



END TERM EVALUATION DRAFT REPORT



COFFEE FARMERS IN DIRE STRAITS PROJECT

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Final Report 1
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Acronyms and Abbreviations

AFFA	Agriculture and Food Authority
BDA	Business Development Advisor
CA	Climate Academy
CAP	Climate Academy Project
CIDP	County Integrated Development Plan
DAC	Development Assistance Committee
FCS	Farmer's Cooperative Society
FGD	Focused Group Discussion
FTA	Fairtrade Africa
HH	Household
ICS	Internal Control System
IGA	Income Generating Activity
KALRO	Kenya Agriculture and Livestock Research Organisation
KCIDP	Kericho County Integrated Development Plan
KCTA	Kenya Coffee Traders Association
KES	Kenya Shillings
KI	Key Informant
KII	Key Informant Interview
MCIDP	Machakos County Integrated Development Plan
MEL	Monitoring, Evaluation and Learning
MCU	Machakos Cooperative Union
NCIDP	Nandi County Integrated Development Plan
NGO	Non-Governmental Organisation
OECD	Organisation for Economic Co-operation and Development
SACCO	Savings and Credit Cooperative
SALM	Sustainable Agricultural Land Management
SPO	Smallholder Producer Organisation
ToC	Theory of Change
TOR	Terms of Reference
UNDP	United Nations Development Program
VSLA	Village Savings and Loans Association

Executive Summary

Background Information

Fairtrade Africa (FTA) the umbrella organization representing Fairtrade certified producers in Africa and the Middle East works within the Fairtrade system to support over 1.1 million farmers and workers in over 500 producer organizations spread over 33 countries. The support to producers is aimed at enabling them to maintain their Fairtrade certification which enables them to access better prices, decent working conditions and fairer terms of trade. Fairtrade Africa interventions are guided by the Fairtrade Theory of Change that is aligned with the three Fairtrade Goals: Make Trade Fair, Improving Sustainable Livelihoods and Empowerment of workers. The Climate Academy Project aimed to increase the climate change resilience of coffee farmers organized in 8 Kenyan Smallholder Producer Organizations (FCSs) in Machakos, Nandi and Kericho counties through training and subsequent application of insights, skills and techniques designed to better adapt to climate change. The aim of this evaluation was to provide an opportunity for the partners to review the performance and achievement following the implementation of the first phase of the project.

Methodology Adopted

Both consultative and participatory approaches were used to collect relevant qualitative and quantitative data. Multiple data sources; primary and secondary were used to assess the performance and achievement of the Coffee Farmers in Dire Straits Project. A two-prong approach comprising of desktop review of literature and field work, was adopted for the evaluation.

Key Findings

The findings along the FTA thematic areas, DAC evaluation criteria and along the key activities indicate that the project was able to achieve its desired goals and objective. The analysis of findings was undertaken bearing in mind that Fairtrade label comprises of requirements to be adopted by various players in the production chain with a focus on people, planet and profits. The broad Fairtrade goals of making trade fair, improving sustainable livelihoods and empowering farmers and workers were therefore a major consideration in the evaluation.

Compliance with broad Fairtrade Goals

- Results indicate that the members of the producer groups are actively cooperating both horizontally (among themselves) and vertically (in the value chain like was the case with Machakos Cooperative Union and government).
- The project empowered 8082 active coffee farmers (of which 33.3% were women) in Machakos, Nandi and Kericho counties, through a number of activities; trainings, demonstration and technology support. For example, a couple of community projects like one rainwater harvesting systems and one solar energy systems installed at the main offices of each of the six participating FCS's in Machakos county to act as demonstration units to farmers. Five greenhouses were installed in 5 FCS's and 1 in MCU. Moreover, an equivalent number of tree nurseries and poultry incubation units were set up for use by the farmers as part of the alternative income generating projects. The uptake of these technologies was impressive except for the capital-intensive ones (greenhouse and solar).
- The project empowered the farmers through its various activities; such as better incomes, employment creation, among other aspects
- The FCSs continued to make trade fair; for example, Machakos Cooperative Union organized for the marketing of coffee in a transparent manner. They have a screen connected to the Nairobi coffee exchange display the current prices for coffee beans when the auction is open. Any farmer can access the facilities to catch up with coffee trade. There was a challenge of the global market price for coffee during the period under review being fairly volatile while harsh weather depressed production in 2019 by 41% that of 2018, decreasing farmers income by an average of KES 14 per kilogramme of cherry.

- The resilience to climate change and a sustainable environment was strengthened through a number of initiatives; for example, in Machakos farmers had adopted the planting of shade trees within their coffee farms in an effort to improve the environment. Farmers who participated in the CAP project had double the number of shade trees in their farms compared to the control group (project farmers reported to have an average of 108 trees, compared to control group members who had 41.6 trees), confirming the reach of the 10,000 subsidized seedlings provided by the project. Moreover, adoption clean energy for domestic purposes like cooking was remarkable with 91% and 14% of the respondents in the treatment and control, respectively reporting use of biogas units as opposed to firewood, in Kericho-Nandi.

Performance based on OECD Criteria

Relevance. The project was relevant to the beneficiaries as reported in through challenges identified in baseline survey and during project evaluation and through the activities implemented through the project. The project activities, outputs, and outcome relate with the FTA thematic area and to the FTA ToC; with focus on improving economic empowerment, wellbeing, diversified livelihoods, environmental sustainability, gender equity, working conditions, resilient and empowered producer organisations and farmers. The project was also aligned to the County and national government’s development agenda. For instance, it followed recommendations made by the national taskforce on coffee (2016) especially on the need to improve quality and quantity of coffee. It is the vision of the national and county governments to improve the standards of living of all citizens especially through trade. Climate change continues to threaten livelihoods of small holder coffee farmers necessitating the need for alternative sources of income thus the objectives are very valid to the needs of the target group. Knowledge and skills are key in successful adaptation and mitigation to climate change thus the capacity building activities were of great importance-most of the technologies documented in the climate academy manual, an output of this project, will go a long way in sharing the knowledge among a wider audience. Despite the high capital requirement, the use of biogas for cooking was spreading slowly in Kericho and Nandi counties, mainly due to the high cost of construction material (attributed to high transport costs as road was in bad state during the project implementation period).

Efficiency. The project objectives were well formulated and the project enhanced value for money as activities were undertaken as planned and in a shorter time. There was some saving on fund on some activities, with savings of 3.79% on total budget. The project MEL framework was effective in realigning the project to its goal, and in sharing and documenting project progress-activities, outputs and outcomes.

Effectiveness and impacts. The project was successful in changing the livelihoods of the beneficiaries through the various interventions as reflected in improvement in value of assets, saving in time for sourcing of energy and energy cost. However, it is worth noting that the benefits of some of the interventions like fruits from avocado or macadamia shade trees or use of improved coffee varieties and domestication of the Fairtrade code in production, may take time before realisation, the project has certainly made a positive difference in the lives of the beneficiaries. Use of biogas and/or improved cookstove as an alternative to the traditional jiko for cooking has freed time among women to focus on alternative sources of income like poultry keeping. For instance, in Machakos, 16.7% of the respondents among the participating FCSs reported having started IGAs while 21.4% were affiliated to a VSLAs compared to 15.1% and 9.7% respectively, in control group. In addition, the value of assets, a good measure of economic status in the short run had improved; with a reported 39.4% and 27.2% increase for those in treatment and control group in Machakos and 25 and 21.2% for those in Kericho

groups respectively. The trainings were reported to be important and, the farmers reported utilising the knowledge acquired. Furthermore, trainings on governance had improved the SCOPE assessment score for 6 FCSs in Machakos from an average of 3.4 in 2017 to 3.5 in 2020. For example, close to 53% of the respondents in the treatment reported trusting the way cooperatives calculated and explained prices, and agreed that their cooperative had improved since 2017, and with 40.3% noting that managers are able to make better decisions now compared to three years ago.

CAP was found to have had some community impact. For instance; VSLAs had improved social interaction and cohesion amongst the community; The coffee roaster installed for MCU is expected to increase returns on coffee, and therefore improve incomes of the community through better prices; IGAs and biogas construction jobs had already started creating employment, including to women and youth, in the rural areas, and in the long run is expected to lead to reduced rural-urban migration; the proportion of respondents accessing credit had improved significantly in the treatment (23.3% compared to control 16.7%).

The study found that the project had mainstreamed gender in its implementation, as reflected in the gender analysis survey as well as MEL and other reports which factored gender and youth. The participants reported youth composition in their membership, with 21.7% of target beneficiaries in Kapkiyai being youth, while participation of women in decision making was high for treatment group; for example, 76.7 % of respondents reported that women in treatment group in Machakos were involved (singly or jointly with husbands) in decision making on selling of coffee; this was higher than in control group (61.9%).

The sustainability of the project is demonstrated through the strengthening of FCS management on governance which is critical to better decision makings and will remain within the producer organisations even after the project ends. In addition, the technologies promoted and the establishment of demonstration farms will ensure that beneficiaries continue to benefit from these interventions. Local promoter farmers who were trained live among the communities and are likely to continue being consulted by farmers while the natural growth of VSLAs will continue to provide access to financial services to the communities. However, the lack of structured linkage to market for some of the products from IGAs like poultry and or fruits could affect their sustainability.

Lessons Learned

- Projects that have activities that lead to quick returns/incomes and technologies that are current are easily taken by the youth.
- Recruitment of key project staff early in project implementation ensure smooth and effective project implementation.
- Qualified and appropriate management of institutions are key to ensuring collaboration, smooth project implementation and beneficiaries' participation
- Provision of adequate time as well as adherence to timelines identified during initial project development ensures that activities are implemented as planned, and the desired impact is realized.
- Gender mainstreaming need be factored early including in concept development; delays in undertaking the gender analysis and failure to include gender considerations in project development may limit effective gender mainstreaming.

- When project has a short time period some aspects might not be fully implemented and also desired benefits might not be realised within project time frame;
- Variations in geographical conditions for different project sites can vary the cost of the different technologies; increasing cost in some situation
- When key stakeholders are involved from in the project, it helps bring and improves on synergies and support from other stakeholders like County government.
- It is important to consider, as much as possible, a value chain approach in interventions because omitting key value chain activities such as market linkages may limit their success.

Good practices

- An efficient and participatory MEL arrangement incorporated early in project ensured efficient implementation of projects
- Tailoring interventions along local solutions or building on local systems (like chamas to VSLAs) enhanced adoption of new technologies and approaches, and improved the success and ownership of the initiative, as beneficiaries easily identified with it.
- Proper planning in the initial stage ensured smooth and timely project implementation, mapping of the stakeholders, definition of their roles and management of their expectations.
- Undertaking baseline study helped in ensuring that the concerns of beneficiaries were factored into the project; the strengths and roles of stakeholders were understood and the right stakeholders were selected; and that realistic targets are set
- The use of institutions already established in the target area, like MCU in Machakos, improved project acceptance and contributed to its success due to close monitoring. Such institutions continue undertaking some activities long after the project ends. Also use of institutions, like We Effect, familiar with project sites and with experience in handling similar project components and working with beneficiaries ensured smoother implementation of projects.
- Organizing groups meeting at the respective FCSs ensured better participation of members, as has been seen with the VSLAs. This is improving relationship between management and members as well as cohesion among them.
- Use of local trainers and artisans was an effective way of provision of technologies and skills, as beneficiaries have quicker access to services and also associate well with local providers of such technologies.
- Piloting technologies through the FCSs was an effective and cost-effective way of transferring technologies; there is trust, possibility of wider reach, and sustainability of the started activities through continuous support by the FCSs
- Building on lesson from previous project, and scaling efforts earlier initiated ensured a quick start and implementation of project; for example, building on Women in Coffee biogas project in Nandi and Kericho.
- Use of promoter farmers, ToTs as well as documentation of good practices, success stories and experiences like it was with the development of the climate academy

manual, will facilitate the sharing of the same to a wider audience thus having a multiplier effect.

