Project Name: Bamboo Production as an Alternative Crop and Livelihood Strategy for Tobacco Smallholder Farmers in South Nyanza, Kenya: Phase II

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Phase II Final Technical Report for the Period: 19th December, 2009- 18th June, 2013

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ACRONYMS

BAT	British American Tobacco
CBOs	Community Based Organizations
FCTC	Framework Convention on Tobacco Control
FGDs	Focussed Group Discussions
IDRC	International Development Research Centre
INBAR	International Network for Bamboo and Rattan
KEFRI	Kenya Forestry Research Institute
KFS	Kenya Forestry Service
Ksh	Kenya Shilling
MOA	Ministry of Agriculture
MOH	Ministry of Health
NEMA	National Environmental Management Authority
NGOs	Non-Governmental Organizations
NTFIC	National Tobacco Free Initiative Committee
OSH	Occupational Safety and Health
SEKU	South Eastern Kenya University
TCs	Tobacco Companies
WHO	World Health Organization

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1.0 SYNTHESIS

In Kenya, tobacco is currently grown for commercial purposes in three major regions, namely; *South Nyanza* (Migori, Kuria and Homa-Bay districts), *Western* (Bungoma, Bumula, Malakisi, Sirisia, Busia, Teso and Mount Elgon districts), and *Eastern* (Meru, Embu and Kirinyaga districts). While the South Nyanza region has been dominating (80% production) in tobacco leaf production since 1970s to 2010, recent statistics obtained through the support of this project indicate that the companies have extensively expanded their production to Eastern and Western regions while reducing their production in South Nyanza.

The long-term vision of this project executed for the period 2006-2013 is to turn-around the dependence of local livelihoods from tobacco farming to cultivation of alternative crops in Kenya. Phase I (2006-2008) of this research project attempted to go into considerable depth in its objectives to provide information useful for local enforcement of Articles 17 and 18 of the WHO Framework Convention on Tobacco Control (FCTC) through the Kenya Tobacco Control Act, 2007. The research efforts and results obtained from Phase I led to some emerging issues or information gaps that required scientific investigation in Phase II (December 2009 to June 2013).

Specific research objectives of the study's Phase II were: -

1. To establish and monitor bamboo propagation nurseries for seedling production and enterprise diversity in the South Nyanza Region.

2. To undertake a gendered assessment of relevant cooperative marketing systems in Kenya and identify best practices that should be replicated in the upcoming bamboo industry for former smallholder tobacco farmers.

3. To undertake a range of feasibility studies and provide effective business plans for smallholder tobacco farmers and related local enterprises interested in bamboo production and processing of five (5) prioritized marketable product-chains (i.e. bamboo seedlings, bamboo handcrafts, bamboo furniture, bamboo housing and bamboo toothpicks industry) in the country.

4. To develop and implement a communication strategy for the project in order to effectively disseminate the outputs of the project.

5. To study the household livelihood strategies used by tobacco and non-tobacco farmers in the other two tobacco farming clusters in Kenya and compare to the South Nyanza region results obtained in Phase I, in order to develop acceptable national policy briefs on alternative economically viable crops and livelihoods.

6. To build capacity of staff and farmers in tobacco control through alternative livelihoods.

7. To carry out environmental auditing of tobacco farming activities in South Nyanza Region for purposes of evaluating their compliance level and policy formulation.

8. To evaluate the project to determine its impact on livelihoods of smallholder tobacco farmers.

This final project report for Phase II covers a summary of activities undertaken for the whole project period of 19th December 2009 to 18th June 2013. This report gives more details of the project evaluation activity undertake in May-June 2013 focused on objective 8 above to give an indication of the project impact on livelihoods of smallholder tobacco farmers.

Development of policies and legislation both by National and relevant County Government on economically viable and environmentally sustainable alternative crops to tobacco through partnerships with key stakeholders in tobacco control in the country is proposed, as a starting point in influencing national programs on tobacco control. While the results outlined in this technical report form the basis for policy formulation and law enforcement efforts, detailed and policy-based research on the environmental and social issues is fundamental in future. The study recommends for support of a final phase of 3-4 years that will focus on strategic research areas with great policy impacts and technical support in policy development at National and County levels of Government.

2.0 GENERAL BACKGROUND ON TOBACCO FARMING IN KENYA

The history of tobacco farming in Kenya dates back to 1907 when British American Tobacco (BAT) set up a marketing organization with its base in Mombasa. The firm concentrated on building a distribution and marketing network throughout East Africa – in what is now Kenya, Uganda, Tanzania and the Democratic Republic of Congo. Until 1928, BAT remained a distributor of imported cigarettes. However the emergence of a strong East African market saw the company make its first major investment when it opened a factory in Jinja, Uganda. The factory was upgraded in 1948, becoming the most modern in the region. The following year, BAT acquired Tanganyika – (now Tanzania mainland) based East African Tobacco (EAT) Company, which became a holding company in the regional BAT group of companies until 1957. In 1957, a modern Tobacco and cigarette factory commenced operations in Nairobi, to serve "the special needs of a growing Kenyan market". The leaf farming and factory production operations have tremendously been expanded and Kenya is currently a regional hub for manufacturing tobacco products because it also processes raw tobacco leaf imported from Uganda, Tanzania and Malawi. BAT Kenya also serves as a hub for 17 African countries, most of which are landlocked. The Plan to expand its operations to the new state of Southern Sudan is currently underway.

Despite the global policies aimed at reducing world tobacco production and use, the Kenyan Government's poverty-reduction policies encourage more tobacco production in the country. This is evidenced by on-going plans of the British American Tobacco Company Limited (BAT Ltd) to expand its activities to other new non-tobacco growing zones within Nyanza and Rift Valley regions according to its past annual reports. Tobacco is also officially listed as an industrial crop in key Ministry of Agriculture official policy documents. The Kenyan government has had a long standing stake in BAT (K), being its largest shareholder with 20% holding held

through the National Social Security Fund (N.S.S.F), which is a government agency. Having a stake means that in addition to receiving revenue in the form of taxes from its operations, the government also receives dividends from the company and plays part in appointments to the Management Board. On the other hand, the Kenyan Government policy encourages crop diversification as a long-term solution (refer to the Kenya Tobacco Control Act, 2007). However, there are no policy guidelines or any tangible Government efforts on this area. Commercial tobacco farming was introduced in Kenya in 1970s in three regions namely South Nyanza (1971), Western (1975) and Eastern (1978) by British American Tobacco (K) Ltd (BAT Ltd) (see Figure 1 below). The company started with an average of 500 contracted farmers in each of the three regions, with an initial national figure standing at 1,500 by 1978.

On the other hand, Kenya as a tobacco growing country, has also been involved in curbing the tobacco epidemic since 1992 when tobacco control campaigns were initiated in the country as part of the World No Tobacco Day commemorations. In 2001, the Ministry of Health (MoH) established the National Tobacco Free Initiative Committee (NTFIC) to coordinate tobacco control activities and a tobacco control focal point was designated. Kenya has actively participated in the negotiations of the WHO Framework Convention on Tobacco Control and in 2004, it ratified the treaty. Despite the strong lobby from the tobacco industry, a comprehensive Tobacco Control Act was enacted in 2007 to control the production, manufacture, sale, labelling, advertising, promotion and sponsorship of tobacco products and a Tobacco Control Board was established in the same Act to provide technical advice to the MoH on Tobacco Control. The key milestones on tobacco control in the country are illustrated in Figure 1.

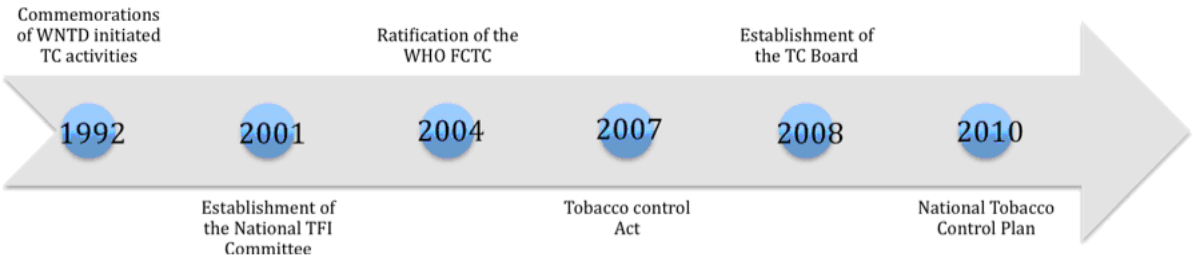


Figure 1: Kenya Tobacco Control Timeline, 1992 – 2010

3.0 THE RESEARCH PROBLEM

Despite the global policies aimed at reducing world tobacco production and use, the Kenyan Government's policies aimed at poverty reduction and hand-off approach to tobacco control from the supply end seem to encourage indirectly more tobacco production in the country. This is evidenced by the current efforts by the British American Tobacco Company Ltd (BAT) of expanding its activities to other high-agricultural potential zone in the country.

New and reliable results from the study indicate that the number of farmers engaged in tobacco farming in Kenya is increasing at a very high rate, i.e. from 500

in 1971 to 35,000 in 1990s and 55,000 in 2011. The number of TCs operating in the country has also increased from one to three excluding some of the subsidiary companies. This rapid expansion of tobacco farming in the country from medium to high potential agricultural areas is due to the collapse or market challenges facing the cotton, sisal, pyrethrum and coffee industries in the last 2 decades. The land under tobacco grew in acreage at the expense of food crops because farmers have been shifting to tobacco production mainly due to lack of reliable and viable cash crops. 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 tobacco growing regions. Child labour, increased HIV and Aids and other human health ailments associated with tobacco production are prevalent in these areas. Livestock production activities have also drastically reduced since most of the grazing areas have been converted to tobacco farms.

The type of tobacco grown in the study area demands a lot of wood-fuel for curing. Consequently, deforestation has occurred with felling of trees, especially the indigenous ones. Furthermore, deforestation has caused soil erosion which is rampant in these areas, ultimately resulting in low soil fertility leading to reduction in food crop production hence increased poverty levels in the tobacco farming areas. Widespread deforestation activities have also led to the change of the local natural streams from permanent to seasonal, hence water scarcity for other agricultural and domestic uses. The remaining seasonal rivers are further polluted by chemicals used in tobacco production that flow from nurseries and farms every season of the year.

This kind of negative scenario called for a study that would advise Tobacco Control (TC) policy and guide future detailed studies in the area of environmental impacts of tobacco farming in the country and globally. Though this was an exploratory study of the project, this final report will be shared with NEMA at the end of this project for environmental enforcement purposes and to reduce the tobacco's negative impacts to the environment. A policy brief on the same has been drafted for discussion with relevant stakeholders in August 2013.

4.0 STUDY AREA

The bamboo experimental project was carried out in Kenya in four (4) sites located in four (4) administrative districts of the South Nyanza region (Ngege in Migori, Sindo in Suba, Ekerege in Kuria and Ragwe in Homa-Bay) which fall within the newly constituted Counties of Migori and Homa Bay, respectively. However, household surveys to establish the livelihoods of tobacco and non-tobacco farmers in the country spread to Western and Eastern Zones shown in Figure 2 below.

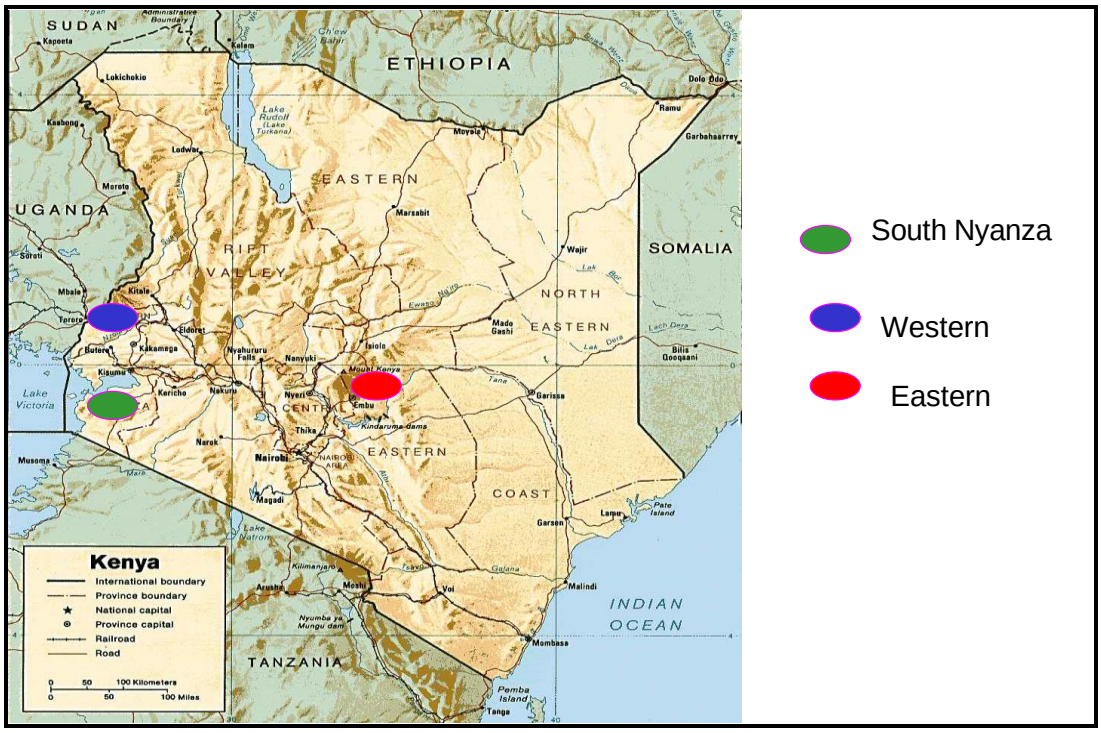


Figure 2: Tobacco farming regions in Kenya

5.0 RESEARCH FINDINGS

This chapter outlines a summary of key findings from the activities of each of the first seven (7) objectives of the research project and also gives more details of the project evaluation objective. The key results are discussed under the following sub-headings:-

- *Research Methodology and Approach*
- *Bamboo Growth Performance*
- *Bamboo seedlings propagation and enterprise diversity*
- *Assessment of handcarts cooperative marketing systems*
- *Feasibility studies of bamboo marketable product-chains*
- *Communication strategy for the project*
- *Household livelihood strategies among tobacco and non-tobacco farmers*
- *Capacity building of project staff and farmers*
- *Environmental auditing of tobacco farming activities*
- *Project evaluation findings*

5.1 Research Methodology and Approach

Several research methods and diversity of data collection approaches were used in this study depending on the objective under analysis. A summary for each objective has been given in each of the following sections in order to ensure a clear link with the results.

5.2 Bamboo Growth Performance

The initial 120 project farmers (i.e 30 from each site) were provided with 20 new bamboo seedlings for experimental purposes. A total of 2400 seedlings propagated from bamboo seeds in greenhouses by a private bamboo farmer in the outskirts of Nairobi were carefully packed and transported to South Nyanza early march 2010. Three new species (*Bambusa tulda*; *Bambusa textillis*; and *Oxytenanthera abyssinica*) were planted in March/April 2010. As was the case in phase I of the project, the bamboo growth performance was assessed in the the four study sites: Migori, Homa-Bay, Kuria and Suba districts every six months. The final monitoring took place in August/ Septemeber 2012.

