INTERNATIONAL JOURNAL OF RESEARCH IN COMPUTER APPLICATION AND MANAGEMENT

CONTENTS

CALL FOR MANUSCRIPTS

We invite unpublished novel, original, empirical and high quality research work pertaining to recent developments & practices in the area of Computer, Business, Finance, Marketing, Human Resource Management, General Management, Banking, Insurance, Corporate Governance and emerging paradigms in allied subjects like Accounting Education; Accounting Information Systems; Accounting Theory & Practice; Auditing; Behavioral Accounting; Behavioral Economics; Corporate Finance; Cost Accounting; Econometrics; Economic Development; Economic History; Financial Institutions & Markets; Financial Services; Fiscal Policy; Government & Non Profit Accounting; Industrial Organization; International Economics & Trade; International Finance; Macro Economics; Micro Economics; Monetary Policy; Portfolio & Security Analysis; Public Policy Economics; Real Estate; Regional Economics; Tax Accounting; Advertising & Promotion Management; Business Education; Business Information Systems (MIS); Business Law, Public Responsibility & Ethics; Communication; Direct Marketing; E-Commerce; Global Business; Health Care Administration; Labor Relations & Human Resource Management; Marketing Research; Marketing Theory & Applications; Non-Profit Organizations; Office Administration/Management; Operations Research/Statistics; Organizational Behavior & Theory; Organizational Development; Production/Operations; Public Administration; Purchasing/Materials Management; Retailing; Sales/Selling; Services; Small Business Entrepreneurship; Strategic Management Policy; Technology/Innovation; Tourism, Hospitality & Leisure; Transportation/Physical Distribution; Algorithms; Artificial Intelligence; Compilers & Translation; Computer Aided Design (CAD); Computer Aided Manufacturing; Computer Graphics; Computer Organization & Architecture; Database Structures & Systems; Digital Logic; Discrete Structures; Internet; Management Information Systems; Modeling & Simulation; Multimedia; Neural Systems/Neural Networks; Numerical Analysis/Scientific Computing; Object Oriented Programming; Operating Systems; Programming Languages; Robotics; Symbolic & Formal Logic; Web Design. The above mentioned tracks are only indicative, and not exhaustive.

Anybody can submit the soft copy of his/her manuscript **anytime** in M.S. Word format after preparing the same as per our submission guidelines duly available on our website under the heading guidelines for submission, at the email addresses, infoijrcm@gmail.com or info@ijrcm.org.in.

GUIDELINES FOR SUBMISSION OF MANUSCRIPT

1. **COVERING LETTER FOR SUBMISSION:**

DATED: _____

THE EDITOR

IJRCM

Subject: **SUBMISSION OF MANUSCRIPT IN THE AREA OF** _____.

(e.g. Computer/IT/Finance/Marketing/HRM/General Management/other, please specify).

DEAR SIR/MADAM

Please find my submission of manuscript titled '_____' for possible publication in your journal.

I hereby affirm that the contents of this manuscript are original. Furthermore it has neither been published elsewhere in any language fully or partly, nor is it under review for publication anywhere.

I affirm that all author (s) have seen and agreed to the submitted version of the manuscript and their inclusion of name (s) as co-author (s).

Also, if our/my manuscript is accepted, I/We agree to comply with the formalities as given on the website of journal & you are free to publish our contribution to any of your journals.

NAME OF CORRESPONDING AUTHOR:

Designation:

Affiliation with full address & Pin Code:

Residential address with Pin Code:

Mobile Number (s):

Landline Number (s):

E-mail Address:

Alternate E-mail Address:

2. **INTRODUCTION:** Manuscript must be in British English prepared on a standard A4 size paper setting. It must be prepared on a single space and single column with 1" margin set for top, bottom, left and right. It should be typed in 8 point Calibri Font with page numbers at the bottom and centre of the every page.
3. **MANUSCRIPT TITLE:** The title of the paper should be in a 12 point Calibri Font. It should be bold typed, centered and fully capitalised.
4. **AUTHOR NAME(S) & AFFILIATIONS:** The author (s) full name, designation, affiliation (s), address, mobile/landline numbers, and email/alternate email address should be in italic & 11-point Calibri Font. It must be centered underneath the title.
5. **ABSTRACT:** Abstract should be in fully italicized text, not exceeding 250 words. The abstract must be informative and explain the background, aims, methods, results & conclusion in a single para.
6. **KEYWORDS:** Abstract must be followed by list of keywords, subject to the maximum of five. These should be arranged in alphabetic order separated by commas and full stops at the end.
7. **HEADINGS:** All the headings should be in a 10 point Calibri Font. These must be bold-faced, aligned left and fully capitalised. Leave a blank line before each heading.
8. **SUB-HEADINGS:** All the sub-headings should be in a 8 point Calibri Font. These must be bold-faced, aligned left and fully capitalised.
9. **MAIN TEXT:** The main text should be in a 8 point Calibri Font, single spaced and justified.
10. **FIGURES &TABLES:** These should be simple, centered, separately numbered & self explained, and titles must be above the tables/figures. Sources of data should be mentioned below the table/figure. It should be ensured that the tables/figures are referred to from the main text.
11. **EQUATIONS:** These should be consecutively numbered in parentheses, horizontally centered with equation number placed at the right.
12. **REFERENCES:** The list of all references should be alphabetically arranged. It must be single spaced, and at the end of the manuscript. The author (s) should mention only the actually utilised references in the preparation of manuscript and they are supposed to follow **Harvard Style of Referencing**. The author (s) are supposed to follow the references as per following:

- All works cited in the text (including sources for tables and figures) should be listed alphabetically.
- Use (**ed.**) for one editor, and (**ed.s)** for multiple editors.
- When listing two or more works by one author, use --- (20xx), such as after Kohl (1997), use --- (2001), etc, in chronologically ascending order.
- Indicate (opening and closing) page numbers for articles in journals and for chapters in books.
- The title of books and journals should be in italics. Double quotation marks are used for titles of journal articles, book chapters, dissertations, reports, working papers, unpublished material, etc.
- For titles in a language other than English, provide an English translation in parentheses.
- The location of endnotes within the text should be indicated by superscript numbers.

PLEASE USE THE FOLLOWING FOR STYLE AND PUNCTUATION IN REFERENCES:

BOOKS

- Bowersox, Donald J., Closs, David J., (1996), "Logistical Management." Tata McGraw, Hill, New Delhi.
- Hunker, H.L. and A.J. Wright (1963), "Factors of Industrial Location in Ohio," Ohio State University.

CONTRIBUTIONS TO BOOKS

- Sharma T., Kwatra, G. (2008) Effectiveness of Social Advertising: A Study of Selected Campaigns, Corporate Social Responsibility, Edited by David Crowther & Nicholas Capaldi, Ashgate Research Companion to Corporate Social Responsibility, Chapter 15, pp 287-303.

JOURNAL AND OTHER ARTICLES

- Schemenner, R.W., Huber, J.C. and Cook, R.L. (1987), "Geographic Differences and the Location of New Manufacturing Facilities," Journal of Urban Economics, Vol. 21, No. 1, pp. 83-104.

CONFERENCE PAPERS

- Garg Sambhav (2011): "Business Ethics" Paper presented at the Annual International Conference for the All India Management Association, New Delhi, India, 19–22 June.

UNPUBLISHED DISSERTATIONS AND THESES

- Kumar S. (2011): "Customer Value: A Comparative Study of Rural and Urban Customers," Thesis, Kurukshetra University, Kurukshetra.

ONLINE RESOURCES

- Always indicate the date that the source was accessed, as online resources are frequently updated or removed.