- Interventions which are not complicated to adopt, and whose benefits are multiple, like the use of avocado/macadamia as shade trees (provide shade, fruits, timber and fuel) or chicken (provide eggs, manure and meat) were easier to promote among smallholder farmers as they do not require heavy capital investments like greenhouses.
- Use of locals to train youth as masons for biogas projects was well received and will increase sustainability of the initiative as the knowledge to implement it is within the community.
- Smallholder farmers organized in cooperatives are influential in getting local leaders make policies in their favour, like it was in Machakos, which led to the enactment of the cooperatives bill and establishment of a Chief Officer coffee position in Machakos County.
- Regular reporting as well as frequent, timely and effective communication strengthened project implementation.

Scalability and replicability

It is possible to replicate or upscale the following interventions in the same project areas and / or in other areas with similar characteristics;

- VSLAs
- IGAs and especially poultry and coffee roasting
- SALM technologies and practices especially on coffee shade trees
- Renewable energy technologies; biogas, cookstoves and solar energy
- Use of promoter as an extension methodology and use of local artisans to support technology fabrication and transfer
- Strengthening of SPOs on aspects promoted through CAP

Recommendations –

General recommendations

- Developed projects should strive to enhance the success of introduced initiatives through offering more support services such as linking farmers introduced to production of for example poultry to the markets. There is also need to support input supply and loans access to boost production for the farmers, for example through better linkages.
- There is need to have activities that target the youth, like projects that have quick returns and have current aspects desired by youth; for example, training on simple technologies such as biogas and solar installation, or translation of the short message service in local dialects or any other initiative which captures the use of information technology and social media.
- Target should be improving farmers' welfare and not the enterprise, so project should also factor in support programmes or activities that improve farmers' livelihoods for example irrigation in the arid areas of Machakos.
- Proper communication, especially on financial matters and expectations, should be in a timely manner to avoid misunderstandings; a communication plan need be factored during project development and implemented throughout to enhance this.

Recommendation to FTA

Planning and project design

- There is need to include key stakeholders early in project planning, to ensure their continued participation and support to project.
- There is need to ensure that an exit strategy is incorporated in project design, such as development of a program for example through discussion with the County governments for project extension or new donor support, to enhance market linkage like for poultry in Machakos. A similar program could be supported to ensure in Kericho and Nandi, biogas beneficiaries' access easily and cheaply materials for repairs and maintenance of biogas units.
- Complete bill of quantities needs to be developed during project development to avoid budget escalation; for example, the poor road network increased BQs for Kabng'etuny biogas systems.
- There is need to have budgetary provision to motivate ToTs
- Differentiated budgeting based on varied conditions of each partner (FCS), would be needed. For example, for Kakuyuni production had gone down and they needed more than training to bring the farmers back. Funding and number of technologies provided should be based also on the size of the FCS and not a flat rate figure for all participants.
- FTA need to build capacity and recruit staff in the various project components instead of using other partners; this could lower the cost of project implementation. Furthermore, there ought to be proper succession planning in every project to ensure no delays in case of staff movement

Project implementation

- Baseline survey should be done early in the project cycle starting immediately after kick off, so as to establish the actual status of key aspects of the ground as well as create awareness about the project. This will enable the project implementer to measure impact easily, as well as map stakeholders and clarify their roles. Furthermore, understanding specific beneficiaries needs way early before implementation of key project activities, helps in setting realistic targets
- Piloting of technologies through demonstration sites closer to the farmers' farms, so that farmers do not travel far to see technologies. Moreover, farmers would relate more with results if they happen at a colleagues/neighbours farm than at a factory facility.
- A more supportive and sustainable framework to promoters needs to be included in proposal development; for example, by providing them with monthly stipend to support their welfare especially in the initial phases of project, then allow them to take over once the demand for their services increases.
- Training on biogas construction should be longer, with artisans being taken through all aspects including trouble shooting and maintenance of the systems. In addition, a similar program, to train artisans to fabricate incubators, construct poultry houses, greenhouses or install solar systems in Machakos would have enhanced sustainability.
- A project of this nature requires longer implementation period to ensure enough time for various activities as well as realisation of results. If possible, adjustments ought to be made to make up for time lost inadvertently, like due to elections (as it was in 2017) or pandemics

Recommendations to Beneficiary Groups (FCS)

- There is need for continuous skills upgrade to promoters and local artisans so that they can continue to support farmers with wider and emerging skills and technologies
- The experiences of Mwatati on transformation of VSLAs to SACCO needed to be shared with other VSLAs to ensure more sustainability in the VSLAs
- Arrangements should be put in place for FCSs to support in procurement materials for biogas construction and repairs through acquisition and transportation; this would not only lower the cost and allow timely repairs, but also improve sustainability by enhancing ownership.
- Projects should target sustainability at the micro (household) rather than macro (society) level especially for ownership of the activities
- There is need to scale out trainings on financial literacy that were undertaken to few but was rated as useful, with such training impacts being felt through the VSLAs
- The efforts of promoters can be expanded by factories expanding internship opportunities for agricultural graduates who can also support promoters' efforts.

Summary of activities planned and achievement

	Initial planned activities	Achievement
Output 1 Improved institutional and management capacity and are capable of making decisions and managing climate change and associated risks	Conduct 9 SCOPE assessments	9 done initially, 6 done for post evaluation
	Curriculum development, based on assessment reflection	Fully achieved
	Training on financial management and premium use.	Fully achieved in the 6 FCS
	Development of internal control systems- policy and procedures, clear governance and succession structures	Fully achieved in the 6 FCS
	Training on Leadership & Governance	Fully achieved in the 6 FCS -8 trainings on management, 74 participants
	Facilitate improved access to affordable financial services	Fully achieved in the 6 FCS -39 VSLAs with 1170 members
	Training on social policies- gender inclusion, child protection.	Fully achieved in the 6 FCS
	Carry out gender analysis to identify barriers to female participation in POS	Fully achieved- 1 report done
	Participatory development of social policies	Fully achieved
	Lobbying county and national government on funding of adaptation strategies	Fully done- in Machakos
	Fairtrade Systemwide Learning	Fully achieved
	Communication through SMS pilot	Fully achieved- Piloted in Machakos

Output 2 Improved farmer's resilience to climate change through sustainable agricultural land management practices and Disaster Risk Management	Carry out climate change awareness and sensitisation training at PO and Union level	Fully achieved in the 6 FCS-9 sensitizations done on climate change
	Carry out Risk and Opportunity Assessments at SPO level. ROA will generate SLAM menu specific to each PO	Fully achieved in the 6 FCS
	Develop Farmer Field School Curriculum that will include promotion and training in identified SALM practices	Fully achieved in the 6 FCS
	Identify and train Promoter Farmers (TOT)	Fully achieved in the 6 FCS-180 promoter farmers identified and trained
	Promote adaptation of identified SALM practices including organic farming & agroforestry	Fully achieved in the 6 FCS-24 demo plots established in the 6 FCSs. 30,000 seedlings distributed to 3200 farmers
	Promote coffee shading including establishment of shade tree nurseries & distribution of seedlings.	Fully achieved in the 6 FCS- 30,000 seedlings distributed to 3200 farmers
	Establishment of demonstration plots	Demo plots in 5 FCS and MCU-24 demonstration plots established
	Support SPOs in development of Disaster Risk Response and Management Plans	Fully achieved in the 6 FCS
Output 3 Increased opportunities for Machakos Union, selected primary societies and women members to promote an energy switch to renewable energy	Machakos union and affiliate societies supported to manage the coffee husk waste by making briquettes for sale.	Not done. Instead switched to support Machakos union and affiliate societies to value-add coffee for local and export market by roasting and packaging the roast coffee. 10kg roaster acquired and installed
	Promote use of solar energy at PO level	Solar systems Installed at 6 at FCSs, 5 at household level
	Promote use of energy saving cooking stoves among women farmers	300 units installed at household level
	5 days hands-on training of 10 artisans per cooperative as ToTs.	Fully achieved in Kapkiyai and Kabng'etuny- 34 artisans (8 females, 26 male) trained
	Set up demonstration units in every FC	Fully achieved in the 6 FCS- demo units setup in 6 FCS
	Promote use of biogas among women farmers in Kapkiyai and Kabgetuny	205 (80 Kabng'etuny, 125 kapkiyai) biogas units out of targeted 280 units constructed
	Construction training materials	Fully achieved
	Quality Management paid t BCE	Fully achieved
	Materials and labour for biogas construction	Materials for 205 biogas units out of targeted 280 units acquired

Output 4 Increased opportunities for households of smallholder coffee farmers to diversify and engage in alternative income generating activities	Training on farming as a family business	Fully achieved- 750 farmers, 45 youth and 86 management board members trained on farming as a family business
	Selection and analysis of alternative income generating activities at farmer level	Fully achieved -fish ponds, tissue culture bananas, poultry, avocados and macadamia, apiculture selected as IGAs
	Facilitate training of individual farmers on financial literacy and in Village Savings & loans	Fully achieved-39 VSLAs with total of 1170 members in the 6 targeted SPOs formed and members trained
	Establishment of greenhouses and drip irrigation systems at PO level	Installed at 5 FCS and MCU
	Training on selected AIGAs	Fully achieved
	Training on marketing and access to markets of AIGAs	Fully achieved
Monitoring & Evaluation & upscaling	Monitoring Evaluation & Learning Manager	Fully achieved
	Development of Academy Guide, including meetings, communication, field visits etc.	Fully achieved
	Project Audit Fee	To be done
	External baseline and end of project evaluation	Being done under this evaluation

About the Report

This Draft Report provides the results of an end term evaluation of the Coffee Farmers in Dire Straits (Climate Academy) Project implemented Fairtrade Africa and partners in Machakos, Nandi and Kericho counties, Kenya. The report has been prepared by Noble Consultants Company limited as per the Terms of Reference (TOR) for the assignment.

This report presents a detailed analysis of the results of the assignment. It presents objectives of the assignment, a synopsis of the methodology adopted and key findings. The report is organised into seven sections arranged to ensure a logical flow of information; **Chapter 1:** offers a background and objectives to the assignment; **Chapter 2:** presents an overview of the global coffee value chain as well as an up to date information of the Kenyan coffee sector. In addition, the details of coffee production in the three counties where the project was implemented, as well as the role of Fairtrade Africa in coffee industry are highlighted; **Chapter 3:** in this section, the methodology and the overall approach to the assignment in particular is presented; **Chapter 4:** the major findings of the study are presented following the DAC criteria in addition to case studies and lessons learnt from the project; **Chapter 5:** presents key conclusions and recommendations drawn from the study; **Chapter 6:** presents some of the reference materials used to develop this report; and **Chapter 7:** comprises of the appendices to the report.

1 INTRODUCTION

1.1 Background and Rationale

Fairtrade Africa (FTA) is an umbrella organization representing Fairtrade certified producers in Africa and the Middle East. Fairtrade Africa is a member of Fairtrade International, the umbrella organization for Fairtrade worldwide. FTA works within the Fairtrade system to support over 1.1 million farmers and workers in over 500 producer organizations spread in 33 countries. The support to producers is aimed at enabling them to maintain their Fairtrade certification which enables them to access better prices, decent working conditions and fairer terms of trade. Fairtrade Africa interventions are guided by the Fairtrade Theory of Change (ToC), a generic theory which visually expresses how Fairtrade's interventions ultimately contribute to the desired change that is aligned with the three Fairtrade Goals: Make Trade Fair, Improving Sustainable Livelihoods and Empowerment of workers.

The Coffee farmers in Dire Straits project aimed to increase the climate change resilience of coffee farmers organized in 8 Kenyan Smallholder Producer Organizations (SPOs) through training and subsequent application of insights, skills and techniques designed to better adapt to climate change.

Noble Consultants Company Limited was contracted to undertake the end term evaluation for phase 1 of Coffee Farmers in Dire Straits Project following a positive consideration of their proposal as per the Terms of Reference (appendix 1).