The main factors attributed for growth performance differences between various sites and the region in general were observed to be the quality and type of seedlings supplied, maintenance standards, animal and human interference, soil type and quality, and climate variability. Climate vulnerability/unpredictable weather conditions remained a major challenge to farmers in the region and it seriously affected the overall bamboo growth patterns in the four sites. The general observation was that the seedlings survival rates (averagely 50%) for bamboo plants were lower than those observed in Phase I (i.e. 63-94%) of the study (Kibwage, et al, 2008). This was attributed to their method of propagation i.e. through seeds as compared to those made from cuttings used in Phase I. Since such seedlings from greenhouses are usually very delicate and tender, they must have suffered from a growth shock due to long distance transportation and general handling during distribution. Furthermore the region also experienced some drought spells which must have affected the establishment of the seedlings.

The 50% survival rates, however, has provided adequate propagation materials for the new bamboo species after 3 years for other tobacco smallholder farmers who will be switching from tobacco to bamboo farming in the future. To increase survival rates in future, propagation from cuttings, branches and rhizomes will be the most recommendable method for farmers. It was learned that seedlings propagated from bamboo seeds in greenhouses should be hardened for longer periods of about 6 months before being transferred to the farms for planting to increase their survival rates.

The findings confirmed Phase I results which showed that the species of bamboo experimented in Phase II can do well in soil and agro-climatic conditions similar to those of tobacco. Higher bamboo production performance rates can be achieved if not planted in waterlogged areas, inter-cropping with non-recommended crops (like maize and sorghum), weeds and domestic and wild animals can be controlled. To replace tobacco with bamboo in Kenya, this experiment needs to be replicated in the other remaining tobacco-growing regions in the country. Performance of the three species of bamboo was also best realized on the gentle sloping farm lands.

5.3 Bamboo Seedlings Propagation and Enterprise Diversification

One of the objectives of Phase II of the project was to establish and monitor bamboo propagation nurseries for seedling production and enterprise diversity in the South Nyanza Region. Four group-based nurseries (i.e. one for each cooperative) were established at suitable sites with reliable water source, well-drained soils and gentle slopes. The seedlings were propagated through cuttings obtained from healthy bamboo culms of *Dendrocalamus giganteus (Giant*) and *Bambusa vulgaris* with an age of about 2-2½ years that were experimented in Phase I of the project.

From the monitoring process of group nurseries, a few lessons were learned from the bamboo propagation activity.

- The bamboo nurseries should be established under natural tree shades/ or constructed shades to protect seedlings from direct sunshine. However, little light should be allowed in the first 2 months before they are exposed to the sun for another 2 months to develop further and harden.
- Watering should be done once daily under normal weather conditions and twice daily in dry periods.
- Pruning of roots that grow out of the plastic bags should be undertaken regularly to prevent roots from breaking when being transported for planting.
- Weeding should be done regularly to prevent weeds from competing with seedlings for water and soil nutrients.
- Seedlings should be well spaced to avoid overcrowding and to ensure there is adequate aeration.
- Seedlings should be hardened-off by gradually reducing the shade and frequency of watering. This allows them to get used to field conditions before transplantation.
- Most bamboo seedlings were ready for transplanting between 4-6 months depending on the care, type and quality of the propagation materials.
- Seedlings should be well protected from grazing animals (especially goats) by fencing the nurseries.
- Most farmers preferred establishment of individual nurseries for easy management, flexibility, farmer-time management and to foster competition among themselves.

The lessons above were shared with the project farmers and this has helped in establishment of successful family-based bamboo nurseries as alternative viable enterprises. Establishment of bamboo nurseries for seedling production and enterprise diversity should be promoted at the family level rather than at the group / cooperative level because it promotes competition among the farmers. It is also the best rewarding to individual farmers, hence motivating them. However, marketing of seedlings should be done at the Cooperative/ Group level to reduce marketing and transportation costs.

5.4 Assessment of Handcarts Cooperative Marketing Systems

One of the key objectives of phase II was to undertake an assessment of cooperatives' marketing systems in Kenya and identify best practices that should be replicated in the upcoming bamboo industry for former tobacco smallholder farmers. The task was addressed from a gendered perspective, because cooperatives often have a major impact on changing power relations in a community, within families, etc, as does any major change in crop production. Purposive sampling procedure was used to select a sample of three cooperatives based on their diversity in terms of history; proximity to urban centers as major market destination of products; geographical setting - a proxy indicator of agro-ecological endowment and hence determinant of livelihoods of the locals; and popularity in the sector. Based on these factors, the following three (3) out of the eight (8) handcrafts cooperatives in Kenya were selected for this study:

1. Wamunyu Handicraft Cooperative Society Ltd based in Eastern Province, near Machakos town.
2. Nairobi Handicraft Industrial Cooperative Society Ltd, based in Nairobi city; and
3. Akamba Handicraft Cooperative Society Ltd, based in Mombasa City.

The above were selected because most of the bamboo culms and final products may have to follow the same marketing value-chain system. The main techniques which were used to collect primary data included: observation, interactive participatory approach through personal or informal interviews; and use of questionnaires. Relevant secondary data sources that supplemented data for the study included published and unpublished works, cooperative By-laws and internal records of the cooperatives surveyed. Details of this study are available from *"Phase II First Interim Technical Report for the Period: 18th December 2009- 18th December 2010"* (Kibwage, J. K. et al, 2011a).

The assessment indicated that wood carving industry has greatly impacted positively on the people and businesses involved, mostly the Akamba community who are traditionally renowned for their curving skill. However, the scarcity of raw materials for curving is becoming an impediment in many handcraft Cooperative Societies. Trees species suitable for the carvings have been over-exploited without replanting programs. Competition from other handcraft enterprises doing similar activities, either wood based, stone based or maybe synthetics still remain a big problem in marketing of the products.

The study further revealed that for the smooth running of the cooperatives, sound computer, management and administrative skills; expertise in product marketing; familiarization by cooperative members with the cooperative law and respect of by-laws and need for good relations with local and international marketing agents must be cultivated among the members of the cooperative. The study indicated that in the emerging bamboo industry in South Nyanza, bamboo cooperatives have a high potential to support business undertakings of farmers and small traders and small-scale manufacturers particularly in the procurement of bamboo raw materials and other inputs, development of marketing infrastructure for high quality bamboo

products, and facilitating access to other productive factors and services on bamboo production technology adoption, skills training, information on bamboo markets, pricing and financing.

From the study, several lessons and / or best practices were learned for the newly established four (4) Bamboo Cooperative Societies for smallholder tobacco farmers that are in the process of switching to bamboo farming and production in South Nyanza. For sustainability purposes, the cooperatives must in future diversify the sources of incomes which should stretch beyond their core business of bamboo production and marketing. The big market potential is that bamboo can be a better substitute to wood in the carving of several handcrafts due to the scarcity of wood in the country.

5.5 Feasibility Study of Bamboo Market Value Chains

The products targeted for preliminary feasibility studies were: 1) bamboo seedlings, production business, 2) bamboo handcrafts, 3) bamboo furniture, 4) bamboo for construction- rural and urban bamboo housing, and 5) toothpicks industry. Using qualitative and quantitative approaches, these studies were carried out and their findings are summarized below. Detailed findings and specific recommendations can be referred to in the interim reports attached as appendix to this final technical report.

5.5.1 Bamboo seedlings

The study found out that the bamboo seedlings market is distorted. The local producers (KFS, KEFRI, bamboo cooperatives and individual farmers) are not linked to the local, regional and the national market chain. Bamboo seedlings supply and demand are also erratic; a situation greatly attributed to the existing unstable market. Interestingly, some stakeholders have bamboo seedlings but they do not know where to sell them while others want the seedlings but they do not know where to buy them. There exists market segmentation and producers must search for market niches. There is, therefore, is need for strengthening of linkages that will enable the market to stabilize and cooperatives to explore new market niches. Since the bamboo market remains segmented, new entrants in the industry are finding it difficult to source seedlings due to high transport costs. Hence, nurseries should strategically be located country-wide for easy access to the market.

Due to the lack of advanced technology on bamboo propagation among local farmers, especially the Giant bamboo, use of green houses and tissue culture technologies will be the long term solution to achieve high market demand. The study concluded that bamboo farmers have more strengths and opportunities when they work as a cooperative in order to encounter challenges in sourcing bamboo information, propagation materials and backstopping from experts, and marketing of seedlings. The detailed report is available from *"Phase II First Interim Technical Report for the Period: 18th December 2009- 18th December 2010"* (Kibwage, J. K. et al, 2011a).

5.5.2 Bamboo handcrafts

Feasibility on bamboo handcrafts made a conclusion that the market is huge both locally and internationally, because the products availability are limited in various market outlets surveyed due to lack of the required skills and exposure. Bamboo products available from local informal sources are of low quality, as compared to those from China and other foreign countries being sold in formal retail malls. The study recommended that the government needs to establish an enabling business environment for local bamboo enterprises to realize fully their potentials. There is also need for establishment of linkages and partnerships between such enterprises and the wood carving cooperatives in the country. The bamboo handcrafts business will also develop further if the on-going lobbying and policy review for lifting of the bamboo ban harvesting so as to access mature bamboo from government forests. The detailed report is available from *"Phase II First Interim Technical Report for the Period: 18th December 2009- 18th December 2010"* (Kibwage, J. K. et al, 2011a).

5.5.3 Bamboo furniture

The study revealed that the market potential for bamboo furniture is huge, because most of those products sold in the formal retail market in Kenya are imported entirely from China, India and Thailand. On the contrary, the availability and supply of locally made bamboo furniture is very minimal. This was attributed to lack of a well-established market chain for bamboo furniture and other bamboo products, government ban on bamboo harvesting from gazetted natural forests, quality standards, and inadequate knowledge and skills on use of bamboo as a raw material for furniture making by local entrepreneurs. The detailed report is available from *"Phase II Second Interim Technical Progress Report for the Period: 18th December 2010- 17th June 2011"* (Kibwage, J. K. et al, 2011b).

5.5.4 Rural and urban bamboo housing

The study on rural and bamboo housing concluded that processing of bamboo housing materials would be feasible and profitable for bamboo farmers' cooperatives in South Nyanza if favourable policies are developed that promote bamboo utilization in the housing sector by poor rural communities. Empowerment of bamboo farmers, cooperatives and processors with the required knowledge and technology is crucial in promoting bamboo housing industry in the country. In general, development of bamboo housing sector in Kenya is feasible given the fact that there is already a resource base, knowledge and experience which only need to be transferred and enhanced. There is also need to lift the ban on harvesting bamboo and give guidelines on how the same resource should be exploited sustainably. The detailed report is available from *"Phase II Second Interim Technical Progress Report for the Period: 18th December 2010- 17th June 2011"* (Kibwage, J. K. et al, 2011b).

5.5.5 Toothpicks enterprise

This feasibility study was undertaken to understand the possibility and economic viability of establishing a toothpicks enterprise in South Nyanza (project area) and provide a technical business advice for the bamboo cooperative societies. In South Nyanza region alone, the 241 bamboo farmers have an average of ¼ acres each of bamboo experimental farms. This amounts to about 60 acres only which will not be sufficient to set a small-scale factory which requires a minimum of about 5,000 acres of bamboo. This venture will only be viable near Kenya Government natural bamboo forests in the Rift Valley and Mt. Kenya Regions which currently stand at an estimated acreage of over 150,000ha after change of the current policy to allow access to the resource for commercial utilization. The study revealed that for the toothpicks industry to be viable, it must be integrated with the manufacture of other bamboo products like chopsticks, skewers and charcoal to maximise on various parts of the bamboo poles. The investment requirement will be huge estimated at an average of USD 450,000, since almost 100% of the toothpicks being sold in Kenya are made of bamboo and are imported mainly from China, indicating that the market is huge. However, this will only be a viable activity for South Nyanza bamboo Cooperatives after they expand their farms to meet the minimal bamboo supply requirements. Transfer of technology and knowledge from countries like China will also be one of the requirements in future.

5.6 Communication Strategy for the Project

The communication strategy developed was intended as a decision framework for the project communication activities aimed to support its work programme and facilitate the achievement of its goals. The strategy was designed to be effective in both collection and dissemination of information, knowledge, ideas and periodic updates and to ensure that high-impact cost effective communication tools were selected, chosen and used for the promotion of the project work programme, within the context of a balanced approach to all stakeholders.

The strategy dealt with information management, including the creation of clear and consistent messages to all stakeholders in the tobacco control and bamboo promotion communities. The strategy defined the key target groups; relevant approaches and the internal processes for optimizing communication with such target groups and outlined the mechanisms for delivering key information and messages. The detailed strategy is available from *"Phase II Second Interim Technical Progress Report for the Period: 18th December 2010- 17th June 2011"* (Kibwage, J. K. et al, 2011b).

Current modes of communication used in the project included; mobile phones, email, word of mouth during field meetings and postal mail. The most efficient method to communicate in rural areas was through word of mouth because messages delivered using this method were clear and direct; however it is was not used regularly because one had to travel to the field and meet the farmers. This was supplemented with other modes above.

The strategy managed to achieve the following objectives:-

- To build awareness of the project among a wide but defined group of audiences and user groups.
- To secure the commitment of a defined group of stakeholders to the project aims.
- To influence specific policies or policymakers around key aspects.
- To attain feedback from the audiences and general public about the project.
- To disseminate project outputs and achievements to the stakeholders.

Key messages shared out to targeted groups were divided into three (3) categories:

- Negative socio-economic, human health and environmental impacts of tobacco farming
- Socio-economic and environmental benefits of bamboo farming and processing
- Policy changes on viable alternative crops and livelihoods to bamboo

Using English and Kiswahili languages played a central role as communication languages to this project through various communication tools. Based on the current limited communication budget, the following effective communication tools were used to implement the project communication strategy.

- Periodical project online briefs
- Interviews on TV
- Local FM Radio presentations
- Newspaper articles
- Social network sites e.g. facebook, twitter, youtube and linkedin
- Scientific articles publications
- Project interactive website and online helpdesk
- Posters for meetings/ events
- Short videos of 5-15 minutes
- Personalized mass email distribution of short and simple messages
- Papers for meetings, seminars, conferences and workshops
- Dissemination of interim and final project reports through project and university websites

The project staff implemented this strategy to inform the wider community about project activities, policies, objectives, achievements and challenges. Communication was prioritized during the project period because it was to build a stronger level of support and awareness on tobacco control from policy makers and tobacco farmers. This might require more funding in future to ensure policy change on viable alternatives to tobacco.

5.7 Household Livelihood Strategies among Tobacco Farmers

Using household surveys and other participatory research methods, the study results showed that the land under tobacco has continued to grow rapidly at the expense of traditional food crops and livestock activities in Kenya. Tobacco companies have taken advantage of the market-challenged agricultural enterprises

like tea, coffee, cotton, sisal, maize among others to expand their activities. It therefore threatens food security and social networks in the tobacco farming zones because desperate farmers are easily enticed and hooked by tobacco companies to accept various incentives to start tobacco farming. It is evident that farmers are aware of the adverse occupational health and environmental hazards related to tobacco farming but poor rural communities depend on the crop for employment and cash income due to lack of alternative viable crop production programs. Children and women were found to be most vulnerable than men to tobacco-related health risks since they spend most of their time in the occupation.

The study revealed that the number of tobacco farmers (Contracted and non-contracted by Tobacco Companies-TCs) has increased from 500 1971 to 35,000 in 2006 (Patel et al, 2007). The number increased to 55,132 by 2011 indicating a very high average increase of 89.4% in less than a decade. However, the crop farming intensity differs from region to region: South Nyanza (31.4%), Eastern (25.0%) and Western (43.6%) regions in Kenya (see Table 1). The current trend is that TCs are expanding their tobacco farming activities more in Eastern and Western Kenya than South Nyanza which has over time been controlling 80% of tobacco production in the country for the period 1971-1990s. Extensive expansion is taking place in the Western Kenya followed by Eastern regions because most of national tobacco control campaigns have been concentrated in South Nyanza.