WEBSITE

- Garg, Bhavet (2011): Towards a New Natural Gas Policy, Economic and Political Weekly, Viewed on July 05, 2011 http://epw.in/user/viewabstract.jsp

INTERNATIONAL SMALL - SCALE FOREST CARBON SEQUESTRATION PROGRAM AND ITS IMPACT ON THE LIVELIHOOD OF LOCAL PEOPLE: EVIDENCES FROM CENTRAL KENYA

DEREJE TEKLEMARIAM GEBREMESKEL
LECTURER AND RESEARCHER
COLLEGE OF BUSINESS AND ECONOMICS
MEKELLE UNIVERSITY
ETHIOPIA

ABSTRACT

The objective of the study was to investigate the impacts of the International Small Group and Tree Planting Program (TIST) upon the livelihood of the local people. The findings of the study revealed that the small-scale forest carbon sequestration program has brought considerable livelihood supports (in terms of owning better number of trees, improved food security, housing, financial incentives, i.e. 'carbon payments', improved awareness on environmental protection and agroforestry knowledge, and potentially expected further carbon payments). The major challenges, however, are blurred greenhouse gas (GhG) contract, asymmetry of interest between the program owners and the local people with regard to selecting tree species to be planted, high opportunity cost of land, and community's lack of confidence over program's sustainability. So, it is safe to conclude that the long-term sustainability of the small-scale carbon sequestration program is under question. When small-scale forest carbon sequestration projects are considered as options of storing carbon, their impact over the livelihood of local communities need to be considered especially the opportunity cost of using land to plant trees (than using it to produce crops) should be determined. Therefore, the Government of Kenya can play a role between local communities and the carbon projects so that both forests and local people thrive. To this end, there is a need for appropriate institutional and administrative framework to enhance program sustainability and increase the contractual capacity of powerless local community groups.

KEYWORDS

Carbon Projects, Carbon Sequestration, Climate Change Forest Carbon Sequestration, Greenhouse gas (GhG) contract, Kenya.

INTRODUCTION

CARBON SEQUESTRATION: WHAT IS IT?

The emission of greenhouse gases such as carbon dioxide, methane and nitrous oxide is mainly due to anthropogenic pressures resulting from burning of fossil fuels, deforestation and related land use changes. Atmospheric levels of greenhouse gases are getting higher than any other time in the recent past (Siegenthaler et al., 2005). Carbon sequestration is a method or process through which atmospheric carbon dioxide is taken up by reservoirs which would otherwise be released or permanently emitted into the atmosphere and accelerate global warming (IPCC, 2001). Carbon sequestration is also defined as the process of removing excess carbon dioxide from the atmosphere (Jindal et al, 2008; Jindal, 2006). In simple terms; carbon sequestration is the removal and storage of carbon from the atmosphere in to carbon sinks such as forests, oceans, and soils through physical or biological processes such as photosynthesis.

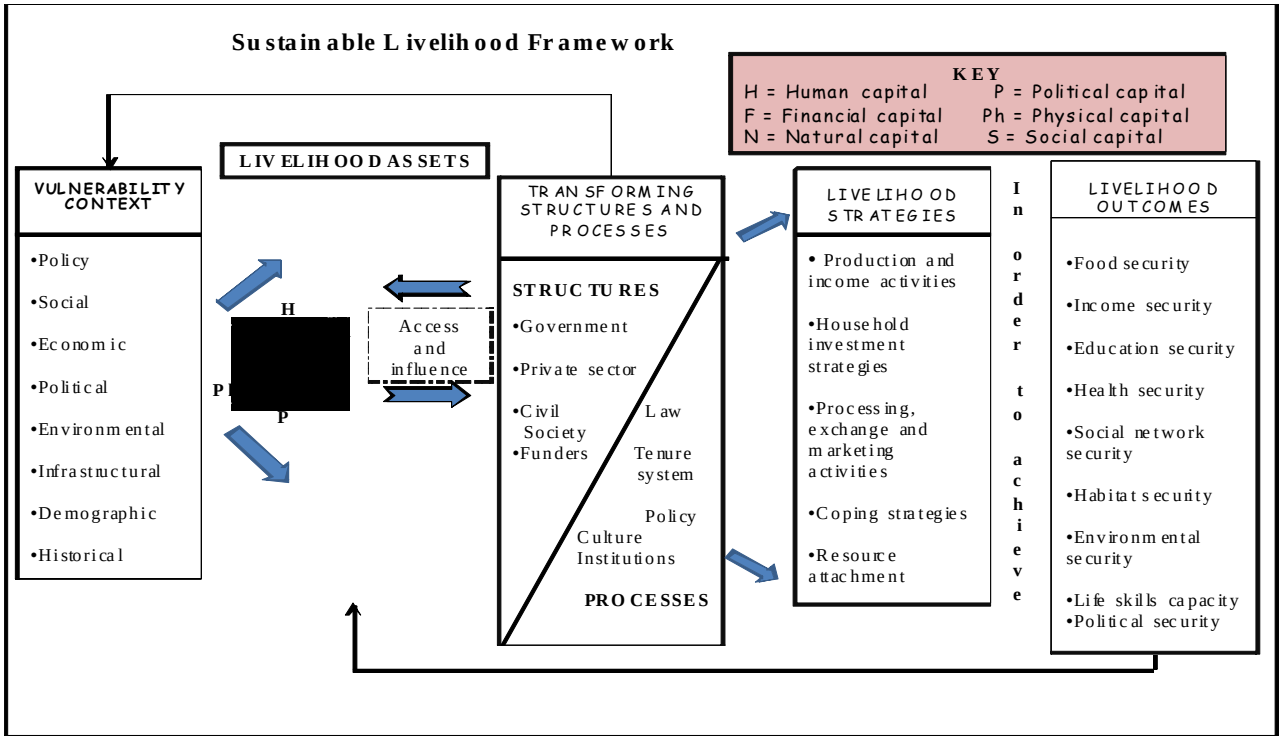
According to the successive assessment reports of the Intergovernmental Panel on Climate Change(IPCC), forests, agricultural lands, and related terrestrial ecosystems have significant potential of sequestrating carbon(IPCC, 2008; IPCC, 2003; IPCC, 2001). While forests themselves serve as net carbon sinks, deforestation in the tropics is one of the challenges contributing to global emissions of carbon dioxide (CO_2). Although data related to the level of tropical deforestation have been subject to debate, it contributes between 17 and 20% of the total greenhouse gas emissions (Lovera, 2009; Angelsen, 2008; IPCC, 2007; Gullison et al, 2007; Asner et al, 2005). If deforestation is not addressed, predictions indicate that the global economic cost of climate change resulting from deforestation could reach $1 trillion US Dollar annually by 2100 (Eliasch, 2008). According to the Stern Review (2006), reducing deforestation is the single largest opportunity for the immediate and cost-effective reductions of carbon emissions. Moreover, by directing funds from developed to developing countries, forest-based carbon projects have the potential to support the economies of developing countries in the tropics where most deforestation is happening (IPCC, 2007; Govindasamy et al, 2003).

SUSTAINABLE LIVELIHOOD FRAMEWORK AND FOREST CARBON PROJECTS

The survival of many rural communities is dependent on access and entitlements to ranges of assets and livelihood strategies that help sustain individual households through periodic shocks and stresses. Although the most widely used definition of livelihood was given by Chambers and Conway (1992), a number of modified explanations have been forwarded by a number of scholars with minor differences in defining the concept. A livelihood constitutes assets, capabilities, and activities necessary for a means of living, implying that livelihood will be sustainable when it can cope with and recover from stress, shocks and enhance or maintain its assets and capabilities both in current and future times (Carney, 1998). A livelihood is sustainable if it does not undermine the natural base of the people (Scoones, 1998). On the other hand, Ellis (2000) excluded 'capabilities' and 'sustainability' in his definition of livelihood and emphasized on 'access' to assets and activities that are influenced by institutions and social relations such as class, gender, belief systems, kinship, etc.

If the impact of any development project or intervention is to be analyzed from sustainability perspective, the sustainable livelihood framework plays a significant role (DFID, 1999). However, the framework has been criticized for its complexity and over ambition in defining different spatio-temporal contexts. Such drawbacks of the Sustainable Livelihood Framework should be considered in order to adapt and use it to conceptualize livelihood systems in diverse contexts. Therefore, in order to investigate the impact of forest carbon projects on the livelihood of local people, DFID's Sustainable Livelihood Framework has been modified and supported with inputs from the household livelihood framework developed by CARE (2002).