1.1.1 Purpose, Objectives and Scope of the Assignment

The overall objective of the evaluation was to provide an opportunity for the partners to review the performance and achievement following the implementation of the first phase of the Coffee Farmers in Dire Straits Project. This process is expected to inform FTA decision making, improve the design and guide implementation of related projects in the future. The evaluation was guided by the Fairtrade Theory of Change, the project Monitoring, Evaluation and Learning (MEL) framework and followed the Organisation for Economic Co-operation and Development (OECD) evaluation criteria. Specifically, the overall purpose of this exercise was to:

1. Assess the relevance and effectiveness of the project and determine the project contribution to the Fairtrade Theory of Change.
2. Review the efficiency in the implementation of the project including but not limited to the implementation approaches adopted.
3. Identify the impact of the project and any sustainability measures put in place.
4. Identify lessons learnt and propose recommendations from the project implementation.

1.1.2 Scope and Deliverables of the Assignment

The two main aspects of the assignment were desk review and fieldwork. The Coffee Farmers in Dire Straits project had been implemented in Republic of Kenya in the counties of Machakos, Kericho and Nandi. A total of eight (8) coffee producer Organizations were involved of which six (6) were in Machakos county located in the Eastern part of the country, one (1) each in Nandi and Kericho Counties located in the Rift Valley region. As listed in the TOR, the deliverables for this assignment were two reports (inception and final), project key summary findings (fact sheet) a power point presentation and submission of any relevant material/information related to the assignment.

1.2 About Climate Academy Project (CAP)

1.2.1 Overview of CAP

The project came out of realisation that coffee farmers are affected by the climate change. This saw the development of a project to address this concern. *“Climate change is threatening the existence of coffee and coffee farmers. We can’t solve this problem in a day, but we would like to work together with you to use the Climate Academy to make farmers more resilient and consumers more aware by means of Scarce Coffee”* (Reinier van den Berg). The concept was refined with input and agreement among We Effect, Machakos Cooperative Union (MCU), FTA and Max Havelaar. The Climate Academy Project was developed to increase the climate change resilience of coffee farmers organized in selected FCSs through training and subsequent application of insights, skills and techniques designed to better adapt to climate change.

1.2.2 CAP Partners

The project was implemented through either FTA or We Effect and through MCU in Machakos and directly to the two cooperatives in Nandi and Kericho. We Effect through the Programmes Officer, oversaw the implementation of the project and particularly on outcomes 2 and 4. The day-to-day activities were carried out by the project Officer designate from MCU.

We Effect is an international development cooperation organization founded in 1958 by the Swedish cooperative movement. It works in 25 countries in Asia, Europe, Latin America, Southern and East Africa. We Effect operates within two main thematic fields, namely Sustainable Rural development and Adequate Housing. In addition, Environment and Climate change, Gender equality and Financial Inclusion are the mainstreaming themes implemented alongside each of the two main thematic areas. In East Africa, We Effect operates in Kenya, Uganda and Tanzania and supports 37 partner projects involved in various value chains including coffee, dairy, timber, cotton and housing.

Machakos Cooperative Union (MCU) is affiliated to 35 primary coffee cooperative Societies, 45 other forms of cooperative Societies and 26 producer groups. MCU focuses on improving the livelihoods of the farmers, producers, employees and customers through provision of support in production, processing and marketing of high-quality products. The Union is Fairtrade certified together with 25 coffee cooperatives. Directly it supports the livelihoods of over 60,000 farmers and their households in Machakos and Makueni Counties who are engaged in coffee farming.

1.2.3 CAP Activities

The following were the planned and implemented CAP activities;

- i) *Strengthen the capacity of the farmer organizations*

The project was geared to have the coffee FCSs improve their institutional and management capacity to enable them to make decisions and take action to more effectively tackle climate change. This was done through various trainings such as on financial management and premium, leadership and governance, social policies and gender inclusion. The FCSs were also to be involved in training modules development, organizational capacity assessment, gender analysis and development of internal control systems (ICS)- policy and procedures, clear governance and succession structures. This included 8 trainings on key management

concepts, (like roles and responsibilities of board members, financial management, role of gender, etc) offered to 74 participants who were members of management boards of the FCSs.

ii) Make agriculture more climate resilient

This was geared to improved farmer's resilience to climate change through sustainable agricultural land management practices and Disaster Risk Management. Activities included; conducting 9 climate change awareness and sensitization training at PO and union level and sensitizing farmers on the same, training of 180 promoters (trainers) and subsequent training of farmers through the promoter, promote adoption of identified SALM practices including organic farming, agroforestry and use of shade trees through the FCSs demo sites and promoter farmers trainings; and linking SPOs to Meteorological Department institutions and county DRM committees to assist in developing Disaster Risk Response. 7 sensitization and awareness sessions were conducted targeting 6 FCS. The sensitization sessions focused causes of climate change, effects and impact and was supported through use of farmers a Trainee of Trainers approach was used. To promote widespread adoption of SALM activities, 24 demonstration plots were established in 6 FCS. Also, a total of 10 tree and coffee shade tree nurseries were established. This translated to 30,000 shade tree seedlings being distributed to 3,200 farmers in the 6 SPOs.

iii) Offer new opportunities to switch to sustainable energy

This was geared to increased opportunities for Machakos Union, selected primary societies and women members to promote an energy switch to renewable energy. It involved promoting adoption of solar energy, promoting use of energy efficient cook stoves among women farmers in Machakos, use of biogas among women farmers in Kapkiyai and Kabng'etuny, and training of youth and women on energy efficient stove making and biogas digester construction. The activities involved training of youth artisans on biogas construction (masons) and construction of biogas to farmers. It also involved construction of cookstove to households in Machakos. 80 biogas units were established in Kabng'etuny and 135 in Kapkiyai; also 11 solar demonstration units were installed (4 at FCSs and 5 at select households) in Machakos, while 300 improved cook stoves have been installed in Machakos at household level. A total of 34 masons (8 females and 26 males) were trained to support biogas construction and maintenance.

iv) Develop new income-generating activities

The activity sought to increase opportunities for households of smallholder coffee farmers to diversify and engage in alternative income generating activities. It involved first a study to identify the opportunities and promotion through training on alternative IGAs. The FCSs were supported with incubators (one for each FCS), and 10 nurseries for seedlings to act as shade trees and also provide an alternative income, including avocados and macadamia trees), 40 tissue culture bananas seedlings per FCS, one greenhouses complete with a drip irrigation system per FCS, that were to be used as demonstration and also support farmers. Farmers were also trained on farming as a family business and on marketing. This activity saw 750 farmers, 45 youths and 86 management board members trained on farming as a business. In Machakos, 39 VSLA groups with a total of 1,170 members in 6 SPOs were formed with a portfolio of USD 160,000. Other activities involved training and financial support that resulted to establishment of a number of enterprises; 6 fish ponds; one apiary was set up in each of the FCS in Machakos; 6 incubators with a capacity of 580 eggs; tissue culture bananas farms in the 6 FCS; and 5 greenhouses and drip systems in the FCS. A 10kg/hr roaster was

also established at MCU (as a result of project plan adjustment- from outcome 3 to 4) as well as establishment and support of 6 fish ponds (each with a capacity to produce 200 mature tilapia) at Mwatati FCS.

v) *Develop a Climate Academy Guide and short message texting platform*

This activity involved putting together the learning from CAP phase 1 and developing a Climate Academy Guide that will be used in other unions within East and Central Africa. The guide has 8 chapters written in easy-to read language complete with pictorials. Through monitoring evaluation and upscale, best practices in climate change adaptation and mitigation were documented adopting a farmer centric approach; it includes topics such as climate change, soil and water conservation, coffee tree management, agro-forestry, waste management and Farmer planning for climate change adaptation and mitigation. Related to this was installation of a short message texting platform to share information with farmers. This system has been very effective especially in relaying messages to farmers-for instance, MCU used the system to communicate to the participating FCSs of the dates of this end term evaluation as well as requirements and measures to be put in place to ensure the activity was successful. This included arrangement to ensure compliance with the government guidelines on COVID-19. It has also been used to call for general members meetings among others.

2 A LOOK AT THE COFFEE INDUSTRY

2.1 The Global Outlook

Globally, coffee continues to be among the most important agricultural commodities. Both production and consumption appear to have stabilised at slightly above 650 million bags over the past 4 years (2015-2018). According to the International Coffee Organisation (ICO), global coffee production grew by 7.0% between 2017 and 2018. Consumption remained steady with a marginal growth of 2.1% between 2016/2017 and 2019/2020 coffee year. The European Union, USA, Japan, the Russian Federation and Canada remain the leading importing countries, accounting for over 76% of total coffee imported during the 2019/2020 production year. With this growth in consumption, it is important for Kenya, whose coffee production is in demand worldwide to develop strategies to increase both quantity and quality. Such strategies may include smallholder farmers switching from “subsistence” to “entrepreneurial” coffee farming, government interventions, adoption of sustainable production systems as well as value addition and marketing targeted for the global specialty coffee markets. However, more need to be done especially at the domestic market to increase local consumption of coffee. Marginal growth in consumption has been noted among the middle class in urban towns where coffee shops have been set up. This trend should be increased by growing consumption at the household level even in rural environments. Moreover, the government should consider strategies to make Kenya a leading exporter of quality coffee, thereby earning the country the much needed foreign exchange. Such strategies should include efforts to lower the cost of production, boost production and productivity at the farm level, as well as improve quality of the final product.

2.1.1 Climate Change and Coffee

Many scholars have noted that the global climate has been changing over the years, with key changes noted in temperature and rainfall quantities and patterns. Coffee as an agricultural crop traded internationally, is grown in open field conditions in most countries under rainfed system, therefore changes in the environmental factors is likely to affect production and quality. Temperature and rainfall have been reported to affect crop phenology, and consequently productivity and quality (Hagggar and Schepp, 2012; Initiative for coffee and climate, 2015). However, others have predicted impacts to be both positive and negative on production. For instance, while drought has been reported to result in reduced yields and growth in distribution of pests and diseases in major global coffee producing countries, an increase in production is predicted for niche high altitude areas; also predicted is an increase in pollination and the potential benefits of elevated carbon concentration (Pham et al., 2019). Irrigation is likely to mitigate effects of drought, but increase in temperature beyond 24°C is likely to affect quality and quantity negatively (Hagggar and Shepp, 2012). Other changes like in the altitude suitable for coffee production may have socio-economic impacts on farmers (Hagggar and Schepp, 2012). In Kenya, coffee production has been shifting from some “traditional” zones, like some parts of Machakos, to new regions, like the highlands west of the rift valley, due to challenges attributed to climate change. Various climate change mitigation and adaptation strategies (including adoption of sustainable land management practices, use of improved certified seedlings, use of scientific data to plan for various activities, like weather data to guide the application of sprays and fertilisers) have been proposed and smallholder farmers need to be empowered to implement them.

2.2 Coffee Value Chain in Kenya

2.2.1 Production

Kenya predominantly grows the Arabica variety, which is processed using the wet method. The initial varieties are SL28, SL34, K7, Blue Mountain, Ruiru-11 and Batian. The crop is mainly grown as a cash crop in medium altitude zones (1,400 and 2,000 m) of central, eastern, western and some parts of coast region as shown in figure 2.1. The high production zone being the triangle formed by Mt. Kenya, the Aberdare Ranges and Machakos Town – essentially the former Central and Eastern Provinces which account for about 70% of Kenya’s coffee production. Production has fallen over the years from a high of 130,000 metric tonnes in the 1990’s to the current average of 40,000 metric tonnes (Taskforce, 2016). However, this is expected to change in the near future as new growing areas are being established, especially in the Rift Valley region while irrigation may boost production in the traditional coffee areas in the low altitude zones.

Coffee in Kenya is produced by close to 800,000 smallholders (organized in 550 cooperatives societies) and 4000 plantation growers (KALRO, 2019). There are two harvesting seasons namely: October until December (main crop) and May-June (light crop). Production has been fairly stable over the last five years with a slight increase in 2018/2019 (Table 2.1) attributed to good weather and initiatives by both national and county governments. After production, the red ripe cherry is selectively harvested and taken to a wet mill where the pulp is removed. The parchment is then cleaned, graded and dried in the sun on raised beds before being taken to a dry mill where it is hulled and polished to get the green beans. Kenyan green coffee is graded into seven classes (AA, AB, PB, C, E, TT and T) before marketing. Marketing of coffee is either through the Nairobi Coffee Exchange (central auction) or direct window where dealers sign contracts directly with FCS to purchase their coffee, and is regulated by the Agricultural and Food Authority (AFFA).