Table 1: Number of tobacco farmers in Kenya- 2011

REGION	NO. OF CONTRACTED FARMERS	NO. OF INDEPENDENT FARMERS	TOTAL
NYANZA	10,203	7,131	17,334 (31.4%)
WESTERN	13,405	10,629	24,034 (43.6%)
EASTERN	4,188	9,576	13,764(25.0%)
TOTAL	27,796 (50.4%)	27,336 (49.6%)	**55,132**

Source: Kibwage, et al, 2012

The number of tobacco leaf companies that deal with farmers directly has also increased from one in early 1970s to three at the moment, i.e. British American Tobacco (K) Ltd, Alliance One Tobacco (K) Ltd and Mastermind Tobacco (K) Ltd. Despite being the country's largest manufacturer, by 2002 the market share of BAT had dropped from 90% to 71%, Mastermind had progressed to 22%, followed by Cut Tobacco (K) Ltd at 7 % (Patel et al, 2007). BAT market share has since increase to 83% by 2012 after the Cut Tobacco (K) Ltd closed shop in the country. Subsidiaries of these companies also include Ozzbeco (K) Ltd, BAT Equatorial Africa Area Ltd and McCroft Tobacco (K) Ltd. Competition and expansion in tobacco farming was enhanced when Mastermind Kenya entered the market in 1987. Alliance One Tobacco (K) Ltd which operates only in South Nyanza has taken over the former BAT farmers in the region under unclear arrangements between the two companies. Farmers were not consulted before the transfer was formalized.

This research attempted to go into considerable depth in its overall goal to promote local enforcement of the Framework Convention on Tobacco Control (FCTC). This provided primary information on livelihood strategies in Kenya taking case studies of Western, Eastern and South Nyanza regions among tobacco and non-tobacco farmers. The study showed that though most households engage in tobacco farming to improve their standards of living, tobacco farming has added little or no difference to their livelihood when compared to non-tobacco households in the country, despite some regional-specific differences. Therefore, there is need to provide other alternative sources of livelihood to tobacco-growing households in the country.

The farmers we surveyed also questioned the economic returns from tobacco. The survey found that the annual net income of a non-tobacco farmer is typically higher than that of a tobacco farmer, with an average annual difference of USD 198. This is a significant difference in living standards at the rural level. The effects of income differentials can be seen at the household level when we compare the two groups. For example, the study showed that housing among tobacco farmers was generally poorer, with a significantly larger proportion of tobacco farmers living in temporary homes with mud walls and roofs made of iron sheets or grass thatch, as compared to non-tobacco farmers. The ownership of livestock, a key indicator of wealth in many Kenyan societies, was virtually the same in both populations, as was ownership of physical assets such as motorcycles, televisions, radios, etc. Differences in other expenditures were more evident.

The survey showed that tobacco farmers spent more income (USD 35 more) on average per year on medical and health care services than non-tobacco farmers. This suggests that tobacco farming households, on average, are more prone to illnesses requiring medical assistance. By contrast, non-tobacco farmers on average spend more of their income on education as compared to tobacco farmers. This suggests that in the longer-term farm families engaged in tobacco farming are less able to improve their situation through education for their children, which puts them and their families at a disadvantage in the broader labour market. Even though farmers presumably engage in tobacco farming to improve their standard of living, tobacco farming seems to have contributed little to their livelihoods in terms of social status, asset ownership, and long-term development.

5.8 Capacity Building of Project Farmers and Staff

One of the key objectives of this project was to build capacity of smallholder tobacco farmers and project staff on economically viable alternative livelihoods in the bamboo industry. Capacity was built in the following ways/ areas.

INBAR training on bamboo harvesting, preservation and treatment techniques: During the project period, the farmers were trained in bamboo harvesting, preservation and treatment techniques in collaboration with the International Network for Bamboo and Rattan (INBAR). The project staff and the youths from the Africa Bamboo Centre in Kisumu city provided a back-up in the training which exposed farmers to simple but effective methods of bamboo preservation and processing.

Professional Bamboo Handcraft Training: The project capacity built 25 (17 men and 8 women) farmers to the level of being professional artisans who are able to produce high quality bamboo handcrafts for Kenyan market and for future export when the relevant Government policies are implemented. The training covered specific several areas which included: (1) Selection of bamboo from the farms for certain handcrafts; (2) Designing of bamboo handcraft products; (3) Handling of handcrafts equipment and basic tool making technology; (4) Preparation of bamboo materials; (5) Splitting and cutting of bamboo materials into different shapes/ designs, (6) Real bamboo carving and handcrafts making; (7) Use of old bamboo rhizomes/ roots in bamboo handcrafts making; (8) Integrating the use of bamboo with Wood, Hides/skins, Beads and Sisal; (9) Product finishing e.g. (i) filing, (ii) sand-papering/ polishing, (iii) treating, (iv) painting and (v) decorating; (10) Products repairing techniques; (11) Treatment and Quality Control; (12) Pricing of final products; (13) Coding of products; and (14) Packaging and Marketing.

Provision of training equipment and materials: The 4 cooperatives were supported by basic equipment for bamboo processing and training materials/ consumables; protective gear. The 4 cooperatives were also supported with Bamboo Processing Manuals as reference materials. This included:-

- *Training Manual on Techniques for Plane Woven Bamboo Products*
- *Training Manual on Raw materials and Tools for Bamboo Application*
- *Training Manual on Three Dimensional Woven Bamboo Products*
- *Training Manual on Techniques for making Bamboo Furniture*

Training on record keeping: The cooperative officials were trained on how to keep cooperatives accounting, membership, sales, and other important records. This was carried out in close partnership with the Ministries of Agriculture and Cooperatives.

Acquisition of new literature: To build research capacity at South Eastern Kenya University, there was continuous acquisition of relevant literature on bamboo and tobacco production throughout the project period from various organisations active in tobacco control in the country and the African region and other developing countries.

Training of project staff and Students: during the reporting period, staffwere supported by the project and other partners to attend local and international workshops/ forums. Through this, they have widened their local and international networks which were beneficial to the project. Masters students and PhD students were also supported by the project to undertake postgraduate studies in areas that enabled the project Team to achieve its objectives.

5.9 Environmental Auditing of Tobacco Farming Activities

Tobacco farming in a given season normally starts with recruitment of farmers to participate during the year. This is then followed by a system of well-controlled farming activities which include: provision of inputs and support services, nursery management, land preparation and planting, farm/ crop management, harvesting of mature leaf, curing of the leaf, sorting and grading of tobacco leaf, transportation of the leaf to collection centres, weighing of the leaf & finally payment to farmers.

To audit the whole of this system, various socio-economic, human health and environmental concerns were recorded at all these stages, in order to obtain the local environmental compliance of Tobacco Companies (TCs) to existing environmental laws, standards and best practices on the protection and conservation of forests/vegetation, water, soil, and other environmental media. Compliance to protection of human health was also given priority in the study. The study was also done in consideration of the Kenya National Environment Management Authority (NEMA), Environmental Impact Assessment/ Audit Regulations of 2003 and environmental standards captured from various local and international environmental regulations and policies on waste disposal, pesticide applications, Occupational Health and Safety (OSH), soil and water conservation, Corporate Social Responsibility (CRS), sustainable utilisation of forestry resources, Multi-lateral Environmental Agreements (MEAs) among others.

Detailed environmental audit checklist, Focused Group Discussions (FGDs), interviews and field observations revealed that the Tobacco Companies' (TCs) environmental compliance level to NEMA, WHO standards and world best farming practices is dismal at 11.6%. This poor performance portrayed a total disregard of good environmental practices in tobacco farming activities. While the results outlined in the technical report form the basis for policy formulation and law enforcement efforts, detailed and policy-based research on the following issues surveyed is fundamental in future:-

- Application of Pesticides and Agrochemicals
- Tobacco Curing and Impacts on Woodlots
- Tobacco Leaf Storage and Disposal of Uncollected Leaves
- Occupational Health and Safety
- Corporate Social Responsibility

The low compliance level in the above five key areas implies that tobacco crop farming is highly unsustainable and calls for reviewing and enforcement of existing environmental management regulations and policies to regulate the sector. This justifies the introduction of bamboo plant as an alternative crop to protect the environment and farmers from the many problems caused by tobacco farming. Research and Development (R&D) of policies and legislation on economically viable and environmentally sustainable alternative crops to tobacco through partnerships with key stakeholders in tobacco control in the country is proposed as a starting point in influencing national programs on tobacco control.

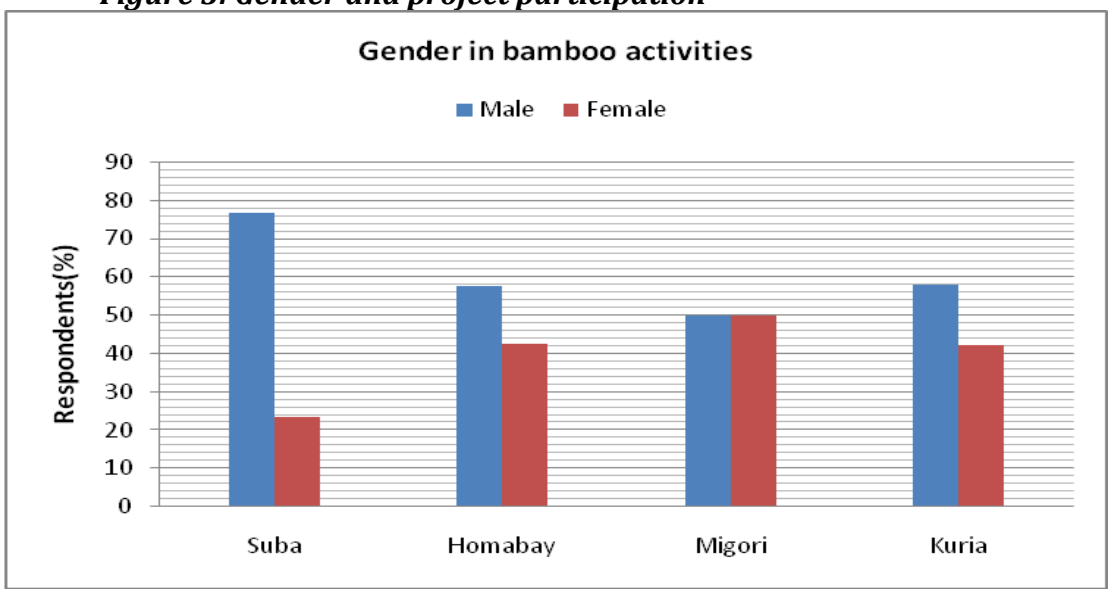
5.10 Project Evaluation

In order to advise policy makers on the potential of bamboo production as an alternative livelihood to tobacco farmers, the evaluation of the project impact (positive and negative) to target beneficiaries was very important. This task focused on detailed evaluation of the extent to which the main goal of the project, i.e. potential of bamboo as an alternative crop or source of livelihood to tobacco farming in the South Nyanza region was achieved during the project period. This was done at the end of third year of Phase II. This was done through household interviews and four (4) Focused Group Discussions targeting direct beneficiaries (i.e. tobacco and non-tobacco smallholder farmers). The interviews purposefully targeted farmers that joined the project in 2006 in order to document accurate experiences and lessons learned. The results obtained are discussed below using various key project performance indicators.

5.10.1 Gender and project participation

As indicated in the Figure 3 below, the number of males involved in bamboo project activities was slightly high in all four sites with overall average of 58% (males) and 42% (females). Migori had the highest (50%) number of females participating in the project while Suba had the lowest number of females involved in bamboo activities. As opposed to other sites where men dominated in bamboo activities, Migori had 50:50 ratios of men to women (Figure 3). This percentage was influenced by the selection criteria applied at the beginning of the project and dominant cultural practices in the region where men lead in household decision making processes. Land and farm investments are commonly owned by men both in monogamous or polygamous families in sub-Saharan Africa. It is only widows who may own such properties in the African cultural context.

Figure 3: Gender and project participation



5.10.2 Expansion of bamboo farms

The evalution indicated that from the initial bamboo seedlings given to individual farmers through the support of the project, they have managed to expand their farms indicating acceptance of bamboo as a viable alternative crop to tobacco. Homabay and Kuria sites recorded the highest number (mean of 14 clumps) of farmers that have expanded their farms as shown in Figures 4 and 5 below. In Migori, the low (mean of 4.1 clumps) expansion rate was attributed to existing cooperative management dynamics among the officials. Population pressure from the neighbouring Migori town could also be impacting negatively on household land–holding thereby affecting bamboo farming expansion programs. For Suba, the expansion was facing the challege of occassional dry spells experienced in the site which discouraged raising of more seedlings and made maintence of familiy nurseries in the field due to scarcity of water. In all sites, almost 100% (see Figure below) of the farmers were willing to continue investing in bamboo. This was largely attributed to monetary and environmental potentials realised so far from bamboo production and local utilization.