FIGURE 1: A MODIFIED SUSTAINABLE LIVELIHOOD FRAMEWORK



(Adapted from CARE, 2002; and DFID, 1999)

Although forest carbon projects have a number of intended benefits, some projects bring risks of activity shifting leakages such as the displacement of communities which can again direct to clearing of adjacent lands, marginalization of local and indigenous populations, and widening local inequalities (Skutch, 2005; Boyd, 2002; World Rainforest Movement, 1999). Pilot forest carbon sequestration projects have tended to fall short of their sustainable development objectives by failing to address the needs of local communities so that poor communities in fact get poorer (Jindal et al, 2008; May et al, 2005; Brown et al, 2004).

The global demand for carbon credits is increasing steadily as the first commitment period under the Kyoto Protocol (2008- 2012) draws to an end, making tropical countries, such as Kenya, destinations for global forest carbon trade. For example, Kenya is one of the fourteen nations in the world to receive funds in the first round of the World Bank's Forest Carbon Partnership Facility, a scheme designed to kick-start new Reducing Emissions from Deforestation and forest Degradation (REDD) projects in developing nations (World Bank, 2008).

In Kenya, it is a common practice for carbon offset projects to be subjected to regular forest assessment practices such as inventorying carbon stocks and evaluating the restoration status of conservation schemes. However, it is not common to see evaluative assessments on the impact of carbon sequestration project on the livelihood of local people. The general objective of the study was to identify the impacts of the International Small Group and Tree Planting Program (TIST) over the livelihood of the local people and draw lessons on the environmental and economic role of small scale tree planting programs.

METHODS USED

This paper is the result of qualitative and quantitative data collected from selected rural communities in Central Meru District, Kenya. The data collection time was the period beginning of May 2010 to end of June 2010.

Description of the carbon sequestration Project: TIST

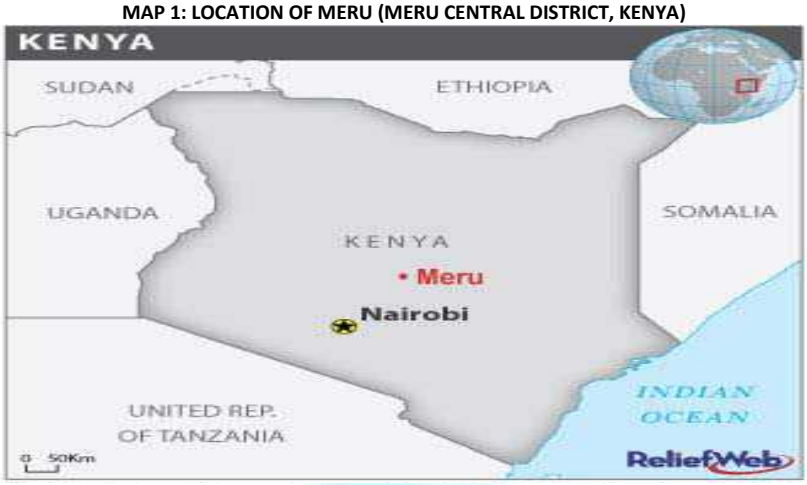
TIST is an abbreviation standing for "The International Small Group and Tree Planting Program" which is an environmental program developed by subsistence farmers of developing countries to sell carbon for the international carbon market. TIST was established in 1999 in Mpwapwa, Tanzania, by the Clean Air Action Corporation (CAAC) - a US based company founded by Mr. Ben Henneke who is currently the president of the company. As part of its establishment process, CAAC sponsored a seminar for representatives of small groups in Tanzania where the groups identified lack of trees, food security, and disease as the leading difficulties for their communities. Following that they decided to start doing something to tackle those challenges. With a joint effort between Tanzanian farmers, US and UK support staff, a pilot project was initiated to improve the degraded environment while contributing for greenhouse gas reductions. CAAC is a registered legal entity that got certificate of incorporation from the government of in January, 2005.

Currently, TIST operates in Tanzania, Uganda, India, and Kenya with over 60,000 farmers, over eight million trees growing and averagely 5,000 trees being planted each day. CAAC is TIST's parent company, owning and operating the local TIST companies. CAAC specializes in 'low cost strategies so as to clean up the air' through control technology and carbon sequestration (using TIST). It was also stated that TIST has been selected for the BioCarbon Fund of the World Bank (TIST, 2010).

DESCRIPTION OF THE STUDY AREA

The study is conducted in Central Meru District which is one of the thirteen districts that form the Kenyan Eastern Province. Geographically, the district is located almost at the equator between 0^0 20'15'' N – 0^0 32' 00'' N latitudes and 37^0 6' 40'' E – 37^0 52' 00'' E longitudes which signifies that the district is located five miles north of the equator. The district is situated to the northeast of Mount Kenya whose peak cuts in the southwest border of the district where it shares borders with Tharaka District to the east, Laikipia District to the West, Nyeri, Kirinyaga and Meru South Districts to the south, and Meru North and Isiolo Districts to the north.

MAP 1: LOCATION OF MERU (MERU CENTRAL DISTRICT, KENYA)



METHOD FOR DATA COLLECTION AND ANALYSIS

According to TIST's revised administrative system, a number of groups form a cluster which helps to facilitate communication, organization and minimize administrative costs. In the district where this study is conducted, there are 11 functioning clusters each constituting from 101 to 892 group and within each group there are 6 to 12 small-scale farmers. All the clusters are located within an approximate 2 to 65 km distance from the local coordinating office of the TIST program located in Meru town. The sample frame from which representative households are selected is set in table 1.

TABLE 1: LISTS OF TIST PROGRAM CLUSTERS UNDER MERU COORDINATION OFFICE

S.N	Cluster name	Number of groups in the cluster	Year of cluster establishment
1	Chugu	744	2005
2	Kirimaara	614	2005
3	Tharaka	331	2008
4	Igembe	220	2008
5	Kirinyaga	283	2008
6	Timau	217	2006
7	North Imenti	327	2008
8	Kithurine	101	2009
9	Wendo	605	2005
10	Kinyaritha	728	2005
11	Ntugi	892	2005

(Source: TIST program office: June 2010, Meru, Kenya*)*

As it is seen from table 1, five of the clusters constitute TIST groups functioning since 2005 while majority of the remaining groups are functioning since 2008. Every group in each cluster is registered and coded. For example, groups located in one of the villages under Chugu cluster are coded as 2005KE278, 2005KE294, 2005KE296 where 2005 indicates year of group establishment, KE refers to Kenya implying that the group is located in Kenya, and the number following KE implies the group number.

Based on the stated research objective and local expertise opinion, investigation of the impacts of the program activities over the livelihood of the local people requires longer period of operation and households' involvement in the program. Therefore, households who were sampled for the study were from those groups who joined the program in 2005. Purposive random sampling was used to select a total of 90 households used in the study of which 50 were participant households and 40 are non-participant households. Participatory Rural Appraisal (RRA) which constitutes a series of observations supported with key informant discussions was used to decide sample size and select sampled cluster areas. Based on the outcomes of RRA, the structure, functioning and overall livelihood system of local households of the study area was so homogenous. Therefore, 90 households were determined to be a representative sample size for addressing the objectives of the study. Initially, both participant and non-participant households where those clusters formed in 2005 are located. Once the clusters were purposively identified, TIST groups were selected randomly and from each randomly selected group a household (one of the 6 – 12 group members) was selected for detailed livelihood investigation. A maximum of 2 households were chosen from a group constituting 6-12 households.

DATA COLLECTION

Due to lack of organized secondary data, the largest data set collected was through detailed and semi-structured questionnaire and focus group discussion (FGD) administered to rural households in the six TIST cluster areas.