Table 1: Production, Area and Average Yield of Coffee by Type of Grower between 2014 and 2019

	2014/2015	2015/2016	2016/2017	2017/2018	2018/2019*
AREA (Ha)'000					
Cooperatives	87.8	88.2	88.8	89.5	90.8
Estates	25.7	25.8	25.9	26.1	25.4
PRODUCTION (Tonnes) '000					
Cooperatives	27.2	30.8	24.5	30.4	30.9
Estates	14.8	15.3	14.2	11	14.1
AVERAGE YIELD (Kg/Ha)					
Cooperatives	319.3	361.1	279	344.4	347.4
Estates	601.6	619.4	525.5	426	543.2

Source: Economic Survey (2019)

2.3 Overview of Coffee production, Socio economic and climate factors in Machakos, Kericho and Nandi

Generally, coffee is grown in areas with high potential for agriculture: -moderate climate (15-24°C), deep fertile red well drained volcanic soils and good well distributed rainfall. Machakos county is in the eastern part of Kenya and is classified as an arid and semi-arid area, while Kericho and Nandi counties are high potential areas in the rift valley.

Machakos county faces a couple of environmental challenges which has affected water levels in rivers, water pollution by industries upstream, deforestation and climate change (erratic rainfall, droughts and rise in average temperature). However, the county has put in place several strategies to mitigate the impacts of climate change like awareness creation, afforestation, enactment of various legislations. Introduction of drought resistant crops and livestock will enable farmers to adapt to the changing climate. The county has 315 registered cooperatives cutting across all sectors (production, financial and investment). Coffee and mangoes are the main cash crops grown on 5000 ha and 6000 ha of land, respectively. Coffee is currently grown in Kangundo, Machakos and Donyo Sabuk at an altitude from 1400m -1830 m above sea level. Average annual rainfall in the coffee growing areas is 685 mm. Estates and smallholder coffee farmers have approximately 1,877 and 6526 ha under coffee with a total combined production of 4246 metric tons. Most of farmers are under the Machakos Cooperative Union (MCU) which is affiliated to 35 primary coffee cooperative Societies, 45 other forms of cooperative Societies and 26 producer groups. The Union is Fairtrade certified together with 25 coffee cooperatives. It directly supports the livelihoods of over 60,000 farmers engaged in coffee farming (FTA, 2019).

Nandi and Kericho counties are high potential agriculture areas with good climate and fertile soils. Tea, dairy, maize, sugarcane and horticulture are main agricultural enterprises. Nandi has bimodal rainfall pattern with annual average ranging from 1200mm to 2000mm makes it possible for rainfed agriculture. Although the county has not experienced serious changes in rainfall as yet, trends point towards increasing climate risks which may affect livelihoods in future. In Kericho impacts due to climate change such as rising temperature have been noted. Expansion of farming activities as well as population pressure is a main cause of environmental degradation. However, both counties have developed strategies to ensure sustainable development; for instance, the CIDPs of 2018-2022 have given a number of strategies on mitigation and adaptation to climate change. However, these efforts need be supported by other stakeholders to ensure wider impacts

In Kericho and Nandi hills, the area under coffee was 557 ha and 2879 ha for estates and smallholder farmers, respectively, with a total annual production of 1,238 metric tons. The main varieties grown are Ruiru -11 and Batian and some S 28 & SL 34. Smallholder farmers are organized in 51 cooperative societies with a total of 12,909 active members (KCTA, 2012). Kericho and Nandi Hills are promising coffee growing zones and have recorded increased expansion and investments in the coffee sector in the recent past.

3 APPROACH AND METHODOLOGY

3.1 Research Design, Approach and Analytical Framework

3.1.1 Overall approach

This study used a consultative and participatory approach to collect relevant qualitative and quantitative data. Multiple data sources; primary and secondary were used to assess the performance and achievement of the project.

Overall, the assignment had two key components i.e. assess the performance and achievement of the project and drawing recommendations and lessons learned.



Figure 1: Key Areas of the Analysis

3.1.2 Research Design and Methodology

The consultants used a mixed method approach, integrating quantitative, qualitative and observation methods to ensure triangulation of data. Apart from in-depth interviews with key informants (KI) and management of producer groups & project owners, the Consultants also administered questionnaires to the project beneficiaries and held Focused Groups Discussions (FGD) to build consensus on critical aspects of the project. Samples of the tools (questionnaires, various KI interview guides, and observation checklists) used for data collection are appended to this report.

The study made use of the Theory of Change (ToC) and the project MEL framework to collect information on key results of the Climate Academy Project in view of capturing results on increased resilience to climate change among coffee farmers in the participating Small Producer Organizations (SPOs). It made use of all available Climate Academy Project documents, and interviewed Project team members, farmer (groups), government officers; and conducted relevant field visits to collect data. The Fairtrade ToC was reconstructed or visualised in line with the Climate Academy Project as shown below.

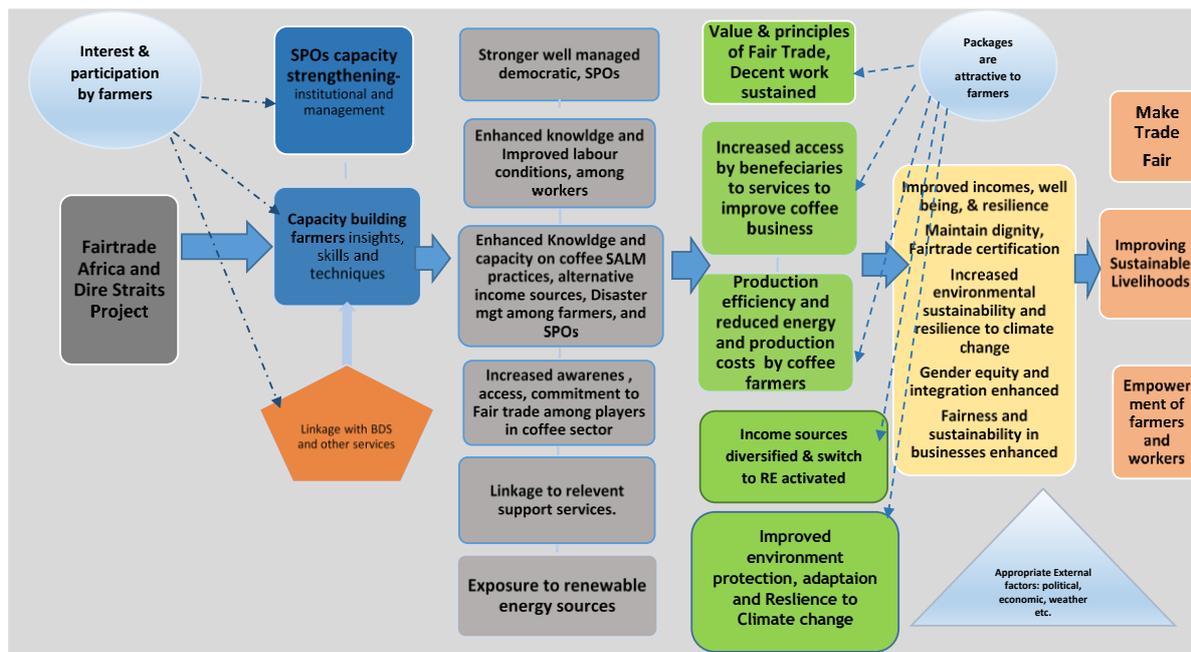


Figure 2: Reconstructed Theory of Change (ToC) for the Climate Academy Project

The questions were developed along the various components of the ToC. The questions were also related with DAC criteria and along the targeted value chain activities. For instance, under inputs questions assessed the efficiency in inputs uses; while under activities the effectiveness was assessed and these were related to the outcomes; while under outcomes the intended and unintended positive and negative impacts were assessed. In line with the OECD/DAC-criteria, the evaluation determined the level of achievements of the programme in terms of relevance, effectiveness, efficiency, sustainability and impact. The assessment of impacts was strengthened through use of other approaches such as attribution, Ritcher scale ratings, assets and income changes, cost and benefit analysis. From the information collected, case studies, lessons, best practices as well as cross cutting issues were highlighted. The study findings were then used to draw conclusions and recommendation to support future programming.

The tools developed for capturing both quantitative and qualitative data included the: Household questionnaire; FGD checklist; KII checklists that were administered to relevant government ministries departments, financial institutions, Cooperative managers, partners and project staff (FTA and We Effect); and IGAs checklist and observation checklist

Sampling Approach and Sample Sizes

The sample size for the smallholder farmers was determined using Feed the Future programmes recommended formula for beneficiary farmers (Stukel and Friedman G, 2016).

$$\text{initial sample size} = n = \frac{N^2 \times Z^2 \times S^2}{MOE^2}$$

where:

N = total number of beneficiary farmers

z = critical value from Normal Probability Distribution

s = standard deviation of the distribution of beneficiary data

MOE = margin of error, a product of target indicator and acceptable percentage error

Consequently, a total of 101 respondents were targeted in the treatment and 50% of these number (Israel, 1992) was selected for the control. The control was drawn from neighbouring FCS who were not part of the CA project. Purposive Sampling technique was used to identify and pick other respondents like county government cooperative and agriculture departments staff, the chief officer coffee in the county government of Machakos County- who was established after the project started and the manager T-Tot hotel Machakos (a leading buyer of chicken) as they were perceived to be relevant to the impact assessment depending on their roles within the program (See appendix for details).

3.2 Analytical Framework – Data Analysis Approach

Content analysis was used to analyze the *qualitative data* to determine areas of commonality within the responses and correlation with secondary project information and data. Key intermediate outcome indicators were analyzed using Difference in Difference technique to assess the differential effect of a treatment on a 'treatment group' versus a 'control/comparison group' support by significance test. This method helped to isolate project impact on outcomes.

Descriptive statistics was used to compare, for example, changes in the measures such as perception on changes due to project.

Information from data collected through SCOPE Insight was arranged along key thematic areas for analysing the cooperatives and rated using Richter scale to make it quantitative and easy for further analysis.

4 RESULTS

4.1 Brief Overview of the FCSs and Machakos Union (MU)

The identification and selection of the FCS's to participate in the project was based on a number of reasons; most importantly being Fairtrade certified. For Kericho and Nandi, the selected FCS's were participants of the Growing Women in Coffee Project (GWIC); funded by Big lottery fund, UK. The project among others which was facilitating farmers support on good agricultural practices, organization development, asset transfer and the construction of masonry biogas units targeted at the women coffee farmers. The GWIC project was winding up by the time the CAP was being initiated thus making the Kapkiyai and Kabng'etuny FCS in Nandi and Kericho counties respectively, worthy participants. In Machakos, all the 6 participating FCSs were affiliated to Machakos Cooperative Union (MCU), an umbrella organization for 81 primary organizations (comprising of cooperatives (of which 35 grow are coffee growers) and women groups are serving over 60,000 individual members) spread across 15 sub counties in Machakos and Makueni counties. MCU's mission is to improve the livelihoods of her members by supporting production, processing and marketing of high-quality products. Consequently, the specific FCS's in Machakos were selected based on zones, sizes, and vulnerability to impacts of climate change, with Kakuyuni and Kitwii being affected most by later. The table below shows the characteristics of the FCSs selected to participate in the CA project.

Table 2: Farmers Cooperatives societies, membership and the number of workers

FCS name		Machakos				Nandi		Kericho	
		New Mitamboni	Mwatati	Musilili	Mukuyuni	Kitwii	Kakuyuni	Kapkiyai	Kabng'etuny
No. of factories		5	2	1	1	2	5	1	1
No. of farmers	M	1257	686	440	550	382	781	289	988
	F	624	343	270	269	156	355	356	336
	Total	1881	1029	710	819	538	1136	645	1324
No. of workers	M	20	8	4	6	2	6	6	9
	F	12	4	2	6	1	6	2	2
	Total	32	12	6	12	3	12	8	11

Source: Secretary managers, FTA reports (2020)

The membership to the FCS's was reported to have been going down due to challenges facing the coffee sectors; and mainly the low prices offered to farmers.