Figure 4 : Expansion of bamboo farms

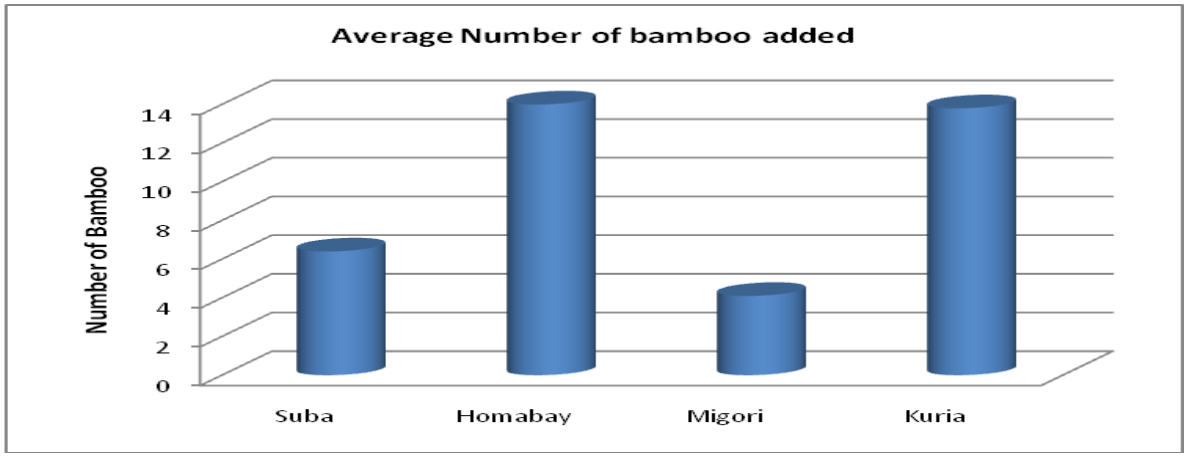
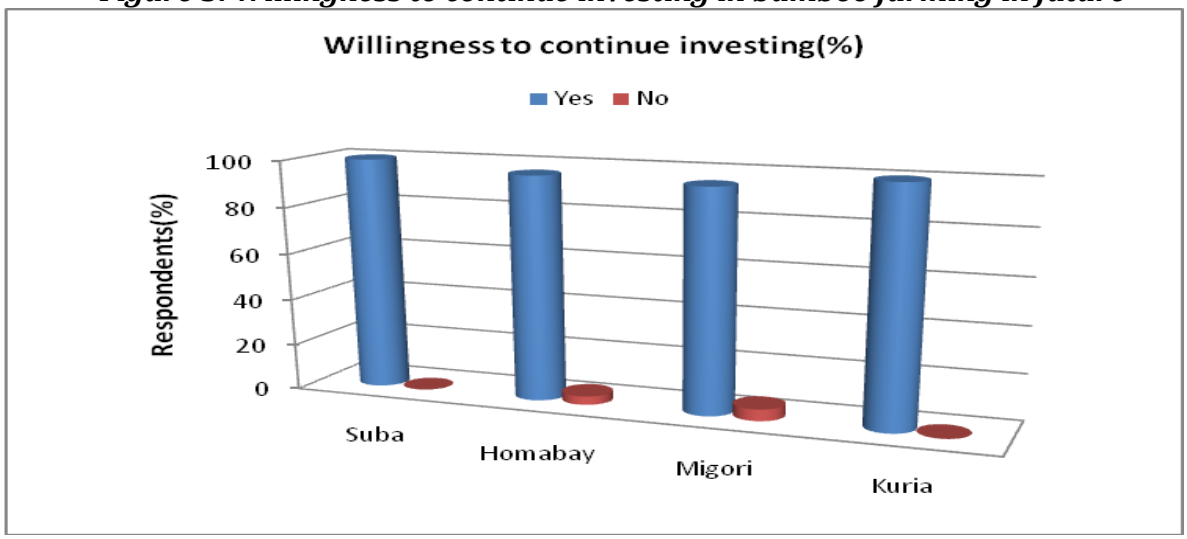
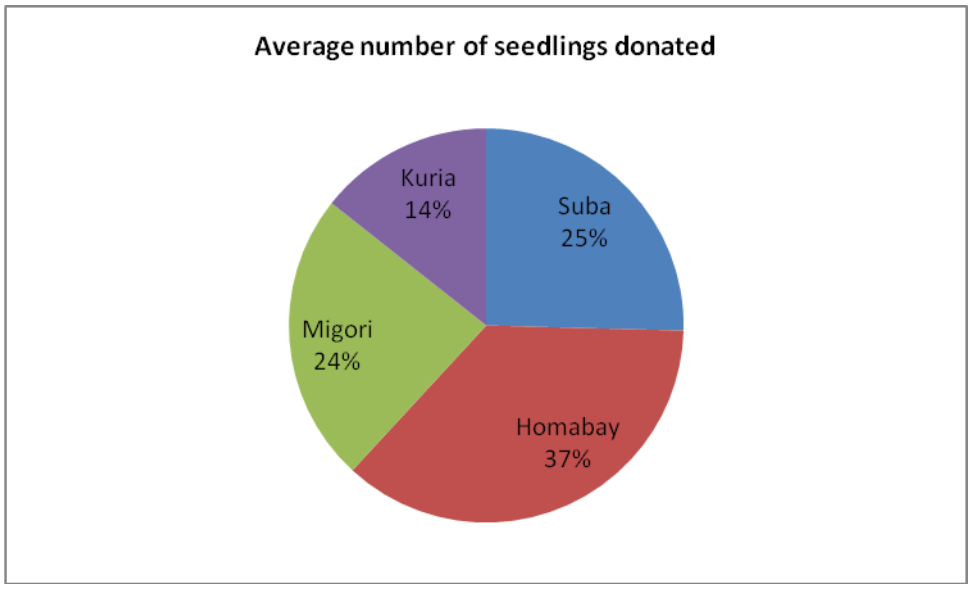


Figure 5: Willingness to continue investing in bamboo farming in future



In all the four sites, farmers indicated that they have been donating the seedlings to their family friends and relatives at no cost. They also do farmer-to-farmer training and transfer of skills. Homabay had the highest number of donated seedlings (37%). Despite the fact that Kuria ranked second in terms of the number of mature seedlings, the number donated was the lowest(14%) because most farmers still have enough land for bamboo expansion. In all the sites, an average of 200 more bamboo farmers had joined as members in groups without support from this project, a clear indication that the new intiative is being accepted in the area as an alternative livelihood diversification strategy.

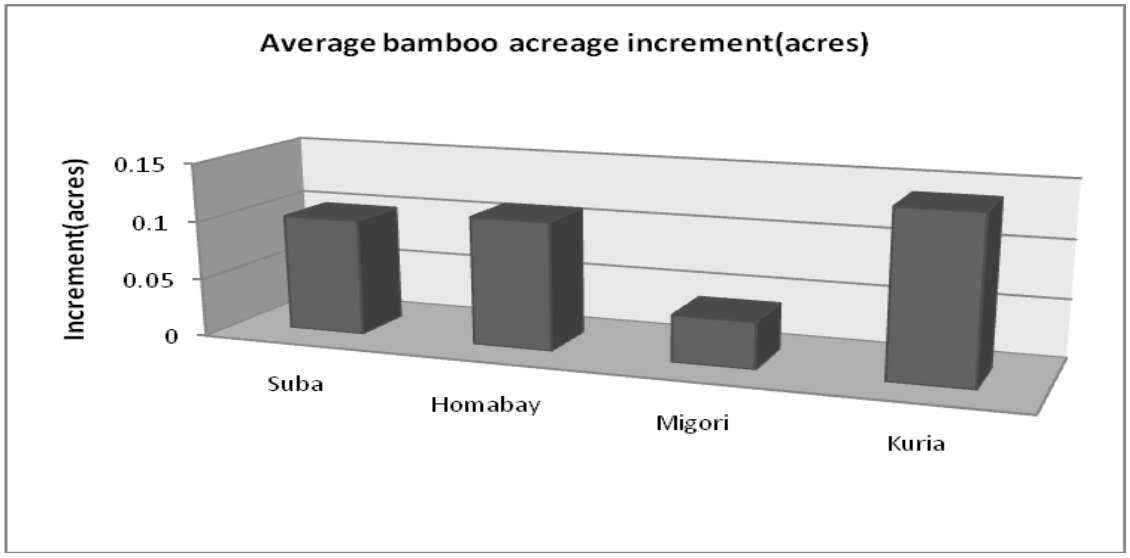
Figure 6: Seedlings donation



Kuria recorded the highest bamboo acreage increment (mean of 0.14 acres) because the household land-holding in is generally large compared to the other three project sites. This, among other factors, could have triggered devotion of more land to bamboo farming. The Migori site had the lowest (mean of 0.04 acres); probably due

to its neighbouring Migori town that may influencing land-holding per household (see Figure 7).

Figure 7: Average bamboo acreage increament (acres)



5.10.3 Current status of bamboo farms

The project evaluation indicated that Kuria and Homabay had the highest number of mature clumps compared to Suba and Migori (Figure 8). On the other hand, Homabay had the highest number of mature poles (Figure 9); an observation attributed to the high number of mature clumps recorded. Similarly, the low number of mature poles in Suba is attributed to the observed low number of mature poles and drought common in the area.

Figure 8: Mature clumps per farmer as at June 2013

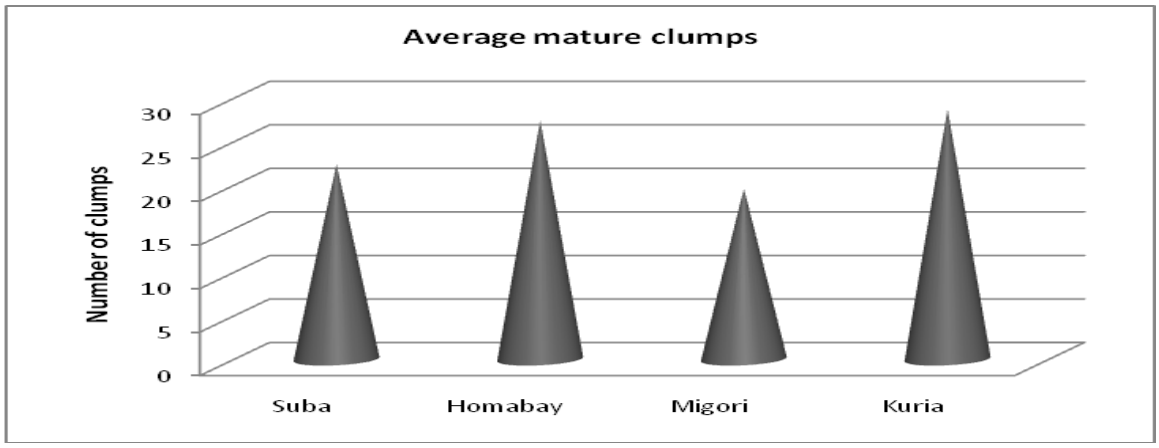
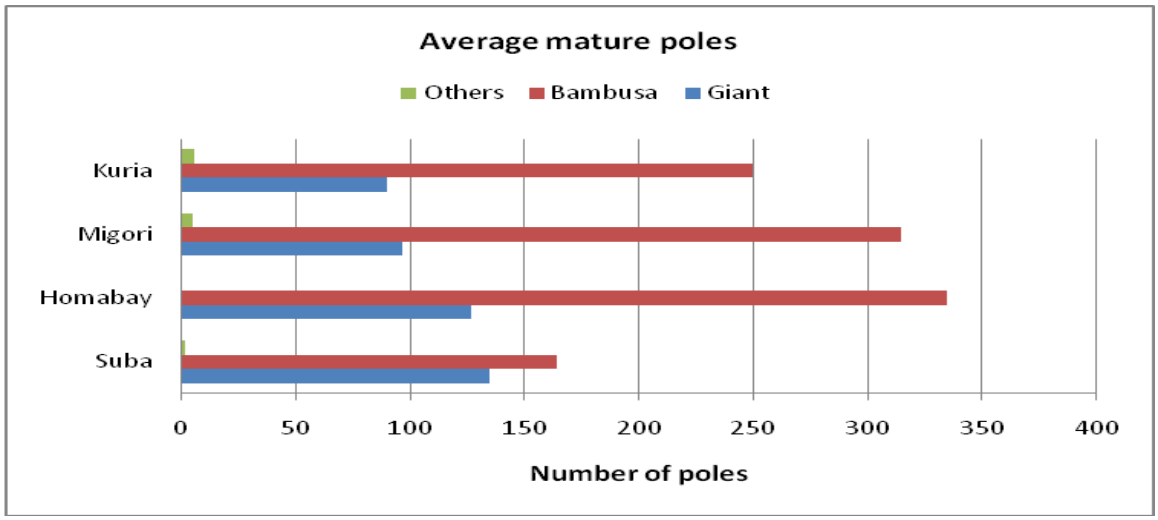


Figure 9: Mature poles per farmer as at June 2013



5.10.4 Bamboo production for income generation and enterprise diversity

The study assessed the bamboo seedlings (see Plate 1) and poles enterprises initiated during the project period. The study showed that Homa Bay and Migori bamboo cooperatives had the highest number of mature seedlings while Suba had the lowest (see Table 2). Market availability and accessibility were the main factors influencing seedlings production among the groups. Dry spells in Suba could, among other factors, have contributed to the observed low number of seedlings. The large number of seedling during this low-rainfall seasons indicated that farmers had not mastered the timing of planting seasons in March-April (long rains season) and October-November (short rain season) every year. More training will be required in this aspect in future to avoid losses through over-maturity of seedlings.

Plate 1: Sample of successful bamboo and other tree seedlings nurseries (Suba)

Table 2: Number of mature seedlings during the project evaluation period

GROUP	NUMBER OF MATURE SEEDLINGS		TOTAL
	***Dendrocalamus giganteus*(giant)**	***Bambusa vulgaris***	
Kuria Bamboo Farmers Cooperative Society Ltd	224	4,080	4304
Migori Bamboo Farmers Cooperative Society Ltd	337	4,103	4440
Homa-Bay Bamboo Farmers Cooperative Society Ltd	659	2,762	3421
Suba Bamboo Farmers Cooperative Society Ltd	106	146	252
TOTAL	**1,326**	**11,091**	**12,417**

In terms of poles (Table XX), most farmers are yet to link themselves to the bamboo utilization market outlets locally. This was evidenced by a large number of mature poles in the farms ready for sale. The evaluation found out that there is need to create awareness on bamboo uses beyond the farmers. There is need for seminars among wood traders, architects, housing construction workers and specialists (traditional and modern), etc. This gap needs to be filled to ensure that the mature bamboo poles reach the market. This will encourage farmers to grow more bamboo by expanding their farms.

Table 3: Number of mature poles for sale

COOP GROUP	MATURE BAMBOO POLES		TOTAL
	***Dendrocalamus giganteus*(giant)**	***Bambusa vulgaris***	
Kuria Bamboo Farmers' Cooperative Society Ltd	1,769	5,926	7,695
Migori Bamboo Farmers' Cooperative Society Ltd	1,837	6,190	8,027
Homa-Bay Bamboo Farmers' Cooperative Society Ltd	3,316	9,333	12,649
Suba Bamboo Farmers' Cooperative Society Ltd	1,990	2,983	4,973
TOTAL	8,912	24,432	33,344

5.10.5 Bamboo utilization at the household level

The study indicated that majority of the farmers had started utilizing bamboo (see Plate 2)with Kuria registering the highest (95.5%) and Suba the lowest (73.3%). Probably, the low number of mature clumps and poles in Suba, among other factors, might have contributed to this observation. While farmers in the other three sites were using bamboo mostly for construction of houses and fencing, Suba records high uses in handcraft and furniture. This was attributed to the presence of an active

workshop in Suba among other factors and the availability of trained and dedicated bamboo artisans (see Figures 10 and 11).

Plate 2: Bamboo utilization at the household level (Migori and Kuria)

Figure 10: Bamboo utilization at the household level

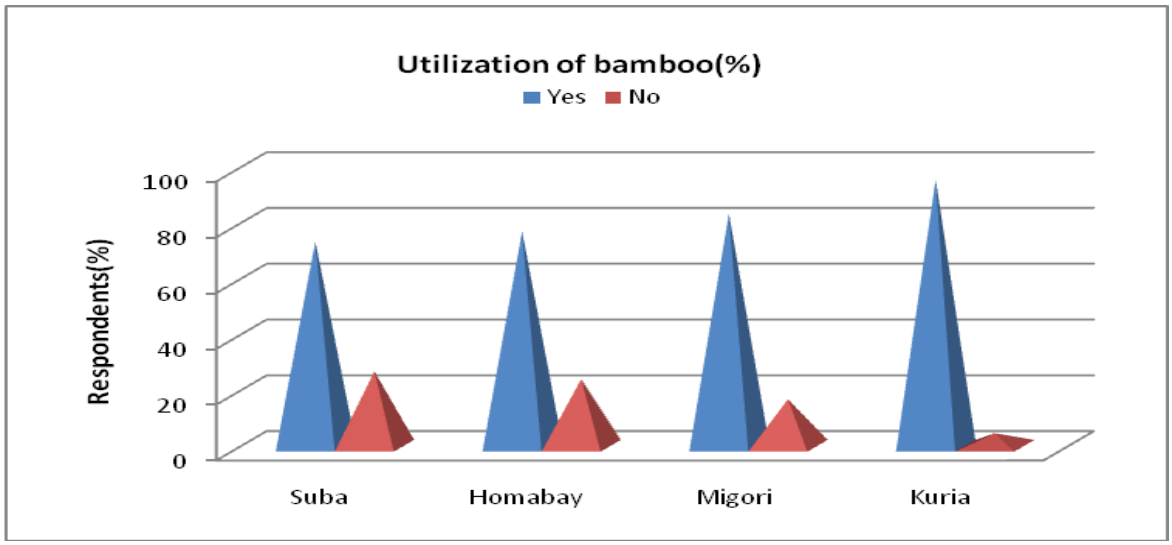
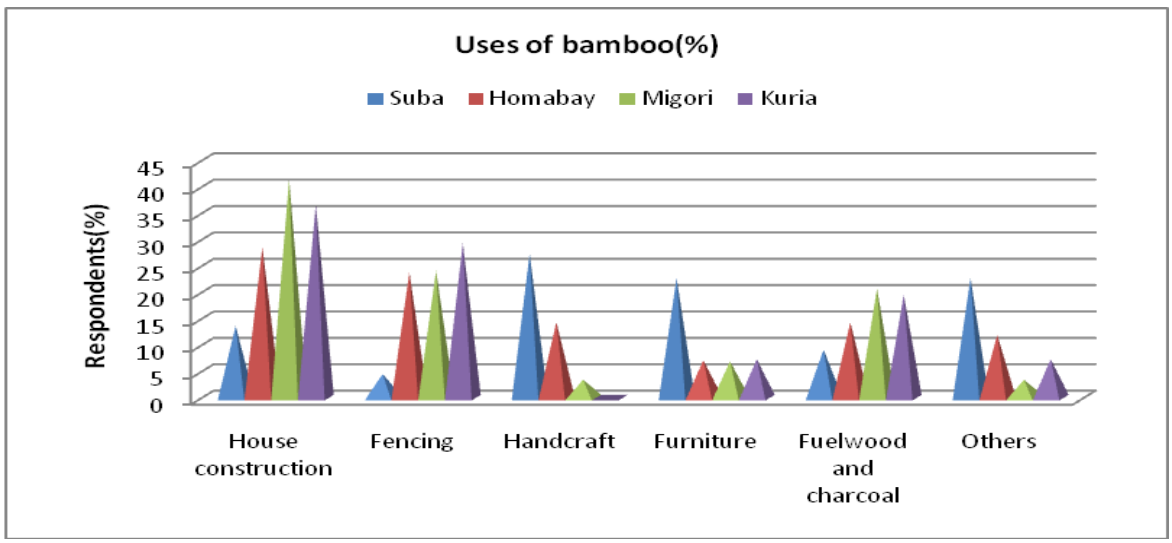