TABLE 2: NUMBER OF SAMPLED GROUPS AND HOUSEHOLDS

Cluster Name	Number of groups selected	Number of participant households selected	Number of non-participant households selected
Chugu	7	9	7
Kirimaara	6	8	7
Wendo	4	7	6
Kinyaritha	7	10	8
Ntugi	7	11	7
Timau	3	5	5
Total	34	50	40

Primary data was generated from local stakeholders, mainly from small-scale households that can provide relevant information about the program and its impacts on local people. The socio-economic consequences of forest carbon sequestration projects such as tree planting programs like TIST are expected to be reflected both at the community and household levels. Therefore, individual households were the major units of analysis in the study. Furthermore, impact of the project over groups and the community as a whole was investigated. Project design documents, auditor or certifier reports, and consecutive internal reports by project management team were reviewed from the standpoint of fulfilling the stated research objectives and triangulating information were generated from primary sources. To gather primary data from the six cluster areas, key informant interviews, semi-structured household interviews (conducted using household

questionnaire), focus group discussion (FGD) and expertise opinion were used. Semi-structured household questionnaire, FGD guidelines, and interview questions were part of the tools applied.

DATA ANALYSIS AND PRESENTATION

Data was analyzed both qualitatively and quantitatively. The 'before-after project' scenario was used to analyze the data generated on the relationship between the program activities and the livelihood components of the local households before and after project. Extraneous factors (i.e., other factors or interventions other than the forest carbon project that might cause changes over local peoples' assets and lifestyles) were tried to be controlled and verification was given whenever necessary.

As part of the triangulation and verification process of the facts collected, in the analyses it was tried to incorporate the 'with and with-out the project' scenarios through investigating the data collected from non-participant households and asking 'recall' questions to participant households addressing specific livelihood issues. Comparison was made between participants and non-participants of the project as well as the changes in the livelihood of those participants through time, i.e., since they joined the program.

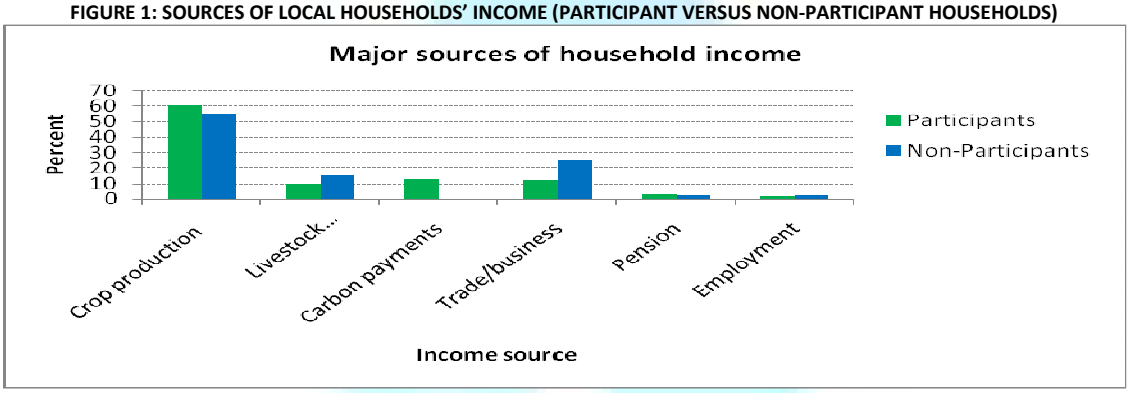
Descriptive statistical values were computed in order to see the impacts of the small scale forest carbon project over the livelihood of the local households in general and the local community groups in particular. In due course, comparison was made between those households who joined the tree planting program and those who have not yet joined. The comparison was made from the perspectives of i) changes in household tree ownership, ii) household income, iii) household food and fuel security, iv) training and capacity building, v) carbon payments, vi) household housing, vii) households' overall living conditions and the like. Descriptive statistics was used to explain those comparables. Besides the "with- project and with-out project" scenarios, the "before-project and after-project" livelihoods of households are compared. Qualitative explanations which were the results from Focus Group Discussions (FGDs) and expert opinion were given whenever necessary. Data have been presented using tables, graphs, charts, preference ranking charts and the like. Two important statistical soft-wares (EXCEL and SPSS) were applied to get quantitative values, develop charts and graphs, and support the data analysis process.

RESULTS AND DISCUSSION

LIVELIHOOD OF THE LOCAL PEOPLE

The life of the households in the area is predominantly dependent on subsistence agriculture whereby traditional agricultural systems are used both to cultivate crops and rear animals. Farmers harvest twice a year using two rainy seasons: May – April of the spring season and July – September of summer season. The major crop types produced in the area are maize, beans, pigeon peas, sorghum, sweet potatoes, green grams, and other groups of local food crops. The common cash crop enterprises in the district constitute tea, coffee, bananas, horticulture, wheat, potatoes, cotton, sunflower, pyrethrum and macadamia. Dairy cattle, dairy goats, local cattle, sheep and poultry are the main livestock enterprises.

FIGURE 1: SOURCES OF LOCAL HOUSEHOLDS' INCOME (PARTICIPANT VERSUS NON-PARTICIPANT HOUSEHOLDS)

