakes. Hence, the need for farmers to continuously keep the bamboo farms clean by utilizing the leaves as animal fodder or make compost. Strategic planting of local plants that act as natural repellants to snakes were also recommended. Bird nests should be removed immediately to avoid snakes that search for bird eggs and young chicks.

Limited Bamboo varieties: So far, only two bamboo varieties (giant bamboo- *Dendrocalamus giganteus* and common bamboo- *Bambusa vulgaris*) have been introduced in the study area. Since bamboo has over 1,500 uses so far documented, its utilization for various products depends on the species availability. In order to have diversified uses of bamboo and to give the farmers a wide range of choice, there is need for introducing at least 5-10 commercial species in the long term. This will call for establishment of bamboo nurseries or purchase of seedlings. This matter should be addressed beginning November 2008 by the farmers with the support from Project supporters, Non Governmental Organizations (NGOs), Constituency Development Fund (CDF) and the Ministry of Agriculture.

Destruction of bamboo by domestic & wild animals: Bamboo is palatable and liked by browsing livestock (cattle, goats and sheep) and wildlife (monkeys, baboons and porcupines). There is urgent need to protect the bamboo farms from such destructions and replace the already destroyed bamboo plants. The farmers should address this matter immediately with some assistance from the Kenya Wildlife Service (KWS). In case of domestic animals, tethering and fencing of bamboo farms should be done. Fencing of all farms may require extra funding from donors.

Bamboo farmers' group identity / Publicity: Publicity is part of a marketing strategy and may open up important opportunities for the group. The focus will be to ensure that many Kenyans and the international community know about the groups and their development activities. Publicity should be through wider dissemination through TV and radio shows, periodical agricultural/ street trade fairs, preparation of Field Manual books, brochures in various local languages, TV and radio productions/ shows, conference news sheets, information news leaflets, newsflashes, newsletters, policy briefs, pocket guides, publications and periodical reports. This issue should be tackled immediately and continuously by the farmers with assistance from media houses, Non-Governmental Organizations (NGOs), Maseno University Research Team and other project supporters.

Local transport for bamboo monitoring and evaluation: Constant monitoring of the performance of bamboo by the farmers group officials help the individual farmers in sharing ideas and skills on the bamboo farm management techniques. This requires the group officials to get adequate means of transport to aid their bamboo monitoring exercise. The farmers recommended bicycles/ motor cycles to address the problem in the short term and long term.

Project Ownership: There has been perception that the bamboo project belongs to Maseno University and project sponsors. However, with more capacity building and empowerment of farmers, this should change in the long term. This calls for a partnership approach among all the stakeholders in order to ensure that the farmers fully own bamboo project as their own initiative.

3.3 Basic training on bamboo utilization for tobacco and non-tobacco farmers

Bamboo, unlike tobacco which is limited to mainly smoking and chewing, has over 1500 uses so far recorded in various parts of the world and has the potential of solving most of the tobacco related problems. Preliminary findings indicate that it does well in the region and many farmers were willing to adopt it (Kibwage, et al, 2008). Since most tobacco farmers are heavily indebted to Tobacco Companies in the region, they are currently operating in a difficult poverty cycle state which needs to be broken. For a successful process of switching from tobacco to bamboo production, farmers must embrace the economic potential of the new initiative as they wait their young bamboo plants under trials to mature by September / October 2009. It is for this reason that bamboo utilization training was conducted in the region (i.e. Suba, Migori, Homa bay and Kuria districts) to equip the farmers with skills through a *Basic Training on Bamboo Treatment, Handcraft Weaving & Furniture Processing Technologies between August –October 2008*. This training was conducted by the Kenya Forestry Products Research Centre (Kenya Forestry Research Institute) staff courtesy of INBAR. The Trainers were formerly trained under

the on-going East Africa Bamboo Project (EABP) being funded by Common Fund for Commodities through United Nations Industrial Development Organization (UNIDO).