Figure 11: Uses of bamboo at the household level



5.10.6 Status of bamboo cooperative workshops

Assessment of the bamboo cooperative workshops indicated that, most of the trained artisans preferred to operate as private enterprises rather than through the cooperative systems. Hence, the majority had left the workshops (except in Suba) and ventured into private bamboo-related enterprises in their localities. Other reasons given include lack of cooperatives management skills and generally lack of a well-developed value-market chain. They, however, prefered to market their skills and sale their products through the cooperatives in future when they are well-equiped and functional. The study revealed that the Kenya Government through the Consituency Development Fund (CDF) had supported two of the four copperatives with a total of (Ksh. 350, 000 or USD 4,200) to purchase land parcels for future bamboo seedling production and processing centres. The two cooperatives (Kuria and Migori) had already purchased the land parcels, a clear indicator of Government direct support to the bamboo industry in the region.

5.10.7 Impact of bamboo production to household livelihood

The evalution revealed that household livelihoods have generally improved in the majority (over 75%) of households in all sites (see Figure 12). This improvement was attributed to both monetary and non-monetary benefits accrued from bamboo investment. Seedlings are the major source of income followed by bamboo products then poles. It is likely that this ranking may change in future as more bamboo reach maturity and chain actors learn how to make more bamboo products (see Figure 13). This incomes were for the period of about three and half years (Janury 2010-June 2013) after the bamboo experimented in Phase I matured.

As Figure 14 indicates, most farmers used the money from bamboo for food (over 30%) and school fees (over 20%). Suba, which has been experiencing periods of droughts during the project period recorded the highest (42%) expenditure on household food stuffs. Generally, many parts of Nyanza regions are classified as poor, hence the high expenditure of the income on food items. Some farmers had, however, invested money in diversifying family enterprises. Some farmers had however invested money in diversifying familily enterprises. Examples included purchase of motor bikes for local transport business, aquaculture (fish ponds), house construction, entertainment items (such as video machines, television, raidio, etc) (see Plates 3 and 4).

Figure 12: Household livelihood improvement

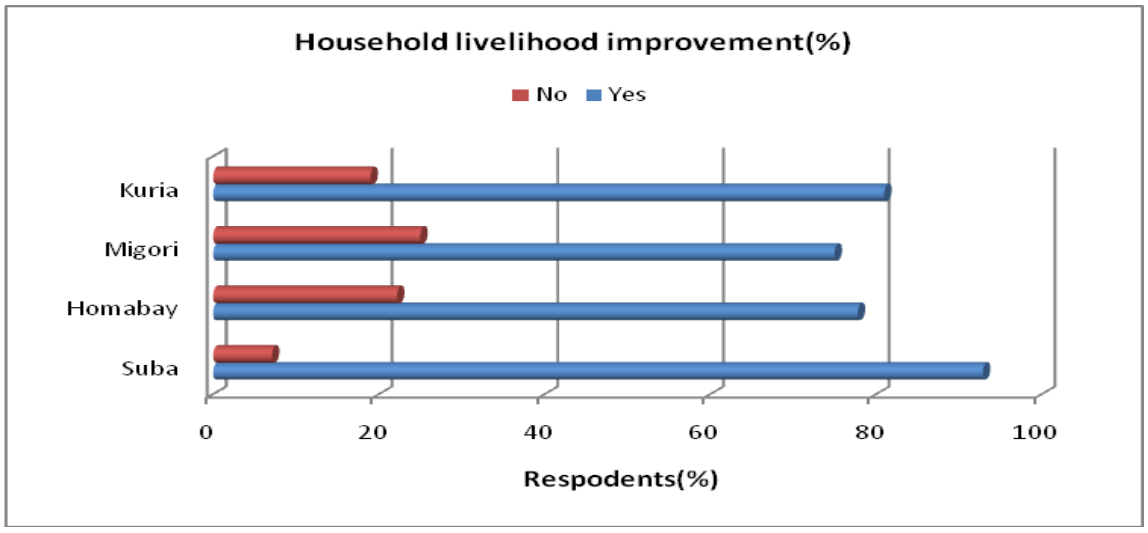


Figure 13: Estimated household incomes from bamboo enterprises (2010-2013)

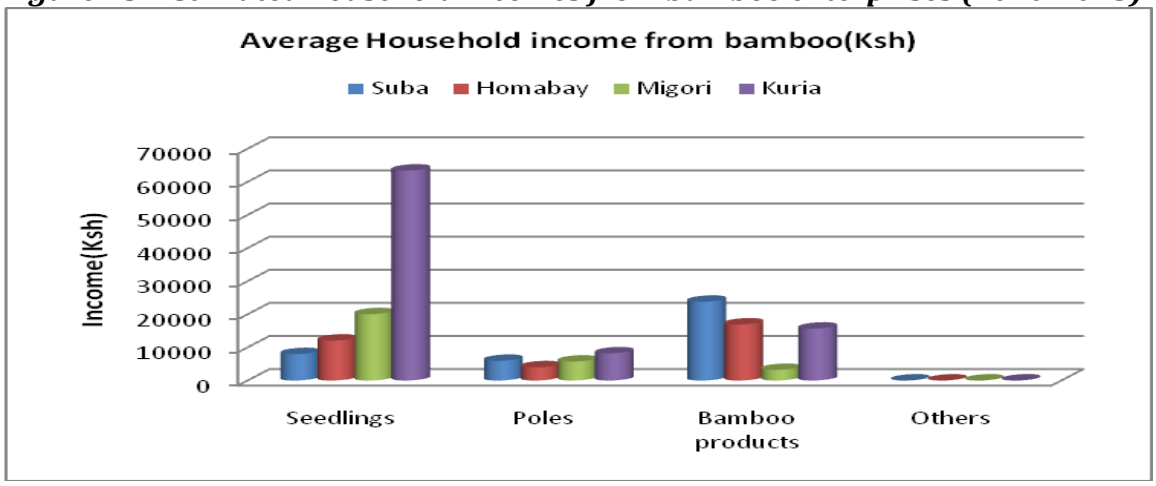


Figure 14: Expenditure of income from bamboo enterprises

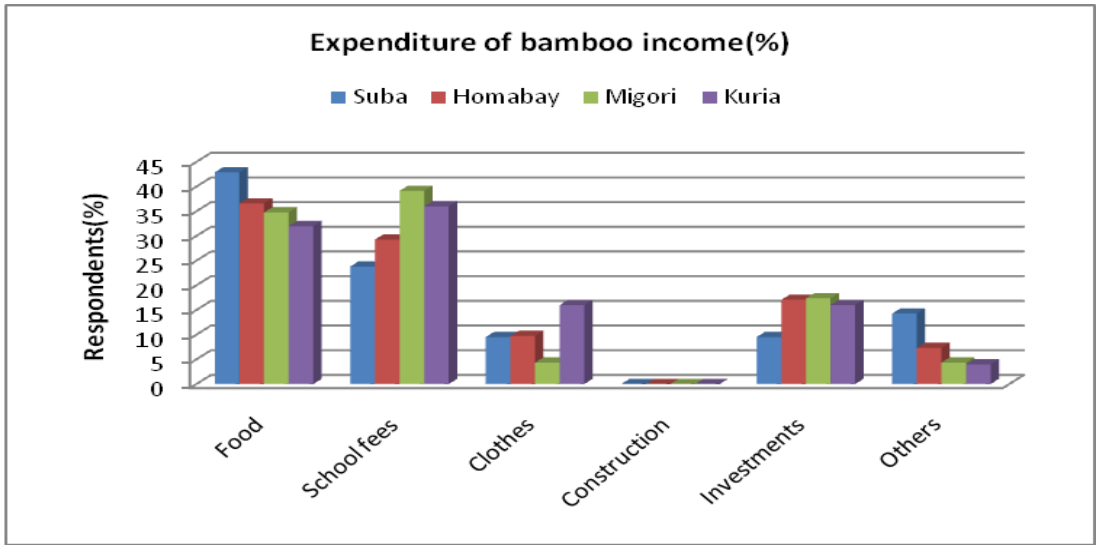


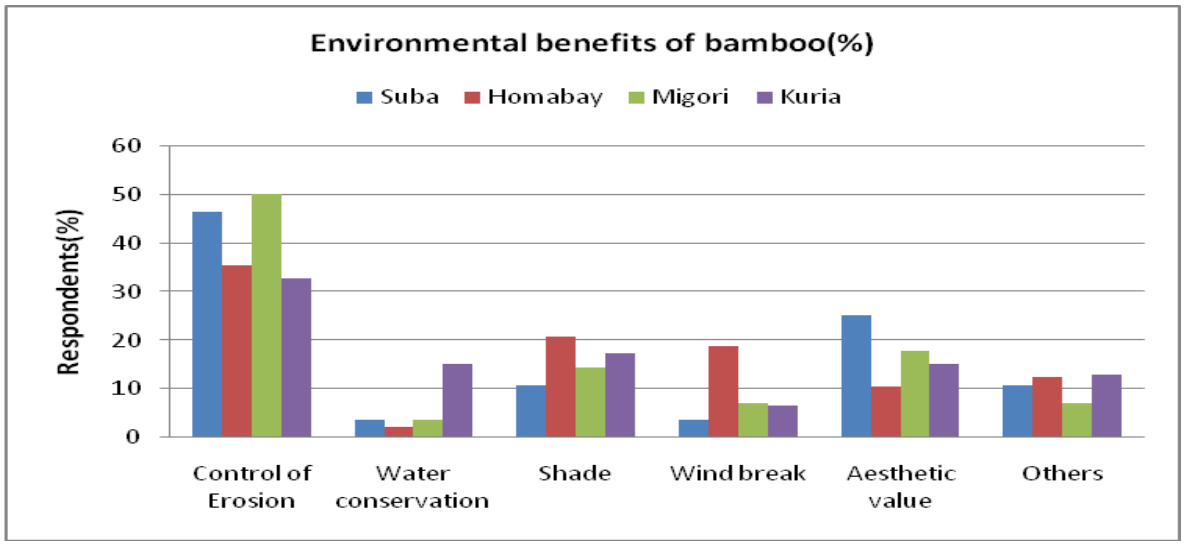
Plate 3: Bamboo farmers' investiments motor bikes and fish pond financed from incomes from bamboo production (Kuria and Homa Bay)

Plate 4: Bamboo farmer with his wife with domestic entertainment electronics purchased from incomes from bamboo prodcution(Kuria)

5.10.8 Environmental benefits of bamboo farming

Over 35% of project beneficiaries indicated that control of soil erosion was the main environmental benefit evident in all sites (Figure 15). On farms, canopy closure and rooting systems also reduced on–farm surface run-off. On river banks, bamboo were found to strengthen the embarkments thus reducing soil erosion.

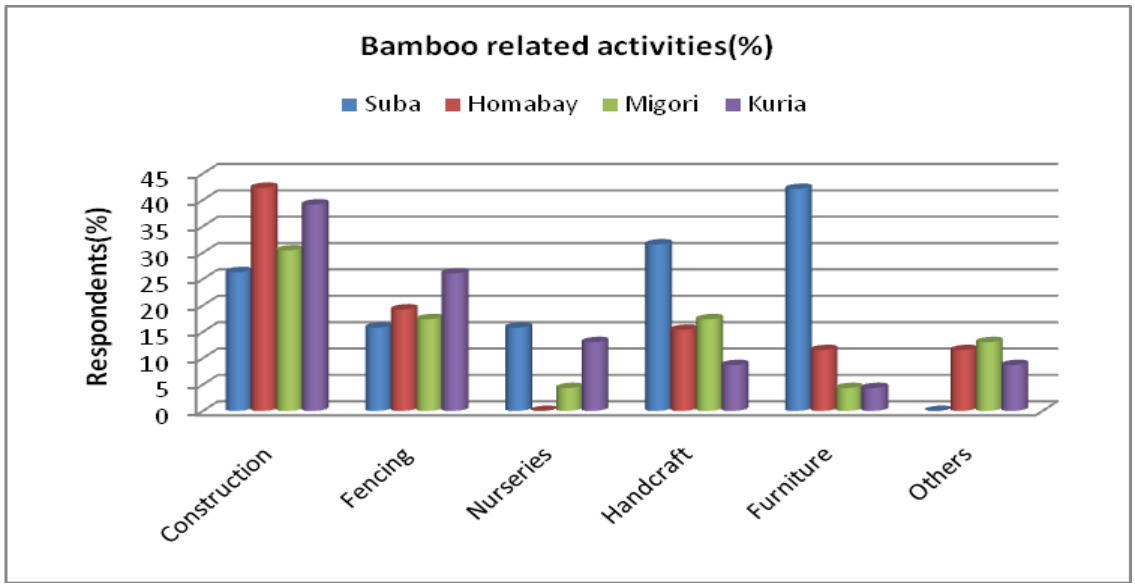
Figure 15: Environmental benefits of bamboo farming



5.1.1 Bamboo project spill-over effects

Locally initiated bamboo related developement activities are taking root in the study sites (Figure 16). The most traditional bamboo uses such as construction and fencing seem to be taking the lead commanding over 26% and 15% of the industry shares, respectively. Bamboo handcraft and furniture making are also taking root. As the production, processing and marketing innovations become developed with time, more chain participants will come into play thus leading to more additional bamboo rural industrial activities. Researches among university students on bamboo growth, production and processing is also on the rise in the country due to the awareness created by this project.