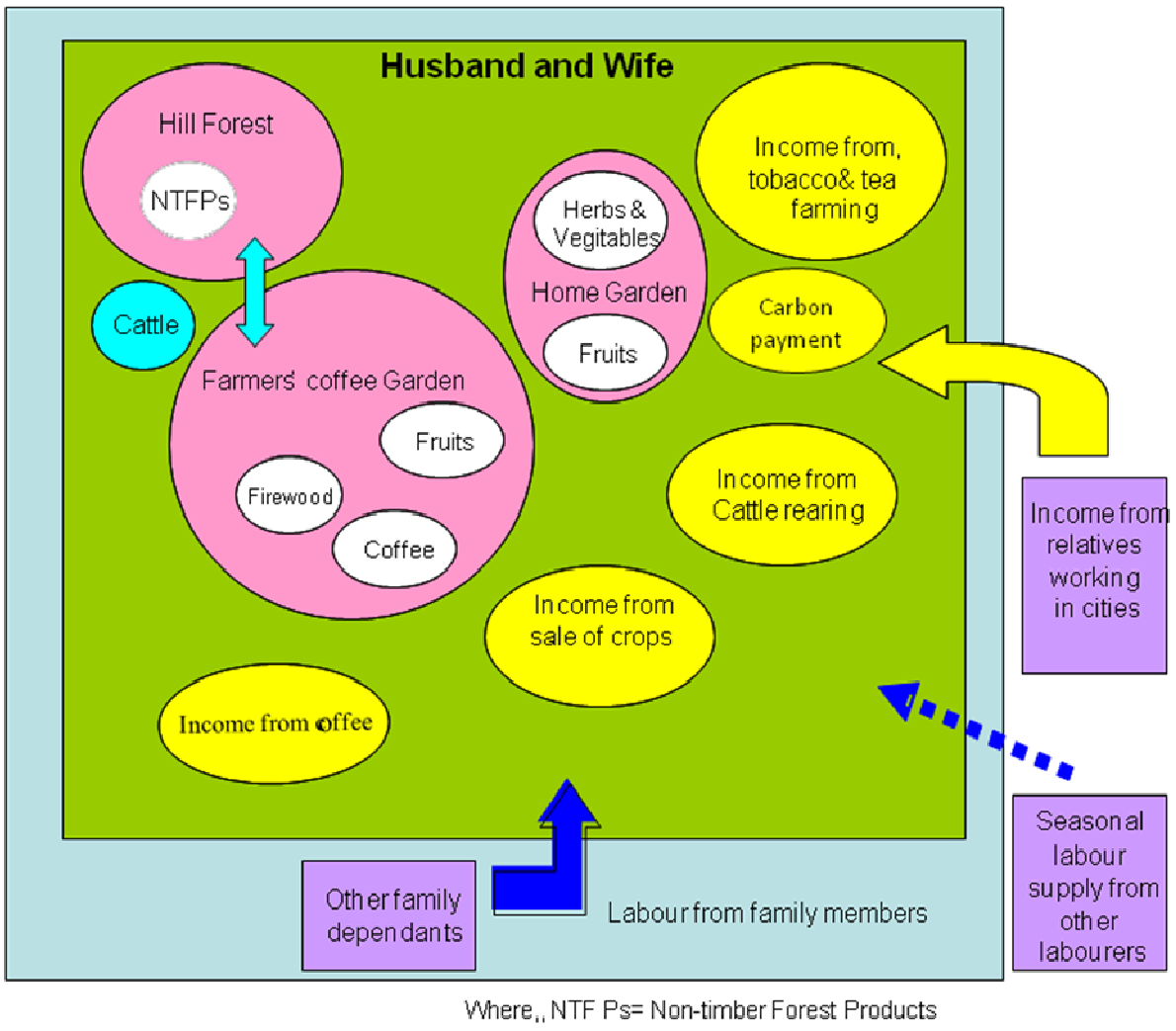


Crop production is the leading source of household income followed by trade/business activities and livestock production for household categories, participants and non-participants. As it is seen from figure 1, unlike non-participant households, participant households get additional income from carbon payments despite the relative magnitude of the income from it is comparably low.

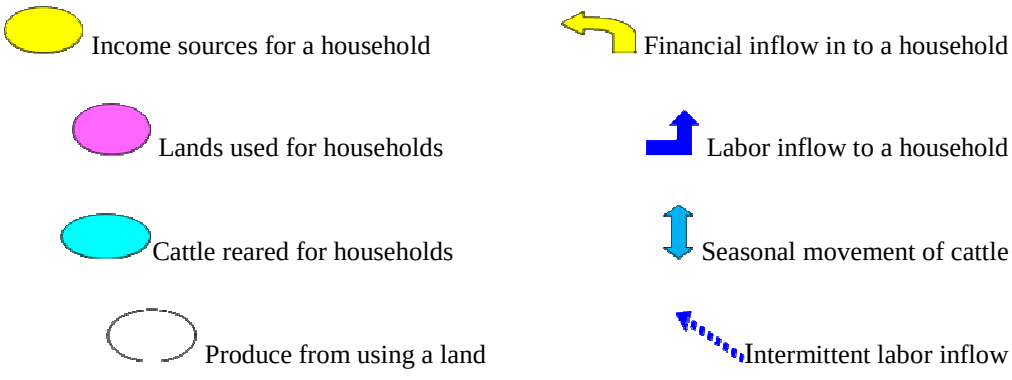
As it is indicated by figure 2, both the husband and wife are the key players when we consider the livelihood of the local people. The major land use systems are farmer's coffee garden, home garden, and hill forests. The major income sources for the household are coffee, sale of crops, cattle rearing, tobacco and tea farming, and carbon payments.

FIGURE 2: A LIVELIHOOD AND LAND USE DIAGRAM OF A TYPICAL KIMERU (OR MERU) FARMING FAMILY AT CHUGU, CENTRAL MERU DISTRICT, KENYA

A simplified livelihood and land-use diagram in a typical Kimeru family, Central Meru District, Kenya



Legend:



PLANTING PROGRAM BENEFITS TO THE LOCAL PEOPLE

a) A positive change in terms of tree ownership

The percentage value indicates the percentage of households in the stated range of number of trees. The ranges like 0-100, 101- 200, etc indicates the number of trees owned by households before 4 -5 years.

FIGURE 3: HOUSEHOLD LEVEL TREE OWNERSHIP BEFORE 4-5 YEARS AGO

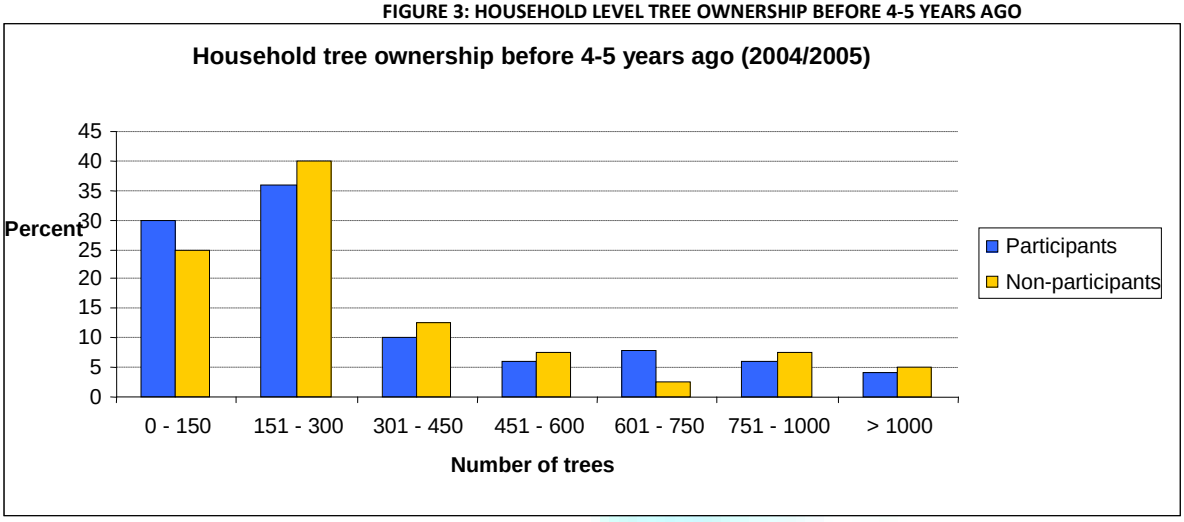
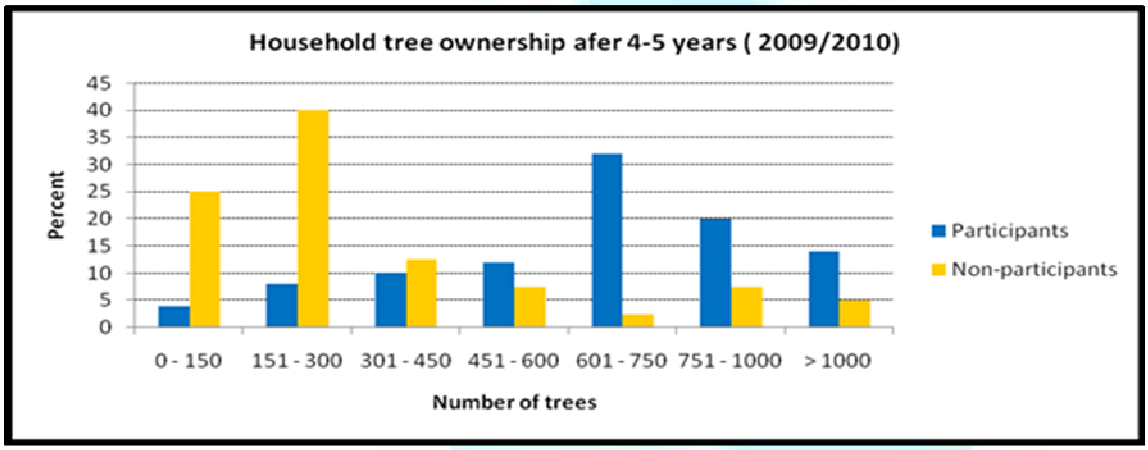


FIGURE 4: HOUSEHOLD LEVEL TREE OWNERSHIP AFTER 4-5 YEARS AGO.