The FCSs render both commercial and technical services to farmers; with farmers rating marketing and processing; access to productive assets including inputs; cost, benefits and risks sharing; fair and transparent governance; access to loans; and innovation and technology transfer as benefits they seek and mostly receive through SPOs and through FTA producer and relation services support.

4.2 Socioeconomic Characteristics of Sampled Farmers in the 3 Counties

4.2.1 General socio-economic characteristics

The average age of the respondents' family head for the CAP beneficiaries was 61.3 and 52.0 years in Machakos and Kericho/Nandi, respectively. Among the control, the average age for the family head was 57.2 and 58.2 years in Machakos and Kericho/Nandi, respectively. These are within the average age of 60 years for Kenyan farmers reported by UNDP (UNDP, 2020). The ages also relate with baseline survey values where average ages were found to be 58.2 in Machakos and 47 years respectively, given 3 years have passed since the baseline was done. This senior age is likely to affect future production since older people may not adopt new technologies quick enough to overcome emerging challenges like climate change, as well as general succession of coffee farming, thus interventions to bring youth on board are extremely necessary.

Literacy levels among project participants were noted to be high with 70.2% and 78.4% of the beneficiaries and control, respectively, in Machakos having post primary education. For Kericho/Nandi, the figures for the same were 57.1% and 41.7% among the treatment and control, respectively. In Kericho and Nandi, 42.9% and 58.3%, respectively, had primary education compared to Machakos 29.2% and 18.9% for treatment and control, respectively. The other spouse or the other household decision makers in the family had almost similar levels of education. The high education level means the farmers targeted had the potential to receive and understand information passed through CAP training well.

Majority of the farmers in the project areas are either full time or part-time farmers. In Machakos 81.9% the CAP farmers were full time farmers, while in Kericho and Nandi the full-time farmers were 81.0%. The proportion relates well with that of control group where 78.4% and 83.3% of the farmers respectively were full time farmers. The remaining farmers were in salaried employment or were running own businesses. This implies that majority of the farmers are ready to dedicate enough time to coffee farming activities thus interventions through this project to improve their livelihoods through increased production hence incomes from coffee farming, improved their attitude towards coffee farming, thus better rewards for their efforts.

Average household size was 5.5 (2.8 male and 2.7 female) and 5.2 (2.7 male and 2.5 female) members for Machakos treatment and control groups respectively; and 6.9 (3.1 male and 3.8 female) and 8.6 (4.8 male and 3.8 female) for Kericho treatment and control groups respectively. This is higher than the national household size of 3 as per data from the 2019 census by the Kenya National Bureau of Statistics (KNBS). The average household size as per KNBS (2019) is 4 for the three counties.

The household characteristics were therefore comparable for the treatment and the control group in the two areas; this strengthening the comparability of the two group. The composition of the household influences coffee production as some roles such as harvesting are done by females while spraying is done by males. Consequently, households with few females or male members rely on hired labour to undertake some specific activities.

4.2.2 Coffee production

The coffee farmers involved in the project are small holders with average farm sizes 2.3 acres (range of 0.5 to 7 acres) in Machakos, and 3.3 acres (range from 1.5 to 12 acres) in Kericho and Nandi counties (Table 3). Inheritance was the dominant mode of acquiring land as reported

by 78.0% and 95.2% of the respondents in Machakos and Kericho, respectively. A few others (12.5% in Machakos and 52.3% in Kericho/Nandi) had rented or purchased part or whole farm. The land sizes compare well with baseline survey figure, where average land sizes were an average of 2.4 and 2.8 acres in Machakos and Kericho respectively. Since inheritance was the predominant mode of land acquisition, the land sizes are expected to shrink further as household heads always subdivide their land to their sons, in most rural areas. This is likely to affect coffee production as the farms will become too small hence economically unviable to undertake coffee farming as a business. Therefore, it is important for stakeholders to develop strategies to overcome this emerging issue if coffee has to remain a key commercial crop for the counties and national economy.

Table 3: Land size, area under coffee, number of trees and years growing coffee

Item	Machakos-treatment	Machakos-control	Nandi and Kericho-treatment	Nandi and Kericho-treatment
Average land size (acres)	2.3	1.9	3.3	2.9
Acreage under coffee (acres)	0.89	0.94	1.72	0.54
Average no. of coffee trees	386	359	1097	279
Average years of growing coffee	30.3	29.2	19.6	18.6

In Machakos the farmers mainly grow SL28 (94.4%) with some few (13.3%) having adopted new varieties; mainly K7, Ruiru 11 and Batian. In Kericho most farmers had mixed varieties with Ruiru 11 being the most dominant (66.7%) followed by Batian 52.3%) and SL28 (19.0%). Coffee is fairly young in Kericho compared to Machakos, having being introduced much later thus most farmers had adopted the new varieties.

Majority of farmers grow coffee under rainfed, with only 1.4% and 9.5% irrigating their coffee farms. The farmers are embracing good coffee production practices, like the use of organic fertilisers, soil conservation practices and timely control of diseases resulting in better quality cherry, with only average of 3.3% of coffee and 2.7% of coffee being rejected at factory in Machakos and Kericho respectively, and with the rejects mainly used as Mbuni. The small proportion of rejected cherry may be attributed to the success of the promoter farmers efforts who visit members and train them on various aspects including harvesting and postharvest handling of cherry. On average the coffee production declined in 2019 from the 2018 levels (figure 4) due to the little rainfall in the three areas, this affected the potential gains that would have been realised through the CAP project. However, production data for New Mitaaboni for the year 2018 was not easily available-this was attributed to challenges related to management of records probably due to issues related to governance-however, the availability of the same for the year 2019 is an indicator that the trainings undertaken by the CA project is having positive impact.

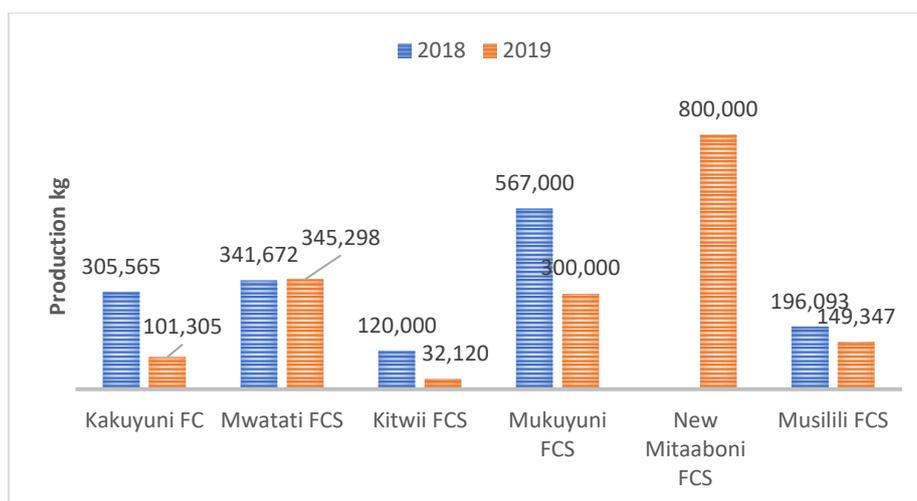


Figure 3: Production in the six FCS in Machakos during the project period

4.3 Findings along key thematic areas and DAC criteria

4.3.1 Relevance

Relevance to County and Country

Broadly the project was geared to increasing the climate change resilience of coffee farmers organized in Small Producer Organizations. In all the three Counties covered by the project there is reported evidence that smallholder farmers are experiencing increased climate variability and climatic change and environmental degradation. In Kericho the County is concerned about the effects of climate change with indication that the effects have particularly become frequent and more severe over the past two decades presenting huge additional burden towards sustainable development of the county. The 2018-2022 CIDP cites over reliance on wood fuel one of the major contributors of environmental degradation which deplete the forest cover; with the report indicating that majority of the residents, 80 percent rely on wood fuel for cooking while 14.4 percent use charcoal.

In Nandi, the threat is also recognized, and the County through 2018-2022 CIDP report notes that wood fuel forms the main source of energy with over 90 per cent of the population (urban and rural) depending on it. The use of firewood and other related human activities leading to deforestation have become a major environmental threat.

In Machakos, data from the Global Forest Watch indicates that deforestation like through for example high use of firewood has led to great reduction of trees cover from 7853 ha in the year 2000 to 6497 ha in 2018 (representing a 17% reduction) (Mongabay, 2020) which has negatively affected attraction of rain. The CDIP 2018-2022 report notes of the effects brought about by climate change; prolonged periods of drought, erratic rainfalls and rise in average temperatures have led to low agricultural production across the County.

In all the three counties, the governments have put in place several strategies towards mitigation and adaptation to climate change, which include both policies and programmes. For instance, Machakos county government has been advocating for tree planting while the CIDPs for Nandi and Kericho county governments mention provision of improved coffee seedlings, all of which are in line with the CA project. The desires of the counties are to have

more of these to address the problem of climate change, with any extra projects and support from other stakeholders being desirable; hence the relevance of this project to the counties.

Relevance to coffee farming

Of major concern in the three counties project areas is effect of climate change on coffee production. According to Nelson et. al. (2010) and Initiative for Coffee and Climate Change (2015); climate change is already affecting coffee production. This is because of the nature of coffee; as a woody perennial specie, the crop, has a lower photosynthetic rate than most annual crops and this has implications for their ability to respond to changing climatic conditions. Thus, the promotion of the use of shade trees as one of the interventions of the CA project, as well as the provision of seedlings to farmers is very relevant to the current situation. Apart from providing shade to the coffee, these trees have other benefits including improved biodiversity, improved microclimate as well as financial benefits like income from sale of fruits or timber and food & nutrition security as fruits are key in provision of nutrients. The authors note that in many coffee-growing regions a combination of lower rainfall and higher temperatures will render production unsustainable by 2050, at lower elevations where the crop is currently cultivated. Introduction of irrigation as well as use of improved coffee varieties and use of weather data in planning farming activities like spraying are timely and will slow or completely stop decrease in production as a result of changing climate. The CA project interventions like the use of shade trees are not only mitigating the negative effects associated to climate change but will also improve food and nutrition security while at the same time, provide an alternative source of income to smallholder coffee farmers, upon maturity of the shade trees.

Relevance to FTA

The project activities relate well with the broad FTA thematic areas, goals and activities as detailed in figure below:

Table 4: Relevance of the Climate Academy project activities to FTA thematic areas

Fair trade principles and principles	CAP Objectives/outcomes	Main directly related principles to CAP outcome	Subsidiary related principles
1. <i>Creating opportunities for economically disadvantaged producers</i>	A. Eight producer organizations have strengthened their communities to better mitigate their risks	2, 8	All
2. <i>Transparency and accountability</i>	B. Improve farmers resilience to climate change through sustainable agricultural land management	10, 1, 8	3, 9
3. <i>Fair trading practices</i>			
4. <i>Payment of a fair price</i>			
5. <i>Ensuring no child labour and forced labour</i>	C. Increase opportunities for Machakos Union, selected primary societies and women members to promote an energy switch to renewable energy	10, 6, 8	1, 7, 9,
6. <i>Commitment to non-discrimination, gender equity and freedom of association</i>			
7. <i>Ensuring good working conditions</i>			
8. <i>Providing capacity building</i>	D. Increase opportunities for HH of smallholder coffee farmers to diversify and engage in alternative income generating activities	1, 8	6, 7, 9, 10
9. <i>Promoting fair trade</i>			
10. <i>Respect for the environment</i>			

The activities of the CAP project were also directly or indirectly related to the FTA intended impacts as visualized in the ToC. The impacts as from ToC include improved income, wellbeing and resilience among small producer and worker households, that directly link with outcome 4 of the project, but was also in other outcomes; enhanced gender equality and intergenerational sustainability in rural communities which related well with outcome 3, but also was in other outcomes; Increased environmental sustainability and resilience to climate change, that related directly with outcomes 2 and 3; Dignity and voice for small producers and workers at local, national and global levels, that was more embedded in outcome 1 and 4; Transparency and equitable distribution of risks and rewards in supply chains, that was in all outcomes; and Fairness and sustainability embedded in business practices, policy and societal norms for production and consumption, which was also in all outcomes.