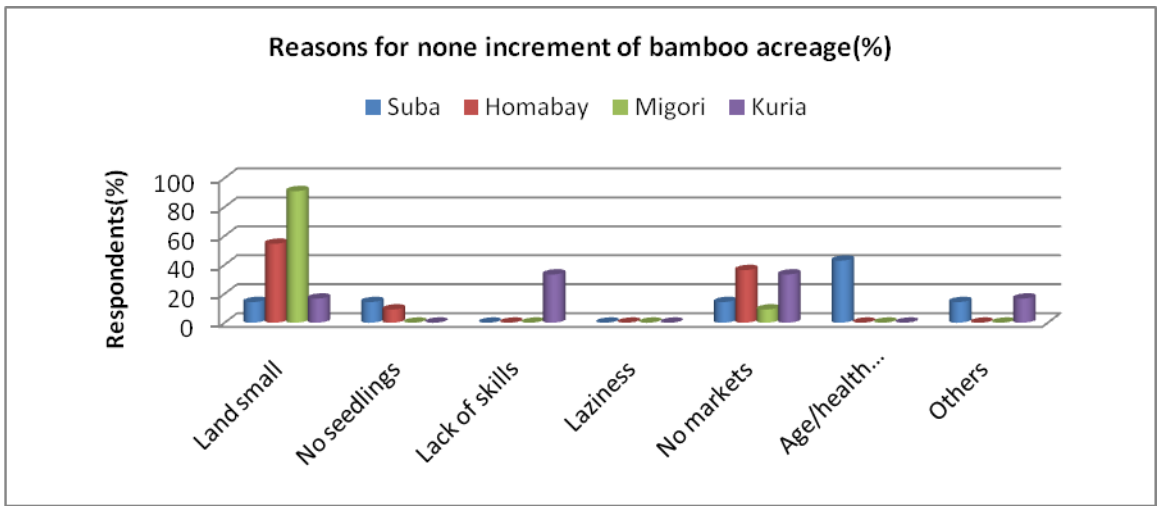
Figure 16: Emergence of rural bamboo industry related activities



5.10.9 Challenges to expansion of bamboo cultivation

In reference to Figure 17, lack of land for bamboo farm expansion was a major challenge given by the farmers. The land issue was high in Migori (90.9%), probably due to the high populaton density of the site due to the neighbouring Migori town. Other major challenges from the respondents included lack of market for bamboo products and by-products, followed by the competitive ability of bamboo on-farms with other crops for nutrients and space. This was atrributed to non-control of bamboo rooting systems in some farms. A ban on bamboo harvesting in 1986 distorted the market chain. This is currently being addressed through policy changes, but the process has been very slow due to prioritization of Government programs. It is likely that as more farmers and investors take into bamboo farming, processing and marketing, the value chain will be streamlined and become fully functional.

Figure 17: Reasons for non-increment of bamboo acreage



5.10.10 Challenges facing bamboo farmers' cooperatives

During the four (4) Focussed Group Disccussions (FGDs) held to evaluate the project activities in May-June 2013, the farmers listed the following as the major internal challenges that are facing their cooperatives.

- Cooperative politics and wrangles among the members and different local clans
- Inadequte cooperative financial management skills
- Limited knowledge among the members on roles and functions of cooperatives
- Poor communication skills among the cooperative officials and members
- Lack of market for bamboo seedlings, poles and finished products
- Lack of financial resources to support bamboo workshop activities, expansion of farms and nurseries developement
- Indequate bamboo treatment technology and skills among the artisans

The key external challenges to the cooperatives identified during the project evaluation include the following:-

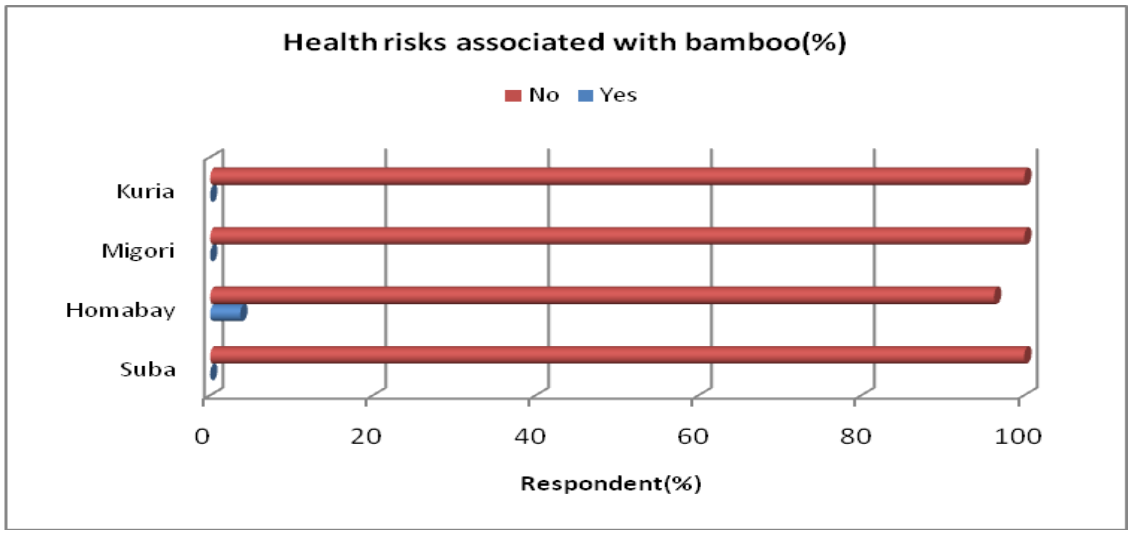
- Lack of national government policy or strategy on bamboo industry development
- Lack of a developed bamboo value market chain system in the country
- Global climate change and its local vulnerability effects
- Lack of a National or County Government offcial policy on bamboo and other alternatives to tobacco

It was the opinion of the farmers that IDRC or any other parner willing to support their bamboo initiatives in future should focus on the above internal and external problems.

5.10.11 Health risks of bamboo farming

One of the assessment indicators was to understand whether the introduction of bamboo had any health risks to local farmers. Unlike the case of tobacco farming which is assciated with a lot of heath problems, respondents during the evaluation of the bamboo project indicated that bamboo farming is almost a 100% health risk-free enterprise (Figure 18). The few risks mentioned included injury by bamboo leaves if protective gears are not worn and chances of encountering snakes in the clumps when best farm management practices such as weeding are not implemented.

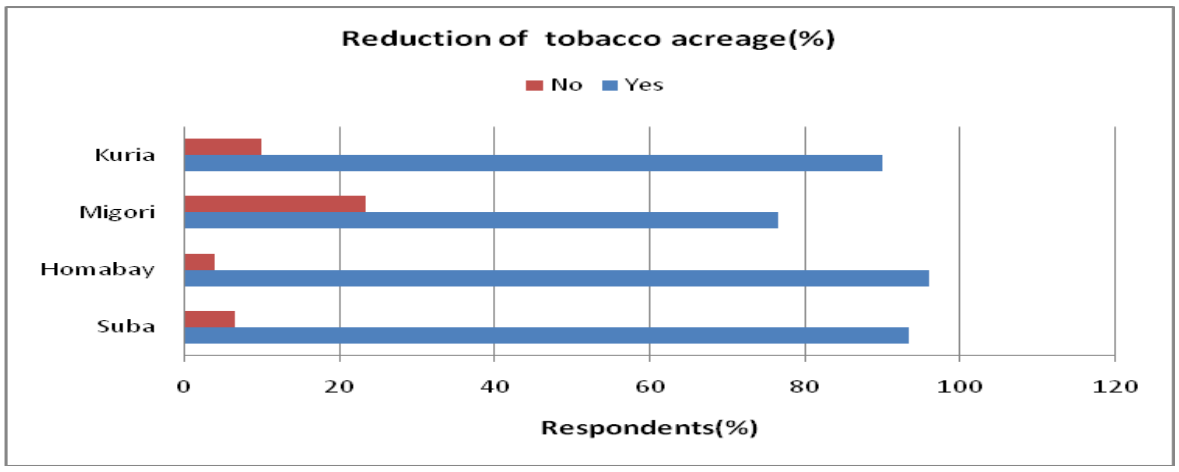
Figure 18: Health risk of bamboo farming



5.10.12 Impact of the project on land acreage under tobacco

Generally, the land under tobacco among the average majority of the residents (over 76%) respondents has been on decline (Figure 19). This was attributed to a shift from tobacco to bamboo among the project beneficiaries. This is expected to continue as bamboo production, processing and marketing innovations get advanced. Continued adoption and diffusion of bamboo innovations is also expected to result to a complete shift from bamboo to tobacco.

Figure 19: Impact of the project on land acreage under tobacco



5.10.13 Contrast of bamboo and tobacco farming enterprises

When farmers were asked to give their general opinion on the contrast between bamboo and tobacco, the majority (over 76%) in the study area were of the opinion that investiment in bamboo production was a better alternative than tobacco

farming (Figure 20). This was attributed to the many health risks associated with tobacco. However, in Kuria, 23.8% of the respondents viewed tobacco as a better option than bamboo; an observation attributed to the links between tobacco and Kuria people's long-time culture and availability of ready market for the tobacco leaf.

Those who supported bamboo atributted it to better incomes as indicated ealier and low labour demands as shown below in Figure 21. Labour inputs in bamboo investments were generally low because of few management practices required by bamboo farming. On farms, once clumps have established and weeding has been done, the bamboo plants can survive on their own with very minimal human labour inputs.

Figure 20: Bamboo and tobacco farming enterprises contrasted

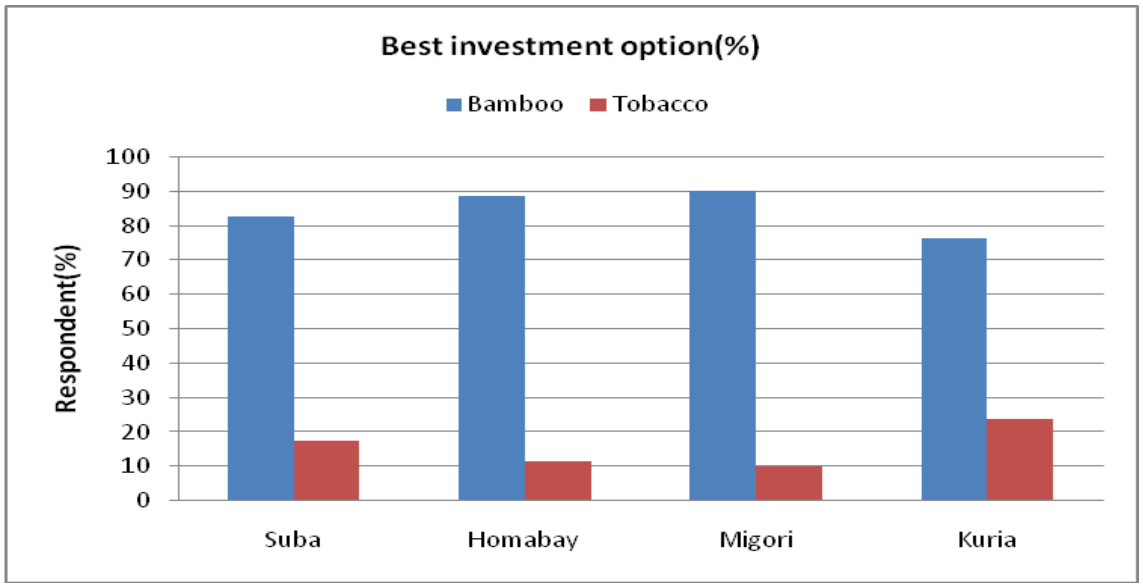
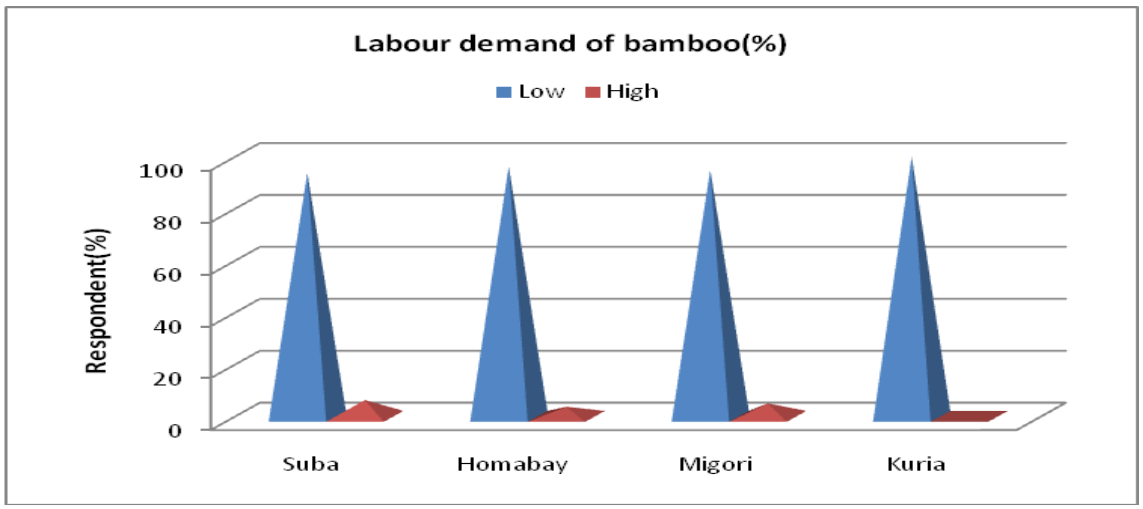


Figure 21: Labour demand



5.10.14 Impact of the project on tobacco farming

Assessment of the impact of the project on the objectives of the project, found out that over 73.8% of farmers that joined the project as tobacco farmers in 2006, had abandoned the activity and switched to bamboo and other viable alternatives in the areas. More tobacco control effort and focus needs to be put in Kuria where tobacco farming has taken deep roots. They attributed this successful change to the introduction of bamboo in the area and tobacco-control awareness programs undertaken through the project among others. This gives clear evidence that implementation of Articles 17 and 18 of the FCTC have great potential of success in Kenya and other African countries that depend on tobacco farming.

Table 4: Farmers who have abandoned tobacco farming during project (2006-2013)

Cooperative Name	Number of tobacco farmers at the start the project (2006)	Current No. of tobacco farmers (2013)	% Change
Suba Bamboo Farmers' Cooperative Society Ltd	30	0	100
Homa-Bay Bamboo Farmers' Cooperative Society Ltd	18	4	77.8
Kuria Bamboo Farmers' Cooperative Society Ltd	58	27	53.4
Migori Bamboo Farmers' Cooperative Society Ltd	16	1	93.8
Total	**122**	**32**	**73.8**

5.10.15 Reasons for the Success of the project

Factors behind the success ***(see successful stories in Annex1)*** of the research project are:-

- Suitable location of research experimental sites, which are in areas with high concentration of tobacco farming activities. These were also the focal points where tobacco farming was established first before it spread to other areas.
- Positive grass root political will to control tobacco. Local leaders from the church, NGOs and popularly-elected councilors and Members of Parliament are very supportive of the initiative and they are actively involved at various project stages.
- Research project is action oriented.
- The research is integrated with other tobacco control strategies like advocacy and capacity building of stakeholders

- Application of a stakeholders' participatory (especially project beneficiaries) approach in the whole project cycle.
- Planning and scheduling of execution of activities is based on the local annual subsistence farming calendars by taking advantage of farmer availability
- Project organization is based on partnerships with clear roles in the project
- Technology transfer has been simple, planned & appropriate
- Integration of gender aspects at every stage through the provision of equal opportunities to men, women and youths (See Figure XX below).
- Inter-cropping of bamboo with vegetables, legumes, pepper and other horticultural crops in the first two (2) years of the experiment ensured that farmers had a constant source of income as they awaited bamboo to mature in the third year.
- Farmers have realized and embraced the idea that bamboo has multiple uses ranging from household, industrial, construction, handcraft, environmental, aesthetics, food, etc.