As depicted in figure 3 and figure 4, participation in the International Small Group and Tree Planting Program (TIST) has brought a greater difference in terms of owning trees where participant households has greater number of trees after joining the program than non-participant households. Significant numbers of participants have success in increasing the number of trees in their land during their 4-5 years participation in TIST. This shift towards owning more trees has implications over the cash inflow for households in the form of payments for carbon. For example, a household who make a move in owning trees from 150 to 700 gets carbon payments for 550 live trees, which means KES 1.50 X 550 = KES 825.00 (equivalent to USD 11.00) annually. During the data collection process in the field visit, participant households have expressed that they have a significant move in terms of improving their live through securing fuel, fodder, timber, and food (example introducing fruit and nut bearing trees). In the *Kimeru Community*, it was also described that having greater number of trees is one of the dimensions considered to label a household as rich, medium, or poor. To conclude, the Small Group and Tree Planting Program (TIST) has positively contributed through encouraging and incentivizing small scale households to plant more trees which are of both useful from the perspectives of sequestrating carbon and providing immediate economic return to the local households.

b) Maintenance of on-farm and off-farm tree diversity

TIST has played a role in conserving diverse species of trees (both indigenous and exotic) through its successive awareness creation and support in supplying seeds. For example, Meru Oak (Vitex *keniensis*), an important indigenous tree species was significantly reducing in the area some years ago. However, due to the introduction of TIST, the availability of such indigenous tree species is getting increased and its management is also getting improved. Similarly, Mweria (*Prunus africana*), a very important medicinal[1] plant used by local communities in Meru is getting improved and which was once approached to total disappearance in the district, except in those trust lands and arks found around the area. Moreover, participant households are encouraged and supported for the introduction and management of multipurpose exotic species, such as Grevellia (*Grevillea robusta*). It was discovered that 65% of the households who participate in TIST have tree nurseries which are used not only for multiplying seeds for themselves but also bringing the seedlings to the local markets and selling them to other community members which are mainly non-participant households.

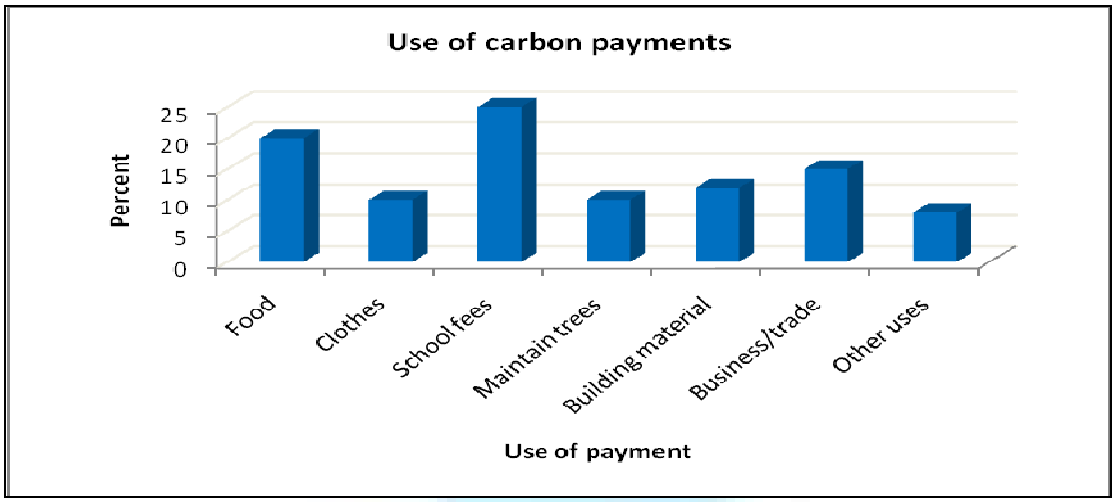
During Focus Group Discussions (FGDs) that were made in the sampled clusters, participant households have listed those trees planted through the support and encouragement they got from TIST. Further successive discussions were made in ranking or prioritizing trees according to their order of importance. Fortunately, consensus was reached on the prioritized or ranked trees as rank as first Grevellia (*Grevillea robusta*) the most preferred, *Cordia africana* the second most preferred, mango (*Mangifera indica*) the third most preferred, and the like. Muteratu (*Vepris nobilis*), Mutero (Olea *europaea*), and Muthigiu (*Rhus vulgaris*) are among the least preferred tree species by the local households . *Grevillea robusta* is the most preferred tree species for the households because it has a relatively better multipurpose tree species which is also fast growing, good timber value, nitrogen fixing which is beneficial for adopting sustainable agroforestry system (tree-crop interaction). On the other hand, there are tree species which are not favored by TIST though local households may not perfectly agree with their preference. For example, the proportion of Eucalyptus (*Eucalyptus spp.)* should not be more than 33% of the overall tree species found on farmer's land so as to be eligible for carbon payments

[1] *Prunus africana* locally named *Mweria* is used by the local communities for curing different reproductive diseases and according to some local old fathers in the area, the bark of plant is an effective medicine for curing cancer. Similarly, its leaves is used us cure male reproductive diseases that occur in old ages.

c) Improved food security status of participant households

The International Small Group and Tree Planting Programme (TIST) has direct and indirect contribution in terms of improving the food-security status of households. Directly, the program plays a role by paying cash incentives for farmers, KES[2] 1.50 (equivalent to USD 0.02 per each live tree annually). Indirectly, the program has contributed towards the development of agroforestry systems and introduction of improved multipurpose tree species which are of both indigenous and exotic in origin. Many of the trees promoted by the program have multipurpose function such as fuel-wood, fruit, nut, timber, pods, fodder, shelter and boundary belts, medicinal use, improvement of soil fertility, and other ecosystem services as it was subsequently mentioned by local key informants and focus group discussants. Many of the participant households have explained that they purchase food crops from the market as compared to non-participant households. A question is forwarded to the respondent household heads regarding for how many months of a year are their households dependent on food crops purchased from the market. Majority of participant households (26 % and 38% of participant households) purchase food for 1-2 and 3-4 months of a year respectively.

FIGURE 5: USE OF CARBON PAYMENTS FOR HOUSEHOLDS

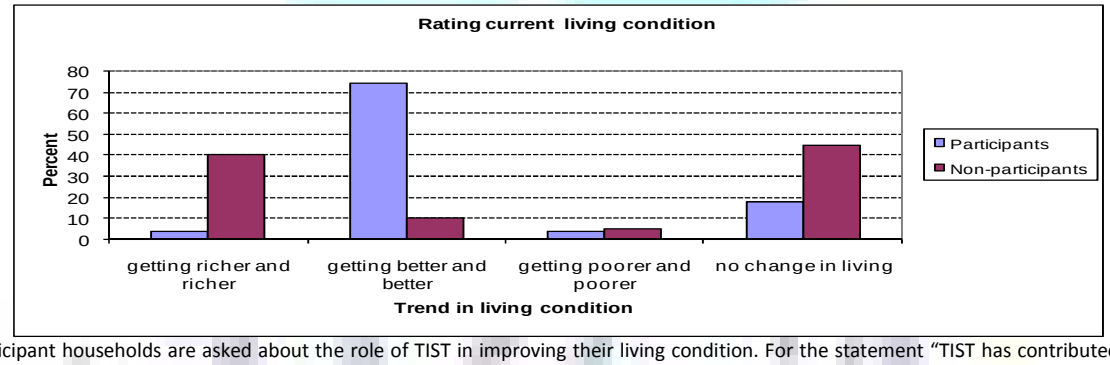


Participant households use their carbon payments received from the Clean Air Action Corporation (CAAC) for schooling fees, food, establishment of businesses, purchase of building materials, clothing, and related purposes respectively. In addition to the aforementioned sources of income and economic activities, participant households are on a move towards the begging and development of alternative income sources. For example, more than 50% of the participant households engage in growing fruits such as banana, oranges, pumpkin, and the like. In addition to enhancing agroforestry practices, TIST has trained participant households from the perspective of developing additional alternative income sources such bee keeping, fish farming (using small ponds on individual household basis), diary production, silk-warm farming, and improved coffee growing especially in terms of post harvest situations.

d) Improved overall living condition of participant households

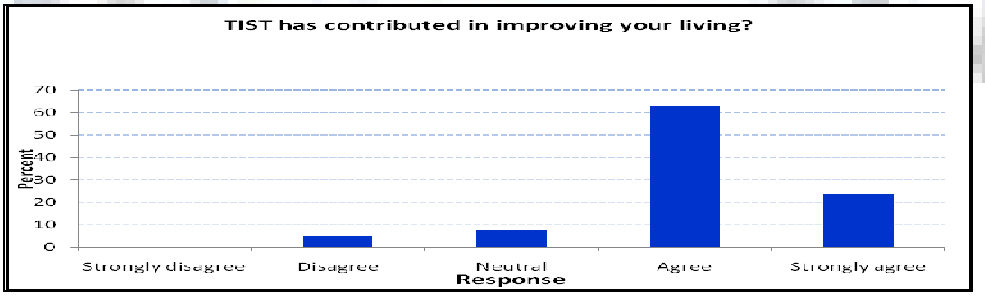
Both participant and non-participant households are asked to evaluate their current living condition (economic status) and hence the trend in their living condition is indicated the following figure.