Relevance to beneficiaries

The coffee farmers involved in the project are small holders with farm sizes of 2.3 acres in Machakos and 3.3 acres in Kericho. These farmers had challenges that were being addressed by the project. The project addressed challenges identified in the baseline survey and during project development (*see case study Leah Nyambura of Kapkiyai FCS in the next chapter*). These included low adoption of sustainable energy practices; high cost of energy; lack of alternative income sources; low productivity -reducing coffee harvest and the quality of the beans due to climate change; limited access to appropriate shade tree seedlings and also limited use of shade trees.

The issues addressed by the project were found to be relevant up to the end, with beneficiaries indicating some of the challenges still remained unresolved; for instance, by the time of the evaluation, coffee farmers in Machakos were yet to reap full benefits of shade trees as this intervention requires time for the trees to reach maturity, or to grow the VSLAs in Mukuyuni and Musilili FCSs to sustainable SACCOS require longer duration. This is attributed to the high magnitude of the challenges that could not be fully addressed through the project. Moreover, the short implementation period of the project made it impossible to realize fully the desirable impacts. The project implementation time was short for the benefits of some of the interventions to be fully realised thus in future, it is recommended to consider matching project lifetime to interventions in order to allow at least the realisation of the beneficial impacts before exit.

4.3.2 Effectiveness and Impact

The CAP activities contribution to delivery of output and achievement of project objectives were analysed along each objective, and positive and negative impacts (and intended and unintended changes) to farmers and broader sector are discussed below.

i. Changes in the socio-economic situation of farmers and their households

Coffee was found to have changed as the main source of income in Machakos; with it being first (by 59.1% of the respondents) and second (25.8% of the respondents) main source of income in 2017. In 2019, the last year of the project, 40.9% and 31.8% of the respondents reported coffee as the first and second source of income, respectively. The situation was not different in control given that it was a first and second source to 33.3% and 51.3% in 2017 and 30.05 and 37.3%, respectively, in 2019. The effect of poor rainfall affected all FCSs. The shift

was to other sources of incomes such as livestock, employment and other crops. The trainings on alternative sources of incomes such as poultry, tissue culture bananas, avocado, macadamia seemed to have caused a slight change to the beneficiaries with those who had started alternative incomes in Machakos being 16.7% compared to 15.1% of control group. However, some of the IGAs like avocado and macadamia farming, require time to fully benefit the farmers, hence the small difference. Thus, in planning future projects, the consultant recommends matching the project lifetime to the duration required for the maturity of most of the key interventions.

The households in Machakos distributed their incomes among various expenditure with food taking 37.3%, education (24.5%), personal items (12.7%), savings (12.4%) and health (12.0%), with others expenditure taking the rest. On average most of the respondents had received some improvement in ability of farmers to finance their basic needs. Almost half of the respondents (46.5%) reported improved ability to finance food. On average the economic status and quality of live were seen to have changes as shown in figure 5 below.

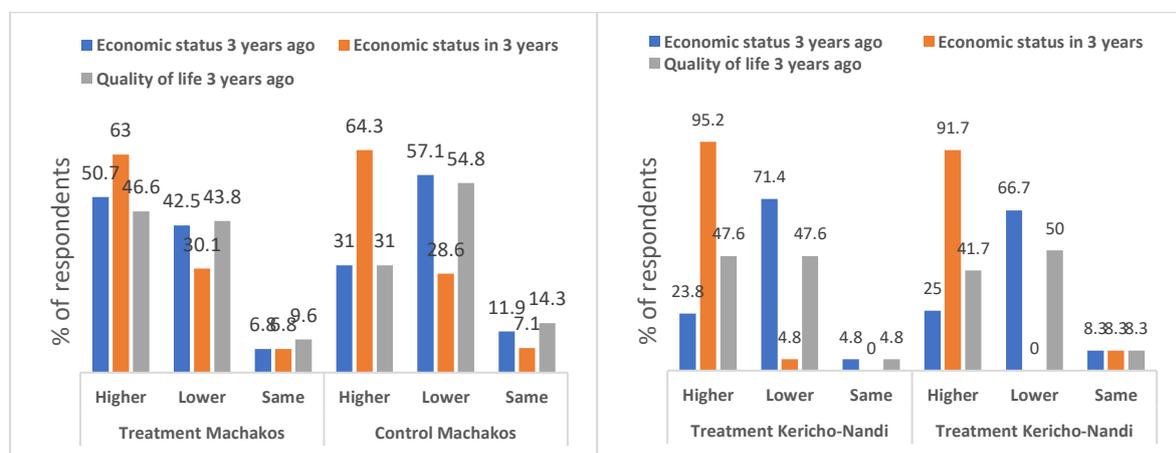


Figure 4: Economic status and quality of life measures before, during and after the project

The low prices of coffee seemed to have affected farmers in Machakos more, that lowering their income levels. Based on the last cherry payments of KES 56 and KES 16 per Kg for farmers in Kapkiyai and Kakuyuni respectively the gross margins have been worked (from FGDs information) out to be KES 96,000 for Kapkiyai and KES (-38,742) for Machakos. This is despite average expenditure in Kapkiyai being higher (KES82,200 per acre) than Machakos (KES 55,642). The low margin for Machakos is coupled by the reported potential number of trees of 500 per acre compared to 1000 per acre in Kapkiyai. The breakeven prices for Kapkiyai being KES 24, while for Kakuyuni was KES 65. The lower incomes from coffee in 2018/2019 season seemed to have affected farmer's view of economic status. In Machakos, more farmers in the control (57.1%) reported that their economic status was lower now (2019) compared to the same time three years ago (at the start of the project) (2017) compared to 42.5% in the treatment. The responses were different in Kericho with 71.4% of the project participants feeling their economic status was lower compared to 66.7% in the control. There was also a high proportion that felt quality of life in 2019 was better than 2017. Many were also optimistic that economic status would improve in three years to come.

There was slightly higher number of respondents in treatment saving their incomes with 76.7% in Machakos (higher than 72% during baseline survey) and 76.2% in Kericho and Nandi,

compared to 73.8 and 75.0% in control in the two areas, respectively. Majority of respondents saved in commercial banks. However, in Machakos, where VSLAs were promoted 21.4% in the treatment group compared to 9.7% in control group saved in the VSLAs. The farmers also saved through mobile platforms like Mpesa and Mshwari, whereas a few others were in SACCOs, or kept cash at home.

The VSLAs have helped improve access to credit and help improve agricultural production, particularly in Kakuyuni this has triggered increased investment in coffee production as farmers can access credit to purchase farm inputs. The VSLA concept has now been adopted outside the 6 FCS and about 80% of FCS in Machakos were said to have started their own.

The incomes from coffee dropped in 2019 compared to 2017 (Table 5) mainly because of the low rainfall. This affected both the control and treatment group. In Kericho, farmers have been planting more coffee, compared to Machakos where the average number of trees have slightly reduced; a factor attributed to the low international prices of coffee.

Table 5: Change in income from coffee, coffee productivity, area under coffee and assets

		Machakos		Kericho	
		Treatment	Control	Treatment	Control
Income from coffee (KES)	2017	35,239	29,967	95,600	16,990
	2019	16,681	21,143	96,758	30,805
	Change	-18,558	-8,824	1,158	13,815
	% change	-52.7%	-29.4%	1.2%	81.3%
Average area under coffee (acres)	2017	0.90	0.97	1.39	0.53
	2019	0.88	0.97	1.71	0.52
	Change	-0.02	0.00	0.32	-0.01
	% change	-2.7%	-0.4%	23.0%	-1.9%
Average number of trees	2017	398.60	373.2	809	268
	2019	388.90	366.80	1078.00	255.00
	Change	-9.70	-6.40	269.00	-13.00
	% change	-2.4%	-1.7%	33.3%	-4.9%
Coffee harvested (cherry) (kg)	2017	1328.50	807.4	2621.1	735.6
	2019	727.60	735.8	2358	433.00
	Change	-600.90	-71.60	-263.10	-302.60
	% change	-45.2%	-8.9%	-10.0%	-41.1%
Productivity per acre (kg/acre)	2017	1472.838	828.9528	1885.683	1387.925
	2019	828.7016	758.5567	1378.947	832.6923
	Change	-644.137	-70.39607	-506.736	-555.232
	% change	-43.7%	-8.5%	-26.9%	-40.0%
Total value of six selected assets (KES)*	2017	171,988	41,581	30,600	37,062
	2019	239,755	52,884	38,250	44,913
	Change	67,767	11,303	7,650	7,851
	% change	39.4%	27.2%	25.0%	21.2%

*value per household of: electricity connection, draught animals, wheelbarrows, hand hoes, TVs, and mobile phones

There various aspects on change due to project were indicated to have changed either slightly or highly (Table 6). For example, 44.5% in treatment group and 25.0% in control group in Machakos indicated that the production per tree or per acre had slightly to highly increased; with the remaining proportion reporting that the production per tree had remained same or reduced (annex). Although there was a decline in yield in 2019 due to low rainfall, productivity per acre was still higher for treatment group than of control group.

The household items estimated from six expenditures (representing various agricultural, luxury and house development items) on electricity, wheelbarrows, draught animals, hand hoes, televisions, mobile phones increased for both control and treatment group. The increase was higher for treatment groups; as reported by 39.4% respondents for treatment group in Machakos compared to 27.2% for control; and 25.0 and 21.2% for treatment and control, respectively in Kericho. Expenditure on assets is a better representation of average incomes over some recent years and reflects a comparative higher change in wealth for the treatment group, compared to control group.

Table 6: Proportion reporting slight to high changes in some household parameters

<i>Assessed parameter</i>	<i>Group</i>	<i>% reporting slight to high change in Machakos</i>	<i>% reporting slight to high change in Kericho</i>
<i>Total household income</i>	<i>Control</i>	50.0	50.0
	<i>Treatment</i>	57.2	95.3
<i>Production per tree or per acre</i>	<i>Control</i>	25.0	-
	<i>Treatment</i>	44.5	-
<i>Total production in Kgs of coffee per year</i>	<i>Control</i>	25.0	33.3
	<i>Treatment</i>	40.0	95.2
<i>Area under coffee</i>	<i>Control</i>	0.0	0.0
	<i>Treatment</i>	9.5	38.1
<i>Income from coffee</i>	<i>Control</i>	0.0	83.3
	<i>Treatment</i>	15.5	95.2
<i>Income through alternative sources</i>	<i>Control</i>	100.0	-
	<i>Treatment</i>	84.1	-
<i>Ability to pay for health for family</i>	<i>Control</i>	25.0	16.6
	<i>Treatment</i>	54.5	95.3
<i>Food security</i>	<i>Control</i>	25.0	33.3
	<i>Treatment</i>	63.7	90.4
<i>Cost of energy for cooking</i>	<i>Control</i>	25.0	16.7
	<i>Treatment</i>	28.9	19.1
<i>Others Perceived benefits e.g. on health</i>	<i>Control</i>	-	16.7
	<i>Treatment</i>	-	85.7

The beneficiaries associated the changes to project as indicated in figure 6. For example, 90.4% associated the changes they reported (either reduction or increase) in cost of cooking energy to the project; with the remaining proportion associating the changes to other factors.