Some of the challenges that the project has faced over time and how the actions undertaken to address them is outlined below:-

Table 5: Summary of key challenges that faced the project and actions taken

CHALLENGE	ACTION UNDERTAKEN
Increased demand of bamboo seedlings by tobacco farmers willing to shift	• Initial beneficiaries (phase one farmers) were trained on bamboo propagation skills and started nurseries at the family level and currently sell seedlings to new farmers
Marketing of bamboo products	• Formation and capacity building of four (4) bamboo farmers cooperatives. • Market surveys were carried out and business plans developed for implementation • Development of a bamboo market value chains for key products
Limited knowledge on bamboo production and processing/ utilization technology	• Transfer of technology from China especially by the International Network of Bamboo and Rattan-INBAR • Training on farm preparation, farm management, harvesting and processing/ utilization by project staff and partners by INBAR and and Kenya Forestry Research Institute, KEFRI) throughout the project cycle

Farmers group dynamics & sustainability	• Establishment of long-term linkages with relevant Government Agencies and Ministries • Trainings from Government Ministries of Agriculture, Cooperatives and Social Services • Create ownership of the project initiative through application of a participatory approach at every project stage • Local provincial administration officials like Chiefs and village elders were recruited as project members
Development of a sustainable market chain for bamboo products	• Formulation of the National Bamboo Industry Development Strategic paper by the Ministry in-charge of forests and other key stakeholders for government approval and implementation • Future plans to establish the National Bamboo Development Program (NEBADEP) by the Ministry of Forestry through technical support by the research project staff
Lack of government and global guidelines and farmer-support mechanisms/ policies on the shifting process from tobacco to bamboo	• Drafted policy brief on alternative crops to tobacco • Drafted policy brief on bamboo as alternative crop to tobacco • Use of WHO draft guidelines on alternative crops to tobacco • Participation of government officers in the various project stages and development of relevant participatory policy briefs

5.10.16 Proposals for future research, support and development

The farmers' FGDs made the following suggestions for future follow-up and sustainability of the bamboo cultivation and production as an alternative livelihood to tobacco initiative:-

- To build capacity of cooperative officials and farmers on cooperative management matters.
- Establishment of well-equipped and strategic bamboo processing centre (s) for the South Nyanza region.
- To develop and support a sustainable marketing system through detailed, wider and continuous market research for bamboo products trade in Kenya, the East Africa region and world-wide.
- Cooperatives to establish bamboo marketing showrooms in major cities in Kenya
- Financial and technical support to additional farmers to grow bamboo as an alternative crop to tobacco in order to meet the economies of scale.
- To support advanced trainings to architects and some bamboo users in the construction and housing sectors in the country.
- To support the diversification and improvement of tobacco farmers' incomes through value-addition initiatives to local agricultural produce like cereals (maize, sorghum and millet), legumes (especially beans and soya beans), tubers, and some horticultural crops.

6.0 PROJECT IMPLEMENTATION AND MANAGEMENT

This section of the report outlines the activities supported during Phase II of the project and general project implementation and management issues. The following are project components supported:-

1. Establishment and monitoring of bamboo nurseries for seedling production and enterprise diversity in the South Nyanza Region.

2. Assessment of relevant cooperative marketing systems in Kenya and identification of best practices that should be replicated in the upcoming bamboo industry for former smallholder tobacco farmers.

3. Feasibility studies of five (5) prioritized marketable product-chains (i.e. bamboo seedlings, bamboo handcrafts, bamboo furniture, bamboo housing and bamboo toothpicks industry) in the country.

4. Development and implementation of a communication strategy for the project in order to effectively disseminate the outputs of the project.

5. Study the household livelihood strategies used by tobacco and non-tobacco farmers in the other two tobacco farming clusters in Kenya in order to develop acceptable national policy briefs on alternative economically viable crops and livelihoods.

6. Building capacity of staff and farmers in tobacco control through alternative livelihoods.

7. Environmental auditing of tobacco farming activities in South Nyanza Region for purposes of evaluating their compliance level and policy formulation.

8. Project evaluation to determine its impact on livelihoods of smallholder tobacco farmers.

While research was the foundation of this project, capacity building of both farmers and project staff remained fundamental and continuous throughout this project in order to achieve the goal and vision of the project in the long term. The role of INBAR and KEFRI in capacity building, especially to the farmers, remained very useful in achieving the goal of the project. The Ministry of Cooperatives proved useful in continued ownership and strengthening of the newly established bamboo cooperatives by supervising their activities and training the officials in management and record keeping skills.

Despite minor adjustments, the general research methodology for all study objectives generally remained unchanged as per the approved proposal. In terms of the project administration, all the key research team (except students/ research assistants) and collaborators remained intact and active in their roles. During the project period, there was a budget supplement to support one PhD student in terms of fees and other study expenses and support for a professional handcrafts training. The project period was also extended for an extra of six months from 18th December 2012 to 18th June 2013 to ensure completion of all planned activities. This was

caused by the harmonization of SEKU financial reporting system with that of IDRC to ensure accurate financial reporting.

7.0 PROJECT OUTPUTS

During the project period December 2009-June 2013, the following were the major outputs:-

1. Increased capacity of project farmers and staff in performance of their project activities

2. Capacity building of project staff, especially four (4) masters and three (3) PhD students that are undertaking various studies relevant to the project objectives.

3. Further enhancement of partnerships between the project and Government line Ministries/ Offices of former Prime Minister, Agriculture, Health, Industrialization, Cooperatives and Environment.

4. Continued dissemination of project outputs through internet. The project regularly updated the project website, *www.tobacccotobamboo.org*. The web has information on the project vision, objectives, research approaches and methods, outputs, partners/ collaborators/ stakeholders, technical reports and other resources. The website is linked to other important websites of project stakeholders.

5. Created more awareness on the cultural, socio-economic, environmental and health impacts associated with tobacco production through local, national and international meetings.

6. Increased awareness on the need for tobacco farmers to change to alternative crops, e.g. bamboo and other livelihood strategies to control tobacco production, protect the environment, human health and reduce poverty levels in the tobacco farming regions.

7. Development of three (3) draft Policy Briefs ready for discussion by key tobacco control stakeholders in Kenya in August 2012: the First Policy Brief is on the *"Need for Alternative Crops to Tobacco Farming in Kenya"* , second Policy Brief is on *"Bamboo as a Sustainable Alternative Crop to Tobacco in Kenya"* and finally *the third one is on "Tobacco and Environmental Compliance in Kenya".*

8. The project developed a complete service model of *inputs, financing, training, farm* and *market education, value-chain development* and *crop insurance* — that will help farmers switching from tobacco to other alternative crops and to increase their farm incomes per acre.

8.0 DISSEMINATION OF PROJECT OUTPUTS

For the whole of Phase II of the project, dissemination of research outputs was carried out through reports, conferences, meetings/ events/ workshops,

publications and internet. A summary of dissemination activities supported by the project directly or indirectly are as outlined below.

Table 6: Summary of dissemination activities

Type of Dissemination Activity	Number achieved
Interim Project Technical Report	05
Papers and chapters published in International refereed Journals and Books	04
Draft papers for publication in International refereed Journals	06
International Conferences/ Meetings	10
Local Conferences / workshops	06
Public/ Cooperative meetings/ events/ Focused Groups Discussions (FGDs)/ Community Forums	32
Draft Policy briefs	03
Website updating	Continuous

9.0 PROJECT IMPACT

This project has recorded its impacts at the grassroots, national, regional and international levels as outlined below:-

- At the national level, the project through its research papers, dissemination of information and close collaboration with the Ministry of Health, it has greatly influenced the prioritization of Articles 17-18 by the Kenyan Government policy makers whose focus has been more on tobacco consumption control. The participation of project staff in national tobacco control forums and project results advised on the prioritization of tobacco alternatives in the drafting of the Kenya National Policy on Tobacco Control of 2012 by the Ministry of Health.

- The number of visitors (local and international NGOs officials, researchers, leaders, government departmental officers and agencies, school children and community members) to the cooperatives reached about 850 during the last three years. This indicates the impact of the project at the regional and national level.

- Government Ministry officials have been inviting the project farmers to participate in local, regional and international Agricultural Shows/ Trade fairs on bamboo as an alternative crop to tobacco. One case is where one artisan was partially supported by the Ministry of Industrialization and the project to attend an international exhibition in Kigali City in Rwanda.

- Over 73% of former tobacco farmers that participated in the project have switched to bamboo cultivation and other viable alternative crops after

abandoning tobacco. This is a very high successful rate for project replication in future.

- At the Sub-Saharan level, the Project Leader was nominated as a Committee member of the *"Committee to Build Leadership to Address the Negative Effects of Tobacco on Africa's Health, Economy and Development*" whose activities will run in two years, 2013-2014. This committee is charged with producing an evidence-informed, authoritative, tobacco control policy document that summarizes the evidence on the negative effects of tobacco on Africa's health, economy, and development and recommends tobacco control strategies for Africa. This document will be jointly published and issued by the African Science Academies and launched at the Africa Union's Ministers of Health Meeting in 2014. Ultimately, the committee will steer this continent-wide effort to produce an evidence-informed tobacco control policy document to engage and mobilize Africa's political leadership to elevate the importance of tobacco control in Africa.

- At the international level, the project outputs greatly influenced and informed the *"Draft policy options and recommendations on economically sustainable alternatives to tobacco growing in relation to Articles 17 and 18 of the WHO Framework Convention on Tobacco Control*) during the Geneva, Switzerland meeting held on 14–16 February 2012.

10.0 CONCLUSIONS AND RECOMMENDATIONS

This section has been divided into three parts: key conclusions, recommendations and way forward.

10.1 Key conclusions

Based on the specific objectives of the study, the following conclusions were reached:-

- The household livelihood strategies used by tobacco and non-tobacco farmers in various tobacco farming clusters in Kenya indicate that tobacco is a major cause of rural poverty, poor health and environmental degradation in tobacco farming zones. The forms a strong foundation in developing acceptable national policies on alternative economically viable crops and livelihoods to tobacco farmers.

- Detailed environmental audit concluded that Tobacco Companies' (TCs) environmental compliance level to NEMA, WHO standards and world best farming practices is dismal at 11.6%. This poor performance portrayed a total disregard of good environmental practices in tobacco farming activities.

- Establishment of bamboo nurseries for seedling production and enterprise diversity should be promoted at the family level rather than at the group / cooperative level because it promotes competition among the farmers. It is also the best rewarding to individual farmers, hence motivating them. However,

marketing of seedlings should be done at the Cooperative/ Group level to reduce marketing and transportation costs.

- The handcraft cooperative marketing systems in Kenya have best practices that should be replicated in the upcoming bamboo industry for former small-holder tobacco farmers. For this transition to fully succeed, a lot of capacity building and support will be required in future to ensure that farmers leap maximum benefits from the bamboo investments. The bamboo enterprises will also need to diversify their activities to sustain their incomes.

- Bamboo feasibility studies indicated that bamboo handcrafts will give the highest returns followed by other product-chains (i.e. bamboo furniture, bamboo seedlings, bamboo housing and bamboo toothpicks industry). All these ventures will require adequate capital investments to promote the cultivation, treatment, processing and marketing of bamboo final products and by-products.

- The development and implementation of the project communication strategy proved to be an effective instrument for dissemination of project outputs. This has led to successful project positive impact to tobacco control policy formulation and other tobacco control efforts at national, regional and international levels.

- Building capacity of farmers and young scientists/ scholars in tobacco control through alternative livelihoods will have long-term benefits in tobacco control efforts in the country and the African region. The study concluded that when capacity building of beneficiaries and young scholars is integrated with an action oriented research project, the outputs and outcomes are tangible even in short periods.

- The project evaluation exercise concluded that over 73% of former tobacco farmers that participated in the project have switched to bamboo cultivation and other viable alternative crops after abandoning tobacco in the last six (6) years. This is a very successful rate for project replication of similar programs in future.

10.2 Policy Recommendations

- Due to low environmental and CRS compliance levels by local Tobacco Companies, there is need for more scientific research on key areas that include: impact of tobacco farming on food security and environment; application of pesticides and agrochemicals used in the farms; Occupational Health and Safety among tobacco farmers; and Corporate Social Responsibility practices used locally by Tobacco Companies.

- Apart from bamboo there is need to research on other viable alternatives (like cereals (maize, sorghum and millet), legumes (especially beans and soya beans), tubers, and some horticultural crops) to tobacco based on lessons learned from this project.

- There is need for development of a national policy and program and guidelines on sustainable alternative crops/ livelihoods to tobacco farming to implement Articles 17 and 18 of FCTC. The program should concentrate on smallholder farmers by providing them a complete, functioning market system – making it possible for even the poorest and most vulnerable rural farmer to generate more and sustainable incomes, and solve their food insecurity problems. The program must provide farmers with a complete service model of— *inputs, financing, training, farm* and *market education, value-chain development* and *crop insurance* — that helps them to increase their farm incomes per acre for bamboo and other alternative crops to tobacco. This should aim to support the diversification and improvement of tobacco farmers' incomes through value-addition initiatives to local agricultural produce.

- The Kenya Government also needs technical support to develop national regulations to enhance implementation of Articles 17 and 18 of WHO FCTC in order to promote alternative crops to tobacco and also protect the environment. The existing Tobacco Control Act (2007) is deficient in that it does not have detailed provisions for regulating tobacco crop production. Close examination of the Act reveals that it does not deal with regulation of tobacco farming activities thereby creating a serious policy gap that needs to be filled up.

- Due to the establishment of 47 County Governments in Kenya, most agricultural programs have been devolved to the County level from the National Government. Since newly established County Governments have a constitutional mandate to make their own policies and laws based on national guidelines, this development creates a major opportunity for Tobacco Control in the country. There is need for shifting the focus to the key eight (8) County Governments (Migori, Homa Bay, Bungoma, Busia, Trans Nzoia, Embu, Meru, Tharaka Nithi) hosting tobacco farming in the country by providing them with technical support to develop individual tobacco control policy and legal instruments focusing of Articles 17 and 18 of FCTC. These policies will have to be approved by relevant County Assemblies which also require awareness on WHO-FCTC, Global efforts in tobacco control and the Kenya Tobacco Control Act, 2007.

10.3 Way Forward

This project has demonstrated great potential in providing technical advice and support to the implementation of Articles 17 and 18 of WHO-FCTC at local, national, regional and international levels. It is strongly recommended that IDRC and other partners should consider supporting one more phase (Final Phase) of this project for a period of 3-4 years with a clear focus on three areas: *1) bamboo market value chain development, 2) scientific research on tobacco and its impact on food security, and environment, and finally 3) policy development at National and County Government levels.* This will lead to final realization of the Vision of this project as envisaged in previous technical reports.

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Annex 1: Successful stories by project beneficiaries

SUBA BAMBOO FARMERS COOPERATIVE SOCIETY LTD

I am Joseph Owalla Orwanda 75 years Old from Ong'aya village, Suba District. Before the tobacco to bamboo research project was introduced in Suba, I was a tobacco farmer. Tobacco farming was labour intensive and time consuming. The income from tobacco was too little to meet my family's expenses. Due to spending too much time cultivating tobacco, I had no time to plant other crops and my family suffered of hunger most parts of the year. I always fell sick due to constant coughs and allergies I contacted during tobacco harvesting and curing process. Therefore, the little money earned from tobacco had to cater for my medical expenses, leaving me with nothing and impoverished. I stopped being a tobacco farmer after the introduction of tobacco-to-bamboo research project in Suba because I realized that bamboo is less laborious and requires little time and attention compared to tobacco. I now have time to cultivate other crops such as sunflower, millet, sorghum and maize. My life has since changed positively as I am able to feed my family throughout the year and pay school fees with the money earned from selling bamboo seedlings. Moreover, my health condition has improved since then as I don't come in contact with tobacco and its toxins.