A two weeks bamboo utilization training workshop was organized in each of the four districts (i.e. Suba, Migori, Homa bay and Kuria districts) to equip the bamboo farmers with basic skills on basic treatment and making bamboo household items. The trainings were held in strategic points in market centres where many local people could make observations on the potential of bamboo in changing rural livelihoods. The trainees were wearing green dustcoats with an advocacy message “*Stop tobacco! Start bamboo!*”

Participation in the Training

Each training workshop brought together members of farmers’ group in the district, Maseno University research team as facilitators and Kenya Forestry Research Institute (KEFRI) staff as trainers. A total of 130 participants attended the trainings and these were 120 bamboo farmers i.e. 30 from each district, 5 research team members and 3 Kenya Forestry Research Institute (KEFRI) staff who are specialists in bamboo utilization techniques. At the end of the 2 weeks trainings in every site, the 30 bamboo farmers who graduated were

each awarded a certificate of appreciation and participation in the exercise (see Plate 1). Several officers from the Ministry of Agriculture, Ministry of Environment, Office of the President and Local Authority and members of the public in every district also attended graduation ceremony. Each graduation ceremony was presided over by the Area Member of Parliament or his key representative. The graduation ceremonies were accompanied exhibitions of the final products to invited guests, government officers, members of the public and nearby school-going children.



Plate 1: Farmers after being awarded certificates

Table 1 below shows the number of trainees by gender. 27% were women while 63% were men indicating a gender imbalance to be addressed in future.

Table 1: The Number of Male and Female Participants in the Trainings			
District	Male participants	Female Participants	Total
Migori	22	8	30
Homabay	21	9	30
Kuria	20	10	30
Suba	25	5	30
Total	88	32	120

During the initiation of this project, the number of tobacco and non-tobacco farmers was 85 and 53, respectively. However, the portion of tobacco farmers has now reduced by about 50% due to the influence of this project.

Training Components

The trainees were taken through the following basic bamboo utilization stages:

- Handling of assorted bamboo workshop tools and equipments
- Workshop occupational first aid skills in case of accidents
- Selection of bamboo materials used in making different items
- Bamboo culms and sheets treatment and seasoning technologies (*Soaking, Smoking, Seasoning, Chemical methods*).
- Node removal and splitting of bamboo culms
- Weaving bamboo sheets into various patterns
- Bamboo drilling straightening and bending technologies
- Basic skills of bamboo furniture making.

Below is photo gallery indicating the project training activities:-



Plate 1: Farmers attending a theory class on bamboo utilization



Plate 2: Farmers arranging bamboo in the bamboo treatment trench



Plate 3: Farmers scraping bamboo and removing nodes



Plate 4: A farmer splitting bamboo into sticks



Plate5: Farmers weaving bamboo sheets



Plate6: Trainer demonstrating on bamboo chair frame making



Plate7: Vanishing of bamboo products



Plate8: Display of bamboo finished products by farmers to guests in graduation day

Table 2 shows some of the bamboo products that were produced during the training period. They were sold locally at the end of the trainings and about Ksh. 12,000-30,000 (200-500 CAD) for each group. The groups will utilize the small funds realized in implementation of urgent activities in their respective Community Action Plans.

Perspectives of the Training

Informal key interviews to the key stakeholders to the training indicated different perceptions to the initiative as outlined below.

Trainees: The trainees' enthusiasm for the training heightened after each session. They were happy and proud that the bamboo they have planted will have multiple household uses and will improve their livelihood. It was common for them inviting friends and showing off their achievements. They were in high esteem and with positive future prospects. According to many, they will henceforth put more effort in farm management and they are ready to expand their farms if market outlets are well defined in the future.

Community Members and the Public: The community was impressed by the training. Most local youth and women groups were constantly approaching the trainers enquiring on how they could get join the groups and get bamboo seedlings for their farms. The Luo community members changed their traditional negative perception on bamboo farming.

Trainers/ Instructors: The trainers considered the trainings successful as their set objectives were achieved. They however noted that the 2-weeks time allocated for the trainings were short and had to put the trainees through a crash programme. They recommended a minimum of four weeks in future for selected youths and some adults with specific skills relevant to the bamboo industry.

Government Officials: Government officers working in the area were pleased with the Research and Development (R&D) initiative in the region. They appreciated being incorporated in every stage of the activities and observed that such initiatives were helpful to the local populace and they would be willing to assist the farmers where necessary. They promised to mobilize available resources to in-corporate farmers in the future.