FIGURE 6: LIVELIHOOD CONDITION AS RATED BY HOUSEHOLDS THEMSELVES



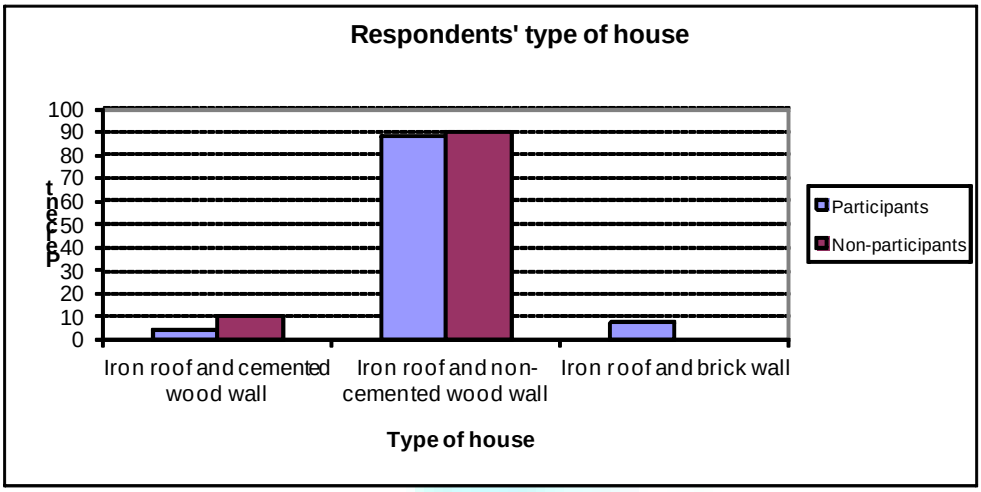
Furthermore, participant households are asked about the role of TIST in improving their living condition. For the statement "TIST has contributed in improving your living condition "which is forwarded to the households, significant number of the respondents are either agreed or strongly agreed that TIST has contributed in improving their living (figure 7). For example, compared to non-participant households, those participant households are on a move from their ordinary houses which are of iron roof and non-cemented wood wall towards iron roof and brick wall which is of better housing categories (figure 8).

FIGURE 7: CONTRIBUTION OF TIST IN IMPROVING HOUSEHOLDS' LIVING CONDITION



[2] KES = Kenyan Shillings

FIGURE 8: TYPE OF HOUSEHOLDS' HOUSE CONSTRUCTED



e) Participatory tree selection and Conservation Farming

In addition to the previously stated positive contribution of TIST for local households, significant numbers of tree species planted on participants' households land are selected either by the household and TIST technical staffs or the household itself. There are also minor cases where participant household groups plant trees using the advice they got from TIST agroforestry experts and others (colleagues and relatives of household heads).

Besides, there are households who practice conservation farming (CF), which is one of the poverty reduction sub-programs initiated and promoted by the International Small Groups and Tree Planting Program (TIST). It was discovered by the study that 18% of those households who participate in TIST have started practicing conservation farming. Those respondents who participate in CF explained that CF provides greater productivity yet the practice is so labor intensive and the relative marginal benefit is not rewarding. However, they also stated that practicing CF is better than the usual farming practices though the reward from it is not up to expectation. Moreover, other important steps are initiated by TIST such as the introduction of fuel-efficient stoves, locally called named *jicko*.

f) Community-wide benefits of the program

The International Small Groups and Tree Planting program (TIST) by its nature has a working philosophy of 'success in group' and program values it promotes: honesty, accuracy, transparency, being servant to each other, mutually accountable to each other, and low budget/big results. It was positively raised during the focus group discussion sessions that the program has brought improved community cohesion, cooperation, and sound local community organizations among overall communities. This was also practically observed and sensed during the field visit that the program has greatly contributed in terms of bringing communities together for working cohesively and solving community problems together which paves the way for effective community mobilization required for further local development and conservation efforts. It has also brought social changes and facilitates community-based problem solutions, for example, solving conflicts locally/ without going to courts.

The International Small Groups and Tree Planting program (TIST) has also wider level positive impacts especially in terms of improved knowledge and practices of agroforestry and environmental protection. For example, the program has a monthly newsletter called (Mazingira *Bora*, meaning *Environmental Newsletter* in Kiswahili) which is distributed monthly for those households who participate in the program. Besides, TIST supports and educates communities in other cross-cutting socio-economic program activities such as anti HIV-AIDS clubs, empowerment program of women and subsistence farmers, youth development sub-programs and related thematic issues relevant to the local communities.

LIVELIHOOD CHALLENGES AND OPPORTUNITIES OF TIST

Challenges

- **Blurred Greenhouse Gas (GhG) contract**: The function of TIST is mainly encouraging farmers to plant more trees hoping that farmers will get better payments for the carbon they will sequester. The GhG contract is signed between participant groups and the Clean Air Action Corporation (CAAC), an international broker for carbon markets. According to TIST staffs and coordination office, those payments that are currently made for farmers are considered as costs of the program which will be deducted from the expected revenue generated from the international carbon market. How farmers are sure that the amount of money deducted is for program development (cumulative costs of TIST Kenya)? Moreover, unlike other markets, market for carbon is very unpredictable; issues such as who will determine the price of carbon? How farmers know and trust that they will really get 70% of the project revenue or not? The Kyoto Protocol is going to be expired soon (2012), so under what mechanism are small-scale local households become beneficiary from the carbon they sequester in the trees they planted?
- **Disparity of interest**: Local households who participate in the project are interested to plant trees which are of fast growing and trees that can be harvested shortly, where as the International Small Group and Tree Planting Program (TIST) insist farmers to plant those trees that grow slowly and stay longer before they reach maturity. This disparity of interest originates from the perspective of maximizing one's own benefit: farmers are interested for short-term economic returns and tree uses while TIST is interested on the carbon that will be sequestrated throughout the agreed period of time, 60 years. For example, farmers are interested on planting much of Australian Oak (*Grevillea robusta*) which is a fast growing exotic species yet reaches maturity with in shorter years and hence fails to store carbon for the agreed number of years, 60 years whereas TIST is much interested on those indigenous species such as Meru Oak (*Vitex keniensis)* which can store carbon as the age of the tree is getting longer.
- **High opportunity cost of land**: Land for crop production vis-à-vis land for planting trees and getting carbon payments? It is known that Meru Central District is one of the agriculturally high potential areas where almost all types of crops found in the Kenya are produced. The land in the district is also much suitable for cash crops such as coffee and tea. On the other hand, significant numbers of households are given promises that they shall get comparable amount of income from carbon sales. In short, what is the optimal combination of land use for producing crops and land use for planting trees to get carbon payments?
- **Lack of trust and confidence over the program**: Participant households have explained that they have due suspicion on the program as to whether it can last for 60 years. Moreover, significant numbers of participant households do not know where the money they received from TIST is coming. Their suspicion reaches to the extent that the tree they planted and/or their land may forcibly be snatched.

Opportunities

Majority of the benefits of the project elucidated under section 4.3 of this report can be considered as opportunities of TIST if they are conducted on long-term basis. Furthermore, the tree planting program has the following conditioned potential opportunities:

- Planting trees has benefits beyond getting paid for the carbon sequestered by the trees. Local households can enjoy the benefits of trees which are manifested in the form of various ecosystem and economic benefits.