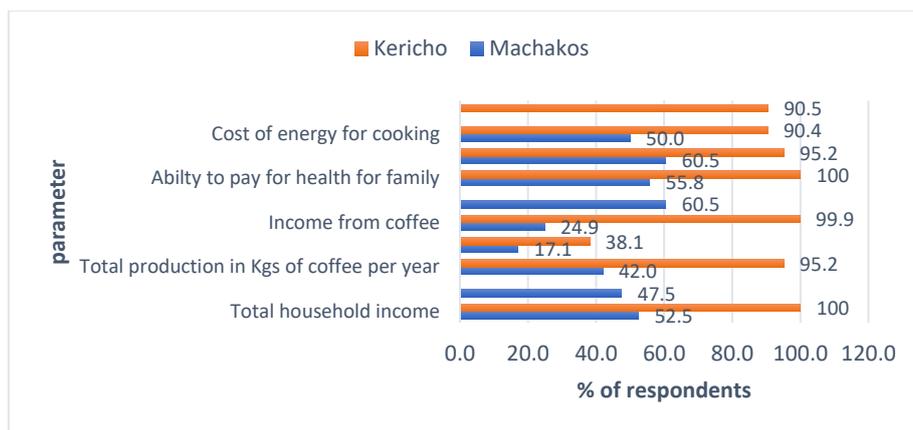


Figure 5: Percentage of beneficiaries associating (slight to highly) the change in parameters to project



Mr Stephen Kilonzo joined the CAP project in 2017 and has benefited from the project through trainings on IGAs like poultry farming and renewable energy use, among others. He has since setup a raised vegetable garden (*on the right*). Through Musilili CAP chicken incubator, he recently took 20 eggs for incubation and was charged Kes 10 per egg; with 18 of the eggs hatching. He has been selling the chicken at different prices depending on the age; at Kes 350, Kes 600 and Kes 800. For the Kes 800 chicken the breakeven price was 400. Before the CAP training he was hatching the chicks using the natural process (using mother hen as brooder), a method he said had lower hatching rate, could only do few eggs at a time, depended on broodness of the hens and also was also not continuous for a given hen. He said that the chicken business, through which he sells about 20 chicken per month, has enabled him to expand his agribusinesses especially the dairy cows, where he is putting up a modern zero grazing from which he wants to install a biogas unit; knowledge that he got after sensitization through CAP project.

Through his wife, he has used the knowledge acquired through CAP to install an energy saving cookstove that is used to cook food and also provider heat to the young chicks (*on the left*).

He hopes to expand his business, now that he has access to incubator at Musilili Farmers Cooperative Society. He however cited a challenge in accessing good market for the chicken, like where he could sell more chicken at a time, and hoped this would improve.

The study assessed the change in assets between 2017 and 2019. The main roofing material in Machakos and in Nandi and Kericho was mainly iron sheet with only 4.8% in Kericho treatment and 25% in control group having thatch roof. There was an improvement in use of iron sheet in Machakos treatment group with 97.5 using iron sheet in 2019 compared to 90% in 2017. Respondents attributed the source of resources to purchase the iron sheets was coffee proceeds coupled with income from IGA, especially poultry. The main material for walls in the three counties was bricks, there was a slight increase in use of quarry stone in Kericho treatment with 4.8% using quarry stone compared to 0 in 2017. There was no usage of quarry stones in control group.

The study assessed access to water and energy in the three counties. Majority of farmers relied on streams and rivers and roof catchment. The usage and access to selected energy option and sanitation is as indicated in table 7 below.

Table 7: Access to improved energy and sanitation services by households

	Machakos		Kericho and Nandi	
	Treatment	Control	Treatment	Control
Improved latrines	60.3	61.9	47.6	25.0
Use of firewood for cooking	81.9	85.9	14.3	91.7
Use of solar for lighting	19.4	26.2	37.3	16.7
Use of electricity for lighting	67.1	59.5	57.1	83.1

There was more usage of firewood in the control compared to treatment groups in the three counties.

Despite the general increase in prices for items, there was an increase in the number of household assets purchased during the project period. Most of the assets purchased included farm tools as well as luxury items; for example, in Machakos, more farmers in the project reported having purchased a motorcycle (average was 0.08 per household in 2017 compared to 0.12 in 2019), while ownership of bicycle shrunk by the same margin. Similarly, more farmers (0.21) in the project were connected to the national grid for electricity compared to control (0.19). Moreover, more farmers in the treatment (0.19) constructed improved cook stoves during the project period compared to the control (0.12). The ownership of other household assets was generally balanced in treatment and control. Adoption of the other technologies like solar energy systems and greenhouses was slow among individual households probably due to high initial capital requirement. Thus it would be worthwhile for FTA to consider interventions which would make these systems more affordable for local farmers to fully adopt them. Such interventions may include engaging key stakeholders like county governments to factor them in their plans for instance by supporting local entrepreneurs or investors to setup production facilities in the counties, or even partnering with national government to lower taxes payable.

In Kericho and Nandi counties 135 unit were installed in Kapkiyai, while 80 were installed in Kabng'etuny FCS. the ownership of biogas units had grown to for example 0.95 for respondents and 34% of Kapkiyai FCS members, while there was no change in the control group. While farmers interact outside coffee production activities, the increase in ownership of biogas units could also be attributed to availability of technical resources especially trained masons as well as the long duration the intervention has been promoted in the area, having

being championed by Women in Coffee project, the predecessor of the CAP (through which 220 units were provided) thus higher adoption. Some of the benefits accruing from the switch from firewood to biogas energy include savings in time required for cooking as well as money required to purchase firewood (refer to case study by Leah Mwaura) and most importantly, creation of employment opportunities for the youth (see case study Alice Jeptoo)

The farmers had undergone through various trainings that were geared to improving their agribusiness skills. Those in treatment group were more compared to the control group; with 61% in treatment group compared to 42.9% in the control reported to have been trained on farming as a business. This is an increase from the 39% who reported to have been trained in treatment in Machakos during the baseline survey.

Table 8: Proportion of farmers participating in trainings on agribusiness

	Group	%
Farming as a business	<i>Treatment</i>	61.1
	<i>Control</i>	42.9
Record keeping	<i>Treatment</i>	68.5
	<i>Control</i>	54.8
Financial literacy	<i>Treatment</i>	36.1
	<i>Control</i>	19
value addition of coffee-roasting and packaging	<i>Treatment</i>	11.1

The respondents indicated the trainings were helpful. With 93.2, 93.3, 96, 48.6% of those trained indicating the trainings were important (rating of 4) to very important (rating of 5). The farmer indicated to be practicing knowledge learnt with 68.5% in treatment group compared to 54.8% in control group in Machakos indicating to be practicing record keeping.

The project supported Machakos farmers with a 10kg/hr roasting machine. MCU will be able to offer slightly better prices to farmer given that a kg of roasted coffee goes for about KES 1000 compared to milled coffee that fetches about KES 30 at times. However, the impact of the roaster could not be measured yet as it had just been installed-MCU will need to engage in marketing of the roasted coffee initially within her members and eventually nationally. In Kenya, many coffee farmers do not consume their product as it is considered a premium export commodity grown for cash. While this intervention has the potential to improve smallholder farmers incomes from coffee, the project implementation period was too short to persuade people to switch from tea (the common beverage) to coffee. Moreover, the authors recommend a consideration for budgetary allocation to support marketing of the value-added coffee in future projects of similar nature.

ii. *Changes on strengthening of producer organisations*

The CAP project had objective of strengthening the FCSs through changes in the organization development and management and through trainings and support. on a number of select topics.

Trainings and the effectiveness

The Farmers' Cooperative Societies were trained and supported through various aspects including financial management, leadership and governance, by the CAP project. This was to strengthen the capacity of FCSs in management and also to pass the skills to their members. The management of FCS were trained on management related aspects such as; leadership and governance, internal management, social policies, climate change, financial management, risk

and opportunity analysis, disaster risk management; and on technical aspects as soil and water management, post-harvest management, farming as a business among others. An assessment of some of the trainings and their usefulness show that the trainings were highly rated; with all assessed trainings receiving an average score of about 4, on a scale 1 to 5, 5 being very useful and 1 not useful (Figure 7). Trainings covered wide areas; for example in Leadership and governance, they were trained on the role and responsibilities of board members, managing conflict of interest, policies and procedural formulation, leadership and productivity, recruitment practices among others; training on social aspects included such areas as child protection and gender; in financial management trainings included financial accounts and practices, Fairtrade premium plan development (FDP), record keeping and reporting, monitoring and evaluation of the implemented plans.

As a result of the training a number of changes in FCSs were reported; these included- evident separation of the roles of the board in oversight and operations that allows smooth running of the POs activities; conducting of FCS meetings/general assembly and deliberations in participatory manner; development and embracement of succession plans in all FCSs. These has been supported by having in place internal control system (ICS) that clearly defines the policies and procedures to be adhered to.

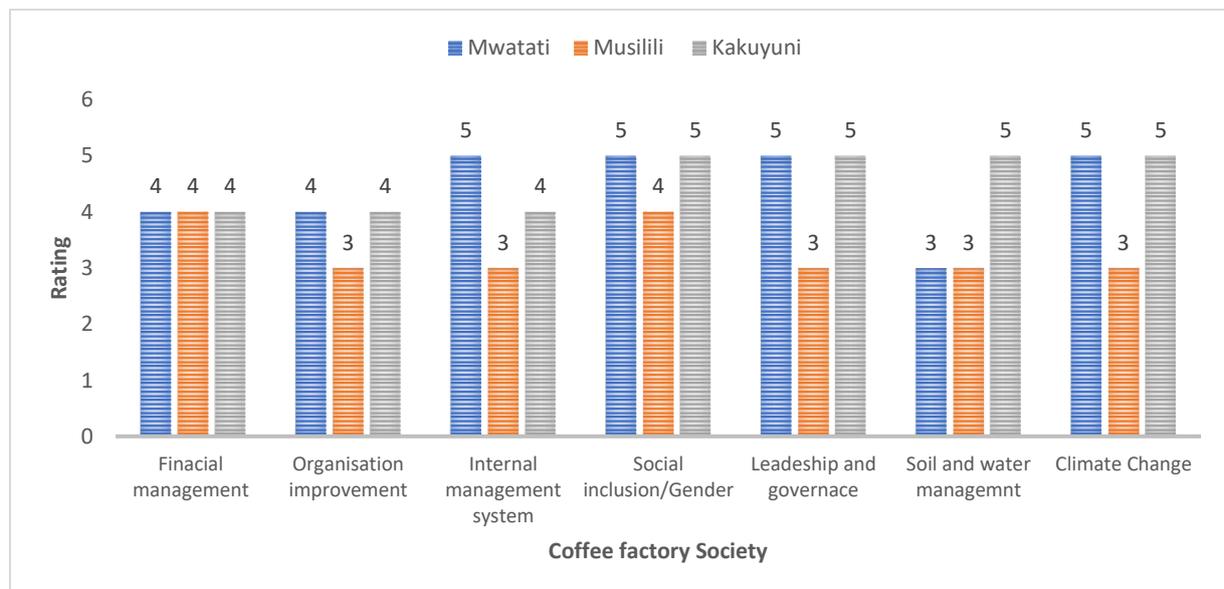


Figure 6: Ratings of the usefulness of the various trainings under the CAP in Machakos

Scope Assessment

FTA undertook an assessment of the six participating FCS in Machakos before and after the project using a SCOPE tool. The assessment dwelt mainly on analyzing the strengths and weaknesses of each FCS, for the purposes of self-improvement, capacity building, and monitoring and evaluation. After the assessment, a report showing the score (between 1 lowest and 5 highest) for eight business areas namely, internal management (governance and internal organization), operations (of storage and processing), financial management (e.g. financial management, record keeping, IGAs), sustainability (e.g. social and environment issues), supply (e.g. procurement, member oversight and training), marketing (covering e.g. risks and strategies), enablers (e.g. capacity builders, community, government) and external risks (e.g. awareness, mitigation) is prepared. The average of the score for the eight areas is an indicator of the level of maturity of the business entity.

According to the results of the SCOPE assessment (Figure 8), the six participating FCS in Machakos scored an overall average score of 3.4 and 3.5 at the start and end of the project.