Bamboo Product	Unit Price (Ksh)
1. Coffee table	750
2. Table Chairs	500
3. Stool	450
4. Corner shelve	1,500
5. Fishing lump holders	450
6. Hair clips	100
7. Baskets (assorted sizes)	100-750
8. Toothpicks (per packet)	20
9. Chopsticks (per packet)	200
10. Cups (assorted)	50-100
11. <i>Orutu</i> (musical Instrument)	300
12. Ladders (assorted)	250-750
13. Penholders	150
14. Flower vases (assorted)	100-350
15. Traditional walking sticks	150
16. Traditional arrow box	200
17. Animal yoke	400
18. Spoon	100
19. Traditional flute	150
20. Skewers (per packet)	200
21. Bamboo rope	40
22. Fencing poles (2.5 m each)	50
23. Motar & Pestle	150
24. Trophy	250
<i>NB: CAD= Ksh. 60 in 2008</i>	

Challenges faced during the training

- Limited resources to cover all the basic requirements during the training workshop
- Limited and lack of permanent bamboo workshop space/ contact offices where farmers would be carrying out their daily processing activities after the training
- Lack of some modern bamboo processing tools
- Limited bamboo materials and culm varieties in processing of a variety of bamboo products
- Lack of access to electricity in three of the training sites (Migori, Homa bay, and Kuria). This was sorted out by use of generators
- Lack of adequate bamboo training personnel in Kenya. The ratio of 3 trainers to 30 trainees (1:10) at every site was low. Hence, monitoring performance of individual trainees was rather difficult. The best ratio would have been averagely 1:5.
- Valuation and fixing of bamboo products in respective areas
- The duration of training was so short and the farmers had to undergo several training sessions, a scenario that resulted in a crush program that was not conducive to some of the aged farmers.
- Limited accessibility / transport to the four existing market centres where the products are being processed from.
- Lack of a well defined marketing structure for the groups' bamboo products, i.e. cooperative societies, private companies or community based organizations.

Lessons learnt during the trainings

- Some trainees had some traditionally acquired skills and talents relevant to the processing of bamboo items. If such skills were harnessed and diverted to bamboo utilization, it would be a major boost to bamboo industry in the region. Hence, such people should be targeted in future bamboo processing trainings.
- There is a large market potential for bamboo products in the region. This was shown by the sale of most bamboo products made during the training workshops.
- The trainings changed peoples negative attitude towards bamboo (i.e. a plant with no economic returns, associated with witchcraft especially among the Lou community).
- Farmers in the various sites had varied interests on bamboo

District	Major area of Interest/ utilization
Kuria (<i>Kuria community</i>)	Socio- cultural uses e.g. Making arrow boxes and flutes due to the insecurity in the area
Suba (<i>Suba/ Luo community</i>)	Fishing related items e.g. Fishing lump holders and baskets due to its proximity to Lake Victoria fish landing beaches
Migori (<i>Luo community</i>)	Modern household items such as tables and chairs and farming implements like yokes.
Homa bay (<i>Luo community</i>)	Socio-cultural uses/ entertainment e.g. Orutu (musical Instrument) &Trophy, household items.

utilization. This has been summarized in Table 3.

- The economic and socio-cultural values attached to different products differs from one community to another

4.0 Project Implementation and Management

This section of the report outlines activities supported by the project. For reference to project activities supported in the first 24 months should be referred to Interim Progress Reports Nos. 1-3 (*please see copies in www.tobaccotobamboo.com*). For the last 6 months of the project, the activities supported include the following:-

- Research expenses for project personnel and consultants/collaborators,
- Continuous sensitization of farmers on the negative environmental and human implications of tobacco production
- Acquisition of relevant literature on bamboo and tobacco production
- Continuous/periodical monitoring of bamboo growth performance in 120 field experimentation sites (farms)
- Bamboo existing and potential market surveys
- Community Action Plan development process to enable the shifting of farmers from tobacco to bamboo production and processing
- Basic training on bamboo utilization (treatment, handcraft weaving & furniture processing technologies) for project staff, and tobacco and non-tobacco farmers who form the study group of this project. The Four farmers' trained are: *Migori Bamboo (Modi) Farmers Group, Kuria Bamboo (Imiere) Farmers Group, Homa bay Bamboo (Modi) Farmers Group, Suba Bamboo (Modi) Farmers Group.*
- Dissemination of project outputs through reports, publications, policy briefs, international and local meetings/ events/ workshops and internet.
- Data entry and detailed analysis of household surveys on livelihood strategies among tobacco and non-farmers.
- Data dissemination through workshops, public forums and publications in international journals