- Though the demand for carbon in the international market is sporadic, the overall trend indicates that there is an increasing demand for carbon sequestered in developing countries. Therefore, households engaged in sequestering carbon such as those Kenyan TIST groups may have greater market opportunity for the carbon they have stored in their groves.
- If conditions are supportive enough, TIST can be the bridge that links the Kenyan small-scale farmer households with the international communities working for clean energy and environmental.

SUMMARY AND CONCLUDING REMARKS

The International Small Group and Tree Planting Program (TIST) as a small scale forest carbon sequestration project play a role in improving the livelihood of local participant households in Central Meru, Kenya. The small-scale forest carbon sequestration program has brought considerable livelihood supports (owning better number of trees, improved food security, financial incentives, i.e. 'carbon payments', better awareness on environmental protection and agroforestry knowledge, and prospective further carbon payments). However, the program has blurred greenhouse gas (GhG) contract, asymmetry of interest between the program owners and the local people with regard to selecting tree species to be planted, high opportunity cost of land, and community's lack of confidence over program's sustainability. Therefore, when small-scale forest carbon sequestration projects are considered as options of storing carbon, their impact over the livelihood of local communities need to be considered especially the opportunity cost of using land to plant trees (than using it to produce crops) should be determined. Furthermore, the contracts made between the local people and the forest carbon sequestering programs should consider the capacity and limitations of local people in understanding contracts which have a long-term impact over their livelihood. To this end, the Government of Kenya should play a role and closely follow the contracts made between local communities and carbon projects that affect local people. The governments should have appropriate institutional and administrative framework to enhance program sustainability and increase the contractual capacity of powerless local community groups.

ACKNOWLEDGEMENT

I would like to thank the UK-based ***Natural Resources International (NRI***) for sponsoring my travel expenses for the study to and from Kenya, Bangor University (UK) and Mekelle University (Ethiopia) for hosting the study used to write this article. Dr. Christine Cahalan, Dr. Zewge Teklehaimanot, Dr. Mark Rayment (Bangor University) for their fabulous guidance, tremendous cooperation and valuable input provided for the study. I am also indebted to Dr. James Kimondo, and Mr. William Omondi of Kenya Forestry Research Institute (KEFRI) for their guidance and cooperation during the field work in Kenya. I am grateful to all Kenyan colleagues who are Mr. Alfred Gichu, Mr. Charles Ibeere, Miss.Susan Wanjiku, Mr.Martin Weru, Mr. Karani Mungania, Mr. Mathew Mbabu, Miss.Faith Ntinyari, Mr. Ibiiri james, Mr. Duncan Murami, Mr. Alice Kathure, and Mr. Maneno for all their extended cooperation during my data collection endeavours in Meru, Kenya.

REFERENCES

- Angelsen, A. 2008. Moving Ahead with REDD Issues, Options and Implications. CIFOR. Indonesia.
- Asner, G. P., Knapp, D.E., Broadbent, E.P., Oliviera, P., Keller, M. & Silva, J.2005. Selective logging in the Brazilian Amazon. *Science 310: 480-482.*
- Boyd. E. 2002. The Noel Kempff Project in Bolivia: gender, power and decision-making in climate mitigation, *Oxfam Gender and Development Journal 10 (2002) (2).*
- Brown, K., Boyd, E., Corbera, E., Adger, W.N. 2004. How do CDM projects contribute to sustainable development? Technical Report 16. *Tyndall Centre for Climate Change Research.*
- CARE-Christian Action Research and Education. 2002. Household Livelihood Security Assessments: A Toolkit for Practitioners. *TANGO International Inc., Tucson, Arizona.*
- Carney, D. 1998. Sustainable rural livelihoods. What contribution can we make? Papers presented at the DFID Natural Resources Advisers' Conference, July 1998. DFID, London.
- Chambers, R. and Conway, G.R. 1992. Sustainable rural livelihoods: practical concepts for the 21st century. *IDS Discussion Paper No.296: IDS,* Brighton.
- DFID -Department for International Development. 1999. Sustainable Livelihoods. Guidance Sheet, UK
- Eliasch J. 2008. Climate change: Financing Global Forests. Office of Climate Change, HMG: London.
- Ellis, F. 2000. Rural livelihoods and diversity in developing countries. *Oxford University Press, Oxford.*
- Govindasamy B, Caldeira K, Duffy P.B. 2003. Geo-engineering Earth's radiation balance to mitigate climate change from a quadrupling of CO2 .*Global and Planetary Change 37(1-2): 157-168.*
- Gullison, R.E., Frumhoff, P.C., Canadell, J.G., Field, C.B., Nepstad, D.C., Hayhoe, K., Avissar, R., Curran, L.M., Friedlingstein, P., Jones, C.D. and Nobre C. 2007. *Tropical forests and climate policy. Science, 316: 985-986*
- IPCC. 2008. Climate Change. 2007. Synthesis Report. International Panel on Climate Change. Intergovernmental Panel on Climate Change (IPCC).
- IPCC. 2007. Climate Change 2007: Synthesis Report. Contribution of Working Groups I, II and III to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change
- IPCC .2003. Definitions and Methodological Options to Inventory Emissions from Direct Human-induced degradation of Forests and Devegetation of Other Vegetation Types.
- IPCC. 2001. Climate changes .2001. Mitigation. Assessment report of working group III of the International Panel on Climate Change. Intergovernmental Panel on Climate Change (IPCC).
- Jindal Rohit. 2006. Carbon sequestration projects in Africa: Potential benefits and Challenges to scale up. Earth Trends, 2006 World Resource Institute.
- Jindal Rohit, Swallow Brent, Kerr John. 2008. Forestry based carbon sequestration Projects in Africa: Potential benefits and challenges. *Natural Resources Forum32: 116-138.*
- Lovera S. 2009. The 'hottest REDD Issues'. IUCN CEESP, February.
- May, P. E. Boyd, M. Chang and M. Veiga, 2005. Incorporating sustainable development into carbon forest projects in Brazil and Bolivia*, Estud. soc. agric. 1 (2005) (special edition).*
- Scoones, I. 1998. Sustainable rural livelihoods. A framework for analysis. IDS Working Paper No. 72. IDS, Brighton.
- Skutsch. M. 2005. Reducing carbon transaction costs in community based forestry management, *Climate Policy 5 (2005), pp. 433–443.*
- Siegenthaler U., Stocker T.F., Monnin E., et al. 2005 .Stable carbon cycle-climate relationship during the late Pleistocene, *Science 310: 1313-1317.*
- Stern Review .2006. McKinsey & Company Report – 'Reducing US Greenhouse Gas Emissions: *'How Much At What Cost?' 2007.*
- *TIST-The International Small Group Tree Planting Program.* 2010. Replicable and Rapid Reforestation. http://www.tist.org/tist/kenya.php (Accessed on 12 July, 2010).
- World Bank. 2008. World Development Indicators 2008, the World Bank, Washington, DC (2008).
- World Rainforest Movement. 1999. World Rainforest Movement, Tree Plantations: Impacts and Struggles, World Rainforest Movement, Montevideo (1999).

REQUEST FOR FEEDBACK

Dear Readers

At the very outset, International Journal of Research in Computer Application and Management (IJRCM) acknowledges & appreciates your efforts in showing interest in our present issue under your kind perusal.

I would like to request you to supply your critical comments and suggestions about the material published in this issue as well as on the journal as a whole, on our E-mails i.e. **infoijrcm@gmail.com** or **info@ijrcm.org.in** for further improvements in the interest of research.

If you have any queries please feel free to contact us on our E-mail **infoijrcm@gmail.com**.

I am sure that your feedback and deliberations would make future issues better – a result of our joint effort.

Looking forward an appropriate consideration.

With sincere regards

Thanking you profoundly

Academically yours

Sd/-

Co-ordinator