I am Daljius Wakiimba, 55 years of age from Sindo, Suba District. In 2006, Maseno University and IDRC introduced me to bamboo farming. I was trained on the importance of bamboo and how it can improve my living standards economically, socially and health wise. This made me develop an interest to plant bamboo, hence I started growing both Giant and Bambusa species using seedlings given to farmers by the project. As Suba Bamboo Farmers' Cooperative Society, we were lucky enough to get a space to plant a variety of seedlings at the Sindo Forest seedling nursery station in 2007; however, members bowed out and I have been left alone since then. I have grown a number of bamboo seedlings which generate good income. I am now able to pay schools fees for my children and save some money to cater for other family expenses. Moreover, as a result of being a bamboo farmer, I got opportunities to travel to Mombasa and Migori to attend exhibitions for further training and gaining of experiences from other people's successful stories, and this has motivated me to work harder and be among the best bamboo farmers in Suba.

My name is Titus Orimba aged 35 years old from Sindo Market, Suba District. I first became a bamboo farmer in 2005, when the Tobacco-to-Bamboo Research Project was introduced in Sindo. Starting with 20 seedlings given to me by the project on a 0.125 acre piece of land, my bamboo farm has since increased and it covers 0.5 acres of land and this holds 18 clumps of bamboo. I attended training in 2008 funded by the project on how to make furniture. I also attended other trainings on handcraft making supported by the project in 2011. 2012 was a good year for me because through the project's support I trained on how to make sofa sets and I have received a great number of orders from clients for making sofa sets and other furniture for hotels, restaurants and homes. This has enabled me to earn good income and I have now opened my own workshop where I make furniture, mats, cups, necklaces, trays, masks and other bamboo utilities and I get a very good income from the sales. I can now afford to give my family a good life, take my children to school and buy luxuries

that I always admired to own before I became a bamboo farmer. I have also been to a number of exhibitions in Kisumu to gain skills on how to make products such as baskets from bamboo. I recently attended an Exhibition in Bujumbura Burundi this year, 2013, where I met other artisans from different countries who make different products. I marketed and sold all the bamboo products I had carried. This made me realize that bamboo has a good market internationally, which really motivated me. I have a variety of bamboo seedlings on my nursery worth Kshs.150, 000 which upon selling will enable me buy materials to build a house.

HOMA BAY BAMBOO FARMERS COOPERATIVE SOCIETY LTD

I am Clement Odoyo, 45 years old from Rangwe. I first sold bamboo seedlings worth ksh. 10,000. I used Ksh. 5000 to clear the school fees balance and Ksh. 5,000 to buy timber for building my house. Moreover, I sold bamboo poles and the money I acquired I used to start a brick-making business which is doing well. I have also bought electronics such as Television, radio and home utensils from the money I earned after selling bamboo products. I now have seedlings worth Ksh. 30,000, which I am hoping to sale very soon and pay school fees for my children. Additionally, I have attended trainings on how to make bamboo products and I have a plan of starting to make my own sofa sets and a bed.
I now own my own workshop, and from the trainings, am able to make a number of bamboo products such as trays, pen holders, cups and other utensils which I sale during the market days and get money to buy food for my family. Unlike tobacco which you have to wait until the end of the season to earn income, with bamboo you can earn money anytime so long us there is market for the products.

My name is Cyprin Odero, 40 years of age from Rangwe. I first started bamboo farming in the year 2006. Sometime later, I sold seedlings from my nursery. I spent the money on food and household goods. The remaining money I bought poultry, around 10 hens. This poultry has been my source of income and food for my family. I supply chicken to most hotels in Rangwe and most residents buy chicken and eggs from me. I am able to pay school fees for my children from the money I earn from the poultry business but of course I supplement it with the earnings I get from bamboo seedlings and poles.
I have used bamboo poles to build a poultry house. The entire racks inside the poultry house are made of bamboo and where the chickens lay eggs is made of bamboo too. I know have over 50 chickens and other poultry. My entire home is now fenced with bamboo and this has enabled me save money which otherwise I would have used to buy trees for fencing my compound.

My name is Peter Osuka, the chairman for Homabay Bamboo Cooperative Society and a resident of Rangwe village, Homabay County. Starting with 20 seedlings given to me by the project, I later added 14 more bamboo seedlings on my farm meaning my bamboo farm has expanded from its original size. In the year 2010, I sold 80 seedlings and made a profit of Ksh. 8,000 which I used to venture into aquaculture business. I started with a small fish pond and a few fingerlings. I sold more bamboo seedlings and by the year 2012, I had four fish ponds. In the same year 2012, I was able to have two fish harvests. In the first harvest I got a profit of Ksh. 80,000 and in

the second harvest I got a profit of Ksh. 140,000. The money I got from the sale I used it to buy a taxi car in 2012. Since I was the only one with the taxi in the village, I earned a lot of money from the transportation business and decided to add another taxi in 2013. My children have never been chased out of school due to lack of school fees, thanks to the bamboo project. I can provide basic needs for my family without straining financially. I thank God for giving me the opportunity to farm bamboo because it has helped me revive my livelihood which had gone down after I became an active participant in the local politics as an area Councilor.

KURIA BAMBOO FARMERS COOPERATIVE SOCIETY LTD

My name is Samwel Chacha Mwita. I was once a tobacco farmer who later resorted to another alternative to tobacco since it was labour intensive and time consuming and yet what I reaped at the end of the season was less compared to the inputs. It is only in bamboo farming where you invest little money and effort and reap maximum profit from the produce. In January 2013, I sold 2,000 seedlings at a price of ksh. 125,000 and in, June 2013, I have sold seedlings worth ksh. 30,000. I have paid school fees for my children who are in College and high school. From the bamboo earnings, I was able to get electricity connection for my home, bought a television set, a radio and other household goods. I have been able to earn over Ksh. 200,000 since last year from bamboo seedlings, the money that I was not able to earn when I was a tobacco farmer despite putting so much effort. The maximum profit I have ever earned from tobacco farming was Ksh. 20,000. I would like to urge my fellow bamboo farmers to work hard and not to wait for the project to find a market for them. Bamboo is a profitable crop and has multiple uses. Farmers can learn how to make bamboo products and sale them locally. I am even ready to train those willing to learn on how to produce bamboo seedlings.

I **am Henry Tegere, the Kuria cooperative manager**. I'll give a successful account of one of our best farmers Mzee Naftali who is now imprisoned for a misunderstanding with a fellow clansman. He was a dedicated farmer, very hardworking with a variety of bamboo species on his farm. He has the most beautiful and well established bamboo farm in the region. His bamboo farm has increased and he sourced for other bamboo species from different parts of the country to plant on his farm. In 2006, Naftali sold bamboo seedlings worth Ksh. 45,000 from which he bought a television set, a radio and paid school fees for his children. Mzee Naftali later sold seedlings worth Ksh. 75, 000 and bought three cows, two ploughs, a bicycle, mattress, bed and the remaining money he paid for school fees. I witnessed his life tremendously change after he stopped farming tobacco and concentrated on bamboo production. Just recently, his family sold bamboo poles worth Ksh. 25,000 and paid school fees for the children and gave Mzee Naftali the remainder for his upkeep in Prison. If only Naftali was out, his bamboo farm would have increased from one acre to 2 or 3 acres. However, the bamboo on his farm is not properly managed by the sons because of his absence.

My name is Thomas Mahiri aged 58 years old, I started planting bamboo in 2006. I began with 20 seedlings. I have since increased from 20 to 105. I attended several workshops both in Ikerege and Migori in the year 2007. I also have a bamboo

nursery. In the first sale; I sold 4000 seedlings and earned a total of Ksh. 30,000 I later sold 3000 seedlings and earned Ksh. 300,000. I have also sold 50 bamboo poles to a secondary school which earned me an income of Ksh. 7500 and another sale of 100 bamboo poles that earned me Ksh. 15,000. From the sales, I was able to buy a dairy cow, a bull for ploughing , cleared all school fees for my children and bought a motorbike to ease my movement in the area. To be honest, since I started growing bamboo, my life has taken a different direction; I can now afford almost everything I have always wished to have. If you come to my home, my compound is beautifully fenced using bamboo poles. I don't have to buy a wire mesh to fence my home, and this has reduced my household expenses. I sell the milk from the cow I bought from the bamboo earnings and this has enabled me to buy food for my family moreover supplement my family's diet. Bamboo farming has given me ample time to plant other food crops unlike tobacco which is time consuming and labour intensive. I have given free seedlings to relatives, neighbours and friends because they experienced the benefits of having bamboo on your farm. I will always be a bamboo farmer and I am even planning to expand my bamboo farm once the bamboo market is stable.

MIGORI BAMBOO FARMERS COOPERATIVE SOCIETY LTD

My name is Ebisiba Sarange, 37 years of age. I am a resident of Migori and a bamboo farmer. I have a bamboo farm comprising of Giant and Bambusa species. I was formerly a tobacco farmer and I spent a lot of money and time farming tobacco. I have a small piece of land which I had to give it up all to tobacco production, leaving no space for other crops. My family suffered from hunger and malnutrition. I immediately stopped farming tobacco after the project sensitized us on the effects of tobacco to our health and on the environment. I first sold 200 seedlings at a price of Ksh. 3000 and I bought a goat and three hens; right now as we speak the goat and the hens have multiplied to 5 goats and 20 hens which are already laying eggs. Sales from chicken and eggs supplement my income and the family's diet is also ensured. I have also built a cowshed for my goats and cows using bamboo poles; I also have a bamboo chair for my guests who visit me. I sell bamboo seedlings and poles and pay school fees for my children. All this I attribute to the project (Tobacco-to-Bamboo Research Project) that was introduced by Maseno University in collaboration with INBAR and IDRC.

I am Renina Otieno, 28 years Old, from Migori County. I was among the first bamboo farmers to be introduced to the project in the year 2006. I have reaped a lot of benefits from selling bamboo seedlings and poles, handicrafts such as trays, key holders, racks, table mats and flutes at an estimated price of Ksh. 40,000. I use the money to pay people to plough my farm and invest the rest in maize, tomato and kale farming. I have cut down my household expenses by not buying fuel wood since bamboo can be used as firewood. I have used bamboo to build racks for my kitchen, because they are strong and durable once treated. Very recently, I sold seedlings worth Ksh. 20,000 and started a Kiosk business. My Kiosk is built with bamboo (this has attracted my fellow business ladies and men who ask for a kiosk like mine for themselves, I think this is another business opportunity for me) Now I am an independent woman who doesn't wait for my husband to provide everything in the

house unlike some of my fellow women here in Ranguka village. Sometimes I help my husband to clear school fees for our children from the income I get from bamboo farming.

I Elekiah Oketch from Migori was among the first bamboo farmers in Migori when the project was introduced. During the first Phase of the project, I sold seedlings worth Ksh. 5000 and paid school fees for my children. During Phase II of the project, I constructed a bamboo house using the bamboo poles that were already mature. After treating the bamboo poles to protect them from being eaten by termites, I used them for roofing the house. I burnt charcoal last year December and I was able to produce 6 sacks out of the 6 bamboo poles. I sold each sack at a price of Ksh. 1000 each, this amounted to Ksh. 6,000. I bought household goods with the money and the remainder I paid school fees for my child who is in a private School. My home compound is fenced with bamboo. The fence is strong and this has enabled me to control the movement of domestic animals into my compound, who eat my bamboo seedlings. I usually split the bamboo poles for my wife who uses them as firewood. Bamboo fuel wood does not produce any smoke, hence I advice people to be using it because it is the best. I use bamboo in my tomato farm as rails and they are very useful. I have planted bamboo in one of my farms to control soil erosion which had eroded the soil in my farm for a long time. As I conclude, from my testimony, we all agree that bamboo has multiple uses. So far, it is the only cash crop that has more than one use, here in Migori. So I will like to urge all of us to continue growing bamboo in our farms and we will never regret it.

Annex 2: List of Outputs

A. Technical Reports

Four (4) interim progress reports (already submitted to IDRC and available at *www.tobaccotobamboo.org**)***

Kibwage J. K. ; Netondo, G. W.; Mutiso, F.; Magati, P.; Sitati, A; Boke, L. M; W. 2013. *Phase II Final Technical Project Progress Report on bamboo production as an alternative crop for smallholder tobacco farmer in the South Nyanza Region, Kenya.* SEUCO/Maseno University, Kenya.

Kibwage J. K. ; Netondo, G. W.; Mutiso, F.; Magati, P.; Sitati, A; Ndungu, P; Nyambeki; W. 2012. *Phase II Fourth Interim Technical Project Progress Report on bamboo production as an alternative crop for smallholder tobacco farmer in the South Nyanza Region, Kenya.* SEUCO/Maseno University, Kenya.

Kibwage J. K. ; Netondo, G. W.; Mutiso, F.; Magati, P.; Sitati, A; Ndungu, P; Nyambeki; W. 2012. *Phase II Third Interim Technical Project Progress Report on bamboo production as an alternative crop for smallholder tobacco farmer in the South Nyanza Region, Kenya.* SEUCO/Maseno University, Kenya.

Kibwage J. K. ; Netondo, G. W.; Arori, W.; Magati, P.; Chepkurui, A.; Sitati, A; Ndungu, P. 2011. *Phase II Second Interim Technical Project Progress Report on bamboo production as an alternative crop for smallholder tobacco farmer in the South Nyanza Region, Kenya.* SEUCO/INBAR/ Maseno University, Kenya.

Kibwage J. K. ; Netondo, G. W.; Arori, W.; Magati, P.; Chepkurui, A.; Sitati, A. 2011. *Phase II First Interim Technical Project Progress Report on bamboo production as an alternative crop for smallholder tobacco farmer in the South Nyanza Region, Kenya.* SEUCO/Maseno University, Kenya.

B. Scientifics Papers (Attached)

Magati, P.O., Kibwage, J.K., S. G. Omondi, G. Ruigu and W. Omwansa. (2012). *A Cost-Benefit Analysis of Substituting Bamboo for Tobacco: A Case Study of Smallholder Tobacco Farmers in South Nyanza, Kenya.* Science Journal of Agricultural Research & Management. ISSN: 2276-6375. Available online at: *http://www.sjpub.org/sjpsych.html*.

Kibwage, J. K; Netondo, G. Wafula and Peter O. Magati. (2013). *Substitution of Tobacco with Bamboo in Kenya.* Chapter in the IDRC Funded Book on Alternative to Tobacco-in Press.

Kibwage, J. K. (2012). Book Chapter: *Alternative Livelihoods to Tobacco Approaches & Experiences: Kenya Tobacco to Bamboo Case Study*. ISBN: 978-3-923020-59-1. FDCL-Verlag, Berlin, Germany.

Wilfred O. Arori, Jacob. K, Kibwage, Godfrey W. Netondo and Fredrick Onyango (2013). *A Markov Model for Bamboo Harvest Forecasting. Advanced Journal of Agricultural Research. In press.*

Kibwage J. K.; Kauti, M. and Muli, B. *(2013). Handcrafts Cooperative Marketing Systems and Best Practices in Kenya: Lessons for emerging Bamboo Enterprises in South Nyanza, Kenya. Draft almost ready for submissions.*

C. Policy Briefs (Under Review by Government Agencies- will be shared when ready in August/ September 2013)

First Policy Brief: *Need for Alternative Crops to Tobacco Farming in Kenya*

Second Policy Brief: *Bamboo as a Sustainable Alternative Crop to Tobacco in Kenya*

Third Policy Brief: *Tobacco and Environmental Compliance in Kenya.*