In terms of the project administration, all the research team and collaborators are still intact and active in relevant scheduled activities. However, the two Masters students have graduated and have been replaced with new ones to ensure continuity of the project activities. The new assistants have embarked on research topics relevant to the objectives of this project. The outgoing research assistants are expected to continue working with the project from their new stations of work until April 2009 when they may re-join as doctorate students.

The financial expenditures for the current period were adequate for the planned activities despite the recent post-election violence in Kenya and global price escalations. The basic financial expenditures forecasted and approved for the period October 2008 –April 2009 is adequate for the planned activities. The annual monitoring research visits by the IDRC contact person, Mr. Wardie Leppan and his interaction with farmers has always added impetus and motivation to farmers participating in the project. All farmers in the 4 study sites expect his visitation this year (November 2008) to share their challenges and challenges.

5.0 Project outputs and Dissemination

In addition to previous events and ways of project data dissemination of results, more results have been shared in the following forums:-

1. Kibwage, J. K. et al, (2008): *Potential and Rationale of Bamboo as an Alternative Crop to Tobacco in South Nyanza, Kenya*: A paper presented at the Second Meeting of the Study Group on Economically Sustainable Alternatives to Tobacco Growing Mexico City, Mexico, 17-19 June 2008
2. Kibwage, J. K. (2008): *Potential of bamboo production and processing technologies as a poverty alleviation strategy in Western Kenya Region*: A paper presented at the Training Workshop on Technology Options for Communities under the World Bank sponsored *Western Kenya Community Driven Development and Flood Mitigation Project (WKCDD/FMP)* on October 1-3, 2008, at Sunset Hotel, Kisumu City, Kenya.
3. Maseno Research Project Team gave talks on the pros and cons of Tobacco and the benefits of bamboo production during the following 4 recent forums:-
 - Community Action Planning workshop for Homa bay Bamboo (*Modi*) Farmers Group held on 25th July 2008 at Rangwe Market Centre
 - Community Action Planning workshop for Suba Bamboo (*Modi*) Farmers Group held on 15th August 2008 at Sindo Market Centre.
 - Community Action Planning workshop for Kuria Bamboo (*Imiere*) Farmers Group held on 25th September 2008 at Ikerege Market Centre
 - Community Action Planning workshop for Migori Bamboo (*Modi*) Farmers Group held on 16th October 2008 at Ngege Market Centre.

Other project outputs are:-

- Establishment and enhancement of a strong and sustainable research partnership among key stakeholders: i.e. Maseno University, tobacco and non-tobacco farmers groups: Migori Bamboo (*Modi*) Farmers Group, Kuria Bamboo (*Imiere*) Farmers Group, Homa bay Bamboo (*Modi*) Farmers Group, Suba Bamboo (*Modi*) Farmers Group, Kenya Forestry Research Institute, Kenya Forestry Products Research Centre, INBAR, Ministry of Health, Ministry of Agriculture, local leaders, 4 Constituency Development Funds Committees (CDFs) and local tobacco control stakeholders.
- Production and dissemination of the bamboo performance reports and other project reports to farmers and key project stakeholders as hard copies and online through the project website, www.tobaccotobamboo.com.

Dissemination of results has also been enhanced through journal and book chapter publications as listed here:-

1. Kibwage, J. K.,(2007). *Diversification of Household Livelihood Strategies for Tobacco Small-holder Farmers: A Case Study of Introducing Bamboo in the South Nyanza Region, Kenya*. A chapter in the book: *The Principle of*

Sustainability: An Interdisciplinary View, ISBN No. 9966-932-41-1, pp 91-100
DAAD/Geothe-nstitut, Nairobi.

2. Kibwage, J. K.; Momanyi, G.M.; and Odondo, A. J. (2007): *Occupational health and safety concerns among smallholder tobacco farmers in South Nyanza region, Kenya: African Newsletter on Occupational Health and Safety, Volume 17, number 2, August 2007- ISSN 0788-4877, pp 47-49, http://www.ttl.fi/NR/rdonlyres/6ADDA217-D9CE-4B3A-8E5C-B8C24D79_5049/0/AfricanNL22007.pdf. Finish Institute of Occupational Health/ WHO/ ILO.*
 3. Kibwage, J. K.; Netondo, G. W.; Odondo, A. J.; Oindo, B.O.; Momanyi, G.M.; Jinhe, F; and (2008): *Growth performance of bamboo in tobacco-growing regions of South Nyanza, Kenya. African Journal of Agricultural Research Vol. 3 (10), pp. 714-722 October, 2008. Available online at <http://www.academicjournals.org/AJAR>. ISSN 1991-637X © 2008.*
 4. Kibwage, J. K.; Odondo, A. J; Momanyi, G. M. (2008). *Structure and performance of formal retail market for bamboo products in Kenya. Scientific Research and Essays Vol. 3 (6), pp. 229–239, June 2008. ISSN 1992- 2248.*
 5. Kibwage, J. K.; Odondo, A. J; Momanyi, G. M. (2008). *Assessment of Livelihood Strategies among Tobacco and Non-tobacco Farmers in South Nyanza Region, Kenya. Submitted in November 2008 to: African Journal of Agricultural Research*
- Dissemination of results through Policy Briefs: the drafts of the *First Policy Brief on the “Need for Alternative Crops to Tobacco Farming in Kenya”* and *Second Policy Brief on “Bamboo as an Alternative Crop to Tobacco”* are undergoing peer review by the Ministries of Health and Agriculture before publication in November/December 2008.
 - Dissemination of project outputs through internet. The project has upgraded the project website, www.tobaccotobamboo.com. The site has information on the project vision, objectives, methods, outputs, partners/ collaborators/ stakeholders, progress reports, publications and other resources. The website has now been linked to other websites like IDRC (RITC), WHO, DIFD, Maseno University, Ministries of Health and Agriculture in Kenya, etc.
 - Dissemination through posters is currently being finalised
 - Dissemination on the potential of bamboo in changing tobacco farmers livelihoods to Government officials, community members and school children during the 4 graduation ceremonies after the bamboo utilization workshops in the 4 project sites, i.e. *Basic Training on Bamboo Treatment, Handcraft Weaving & Furniture Processing Technologies*

6.0 Impact of the project

The project has gain momentum with a high positive and tangible impact to the participating and even non-participating tobacco and non-tobacco farmers and government agricultural officers in the South Nyanza Region. The 4 community-based bamboo farming groups formed are growing strong and operating independently with technical assistance being offered by the Project Research Team. The number of tobacco and non-tobacco farmers interested in joining the groups and start bamboo cultivation as an alternative to tobacco is excessively high and continues to swell in the 4 study sites. During the initiation of this project, the number of tobacco and non-tobacco farmers was 85 and 53, respectively. However, the portion of tobacco farmers has now reduced by about 50% due to the influence of this project. On the other hand, two more masters' students have been recruited to the project for capacity building purposes. More students are keen at the University level to undertake studies related to tobacco control.

The Community Action Planning participatory process re-energized project farmers because they were able to list all their challenges and identify sources of funding. The bamboo utilization training also served as an eye opener on how to start a simple bamboo workshop for making household bamboo products that were readily demanded in the region. The CAPs process and training changed farmers' perception that bamboo was a mere crop that could not generate tangible financial returns as compared to tobacco. A number of farmers have decided to reduce their acreage on tobacco and instead grow more bamboo if provided with training, relevant inputs and support required. Even non bamboo farmers who attended the graduation ceremonies were willing to join the exiting farmers' groups to be able to enjoy the same benefits expected from bamboo farming.

The 120 farmers who undertook the trainings graduated with certificates that motivated them. Members of Parliament from each of the districts, several Government officers and the Public who attended the closing ceremonies, appreciated the importance of bamboo and the trainings. From their speeches, it could be deduced that the workshops changed people's perception that bamboo was just a plant like any other plant growing in the region. They observed that bamboo is an important crop that should be given a special attention and be adopted as a crop in large scale for the betterment of rural livelihoods in south Nyanza region. The Ministry of Agriculture has already started involving the Groups in regional development events. In brief, as indicated in the previous technical report, the policy of changing to alternative crops is quickly taking root in the region since the inception of this project.

7.0 Conclusions and Recommendations

With reference to the key activities in the last six months, the following conclusions are made:-

In terms of bamboo growth performance trends, they study results indicate that whereas survival rates dropped in the early months, *Bambusa vulgaris* exhibited higher survival rates than *D. giganteus* while growing under similar agro ecological conditions and farm management techniques over time. Generally the growth in diameter increased with

variations at the four sites. *D. giganteus* had bigger culm diameter than *B. vulgaris* in the study sites. The increase in diameter and height seem to follow a similar pattern. The number of culms produced by both *D. giganteus* and *B. vulgaris* increased steadily over time, with higher rates recorded after twelve months. It is, therefore, recommended that the bamboo growth performance monitoring should continue to maturity in around September/ October 2009 for final conclusions to be made on the economic potential of bamboo in the area, despite the preliminarily positive and good results.

The second phase of the research project should be based on the Community Action Plan issues as identified by the farmers themselves. These include:

- Capacity building of the leadership of farmers' organizations
- Development of local Bamboo Processing and Tobacco Control Training Centres
- Development of a marketing system for bamboo products
- Provision of protective equipment to bamboo farmers
- Integrate the climate change vulnerability to the project
- Control of termites which destroy young bamboo shoots
- Create awareness on bamboo benefits to reduce the traditional misconceptions and stigma on the plant
- Train farmers more on the growth patterns of bamboo and management of the bamboo farms
- Integrate measures to address the issue of a long bamboo maturity waiting period
- Vulnerable Groups like the HIV/AIDs farmers should be give extra support to ensure that the farms are well taken care of
- To control snakes attraction through good care of the farms and use of natural snake repellent plants
- Introduction of more bamboo varieties and undertaking of a propagation training
- Implementation of measures aimed at control destruction of bamboo by domestic and wild animals
- Publicity of the project is essential to attract more tobacco and non-tobacco farmers to the initiative

The Basic Training on Bamboo Treatment, Handcraft Weaving & Furniture Processing Technologies was a major impetus to the acceptance of bamboo in the region because it acted as an eye opener on the multiple and wide market potential of bamboo at local, regional and international markets in the long run. The second bamboo utilization should focus more on value addition or quality aspects to bamboo products and development of a sustainable marketing structure. The training centres should urgently be up-scaled and supported to run on full-time basis to undertake bamboo processing and marketing of finished products.

In brief, despite the few challenges to this action-oriented research project, the project progress is on track as per the set objectives and relevant data collection activities. However, to realize fully the purpose of this study, the above research needs/ recommendations should be addressed in phase two of the project. The IDRC should consider funding other research/ development areas (not included in the current study) considered fundamental to the final success of the goal of this current project. For emphasis purposes, a tier approach should always be used by studying further the potential of bamboo while at the same time investigating the key issues and trends in tobacco industry. If most of the recommendations listed in progress reports 1-4 of the last

30 months are positively considered for funding in Phase II of the project after April 2009, the goal of replacing the tobacco industry with bamboo industry will be achieved in the short to medium term. This is evidenced by the large numbers of farmers willing to abandon tobacco and start bamboo cultivation.

Acknowledgments

This work is being carried out with aid of a grant from the International Development Research Development Research Centre (IDRC), Ottawa, Canada. We acknowledge IDRC and International Network for Bamboo and Rattan (INBAR) for providing access to their website online publications where relevant literatures were obtained. The project team acknowledges the assistance of several colleagues like Dr. Jinhe Fu of INBAR who is based in China and Mr. David Nyantika of the Ministry of Agriculture in Kenya for taking a leading role in training on Bamboo issues. Maseno University is also acknowledged for accepting in host the project for the next three years. We also acknowledge all farmers, government agricultural officers and stakeholders participating in the research project. However, the content herein is attributed to the authors and not supporting institutions or individuals.

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