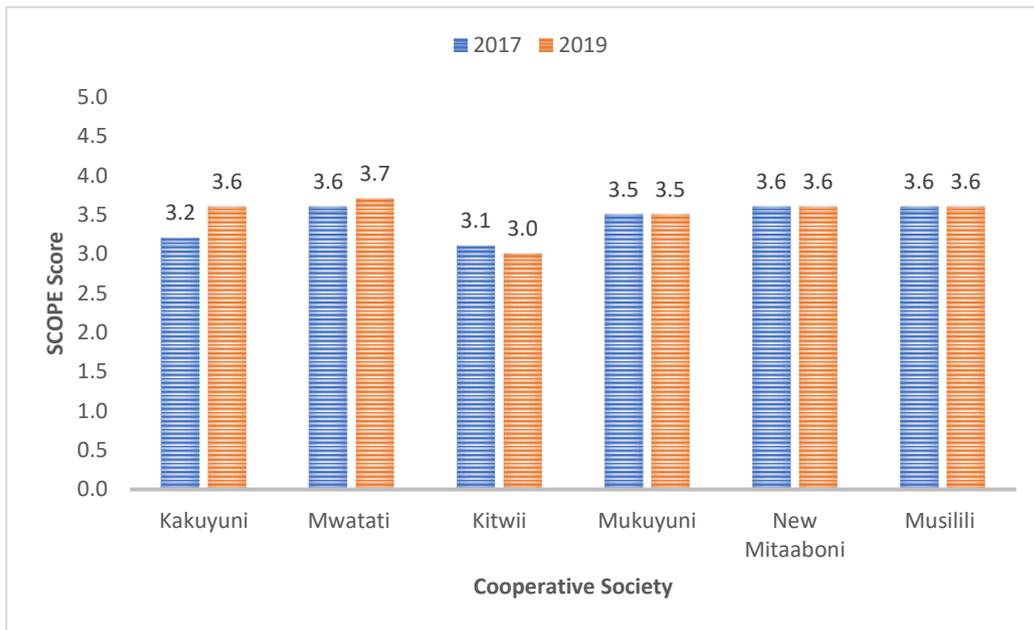


Figure 7: Overall Scope Basic Assessment score for the six FCS before and after the project

The improvement in the overall score may be attributed to the impact of the Climate Academy project especially training on governance, which improved their capacity on internal management (0.5 points) especially on making decisions to cope with external risks (+0.7 points) (Figure 9).

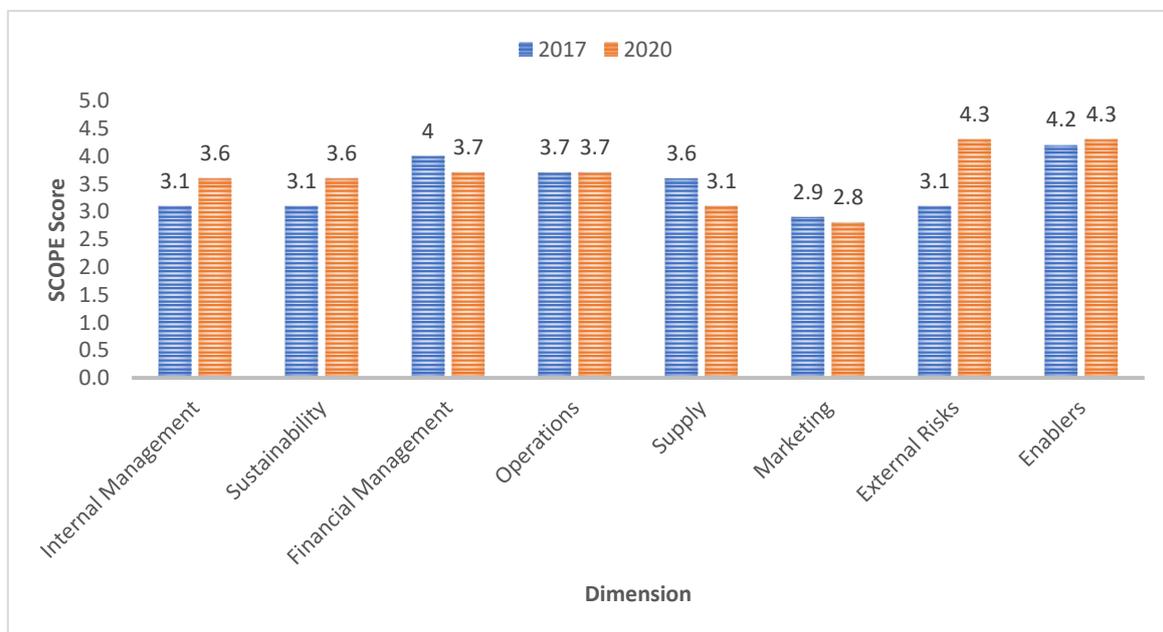


Figure 8: SCOPE Score for different dimensions before and after the climate academy project in Machakos

The internal management score increased by 0.5 as in figure 9 above. The increase was small due to the low participation by women; especially the low numbers in management or as factory employees in New Mitamboni, Kitwii and Mukuyuni. The other factories showed improvement in this area; more so due to improved participation of women in management. The sustainability measure improved by 0.5 due to project activities such as improved signage, diversification, climate mitigation promotion and SALM practices promotion and adoption; but limited by social pillar where some two factories didn't improve on youth participation. Similarly, the score for enablers improved by 0.1 points, while that of external risk improved by 1.2; which is attributed to among others the impact of the CAP in creating networks with stakeholders like county government of Machakos leading to the recognition of coffee as an important crop, awareness in climate change mitigation and adaptation, good relation with financial institutions, and ready international coffee. The county Government of Machakos enacted the Machakos County Cooperative Enterprise Development Fund Bill (2019) and recruited a chief officer for coffee rejuvenation after local leaders saw the work CA project was doing. The enabler and external risk dimensions score were however slightly lowered by among others, competition from private coffee buyers and limited extension services.

There was a drop on the financial management (-0.3), supply (-0.5) and marketing (-0.5) dimension; with negative drivers such as inability to control global coffee prices, limited marketing capacity of FCSs, high production cost, low staff number (like Kitwii had only one manager) outweighing the positive aspects such as competent staffs, quality checks enforcement, good legal system in some factories. The score could also be attributed to reduced production (Figure 4 in section 4.2) and low coffee prices (Figure 12), which affected cash flow in the FCSs during the project implementation period, as none of the entities have reserve funds.

The project implementation period was too short to reap all the associated beneficial impacts as some interventions e.g. planting trees for shade or alternative income generation take long to mature.

Farmers perception and affiliation to the FCS

Some selected measures were used to assess the changes in organizational and management capacity of the FCS from the farmers' perspective. There was marked difference between the treatment and control in terms of the treatment cooperative being better in most management related parameters. For treatment and control respectively, 95.9% compared to 90.5% in control agreed they deliver more than 90% of the coffee production to FCS, 52.8% compared to 52.4% trusted the way cooperatives calculated and explained prices, 40.2% compared to 30.9% agreed that cooperative had improved since 2017, and 40.3% and 30.9% agreed the managers are able to make better decisions since 2017. However, farmers in treatment rated feel of ownership and pride in belonging to cooperatives lower (59.7%) than control (71.8%). This is related to aspects such as on limitations in management in some cooperative like New Mitamboni, which was identified during the SCOPE assessment.

The low prices in 2018 crop seemed to have demoralized some farmers in treatment group probably due to the higher expectations, as 50% of the treatment group farmers compared to 42.6% of control indicated that if offered a price of more 20% of the FCS price, they would sell their coffee to such buyer. However, the farmers have not yet started selling the coffee to other buyers, as only 9.7% compared to 9.5% in control sell coffee outside the cooperatives. The higher rated services from the cooperative was the commercial one with 50.0% of farmers in

treatment group compared to 47.6% in control group expressing satisfaction; with the support on technical services being rated almost the same at 51.4% and 52.7%, respectively.

The farmers were prompt to point at the services offered by the cooperative, with proportionate weights of 24.3% for training, 31.4% for marketing, 25.7% for input acquisition and 15.7% for financial services for treatment group, compared to 17.9, 51.3, 20.3 and 10.3% for control. The higher rating on trainings and financial support indicates realisation of support offered through CAP; through training and VSLAs.

iii. Impact on farmers

Within the broad Fairtrade framework is the need to integrate, even if not directly, the decent working conditions within her projects and interventions. These include health and safety, fair working conditions, improved management systems to guarantee respect of workers right at the farm level and incorporate programmes to combat causes of child labour. Though this is a pillar in the Fairtrade goals, this principle needs to be focused in projects interventions. The study looked at the issues that relate with this Fairtrade principle.

There was high use of labour (both permanent and casual) by the treatment groups in Machakos and in Nandi and Kericho as in figure 10.

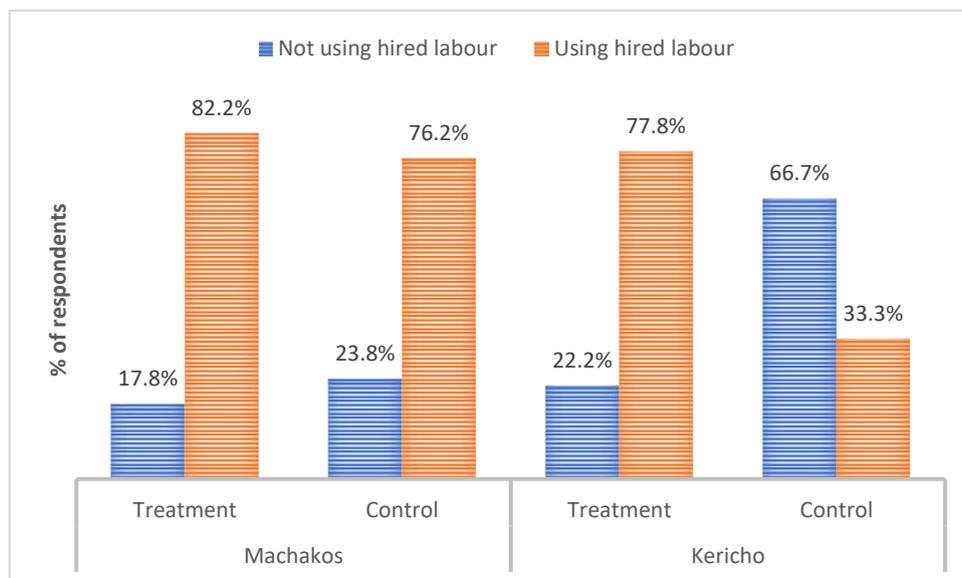


Figure 9: Use of labour in farm work in Machakos and Kericho

There was also proportionate good employment of permanent labour in many factories; with in the percentage of permanent workers during peak harvesting period being, New Mitamboni-33.0% Mwatati- 63.2%, Musilili- 20% Mukuyuni- 33.3%, Kitwii- 18.8%, Kakuyuni-33.3% Kapkiyai- 34.8% and Kabng'etuny 35.4%. The number of permanent labourers in these FCSs ranged from 3 to 32 in Machakos, with an average of 12.8; while in Kericho it ranged between 8 and 11 with an average of 9.5. Most FCS had almost an equal number of male and female labourers although all watchmen were male. Managers reported not giving heavy duties to women, especially expectant mothers.

The study didn't find visible cases of child labour abuse. Signages were posted in most factories indicating that only persons over 18years old were engaged. On use of child labour, since the

component was not handled by the project as one of the outcomes, majority felt the situation had not changed and hence many were still not abusing child labour; in Machakos it was reported by 84.1% that this had not changed since 2017, while 13.1% felt it had reduced, with only 4.3% feeling it had increased.

Though promoted, use of chemicals was found to be well undertaken, there was little participation of women in spraying activities; with women participation in chemical application indicated at 10% in both Machakos area and in Nandi and Kericho. This is attributed to training provided under the CA project, especially recognition of gender roles in coffee production as well as adoption of good farming practices due to a better appreciation of the Fairtrade standard. Women, particularly those who are pregnant, participation in spraying could also expose them more than men to health risks from the chemicals.

The remuneration to biogas artisans for biogas unit construction was appreciated by the artisans. The payment of KES 20,000 through the project and KES 15,900 to 18,600 for privately constructed biogas was reported to be enough.

In Machakos, the artisan of cookstoves and who mainly are women are able to charge 1,500 for every cookstove made for the farmers.

iv. *Changes in the local context and national development*

This study also assessed whether the CAP had some wider community impact through for example; empowerment of community; rural-urban migration reduction; improvement in bargaining power; market access; impact on coffee supply chain; changes in practice by supply chain actors; prices stability; social conditions; infrastructure; and impact on policies and regulations.

The VSLAs were reported to have improved social interaction and cohesion amongst the community, as members met frequently. The meetings are held at the FCS grounds thus making it easy for members to meet management, get updates on the welfare of their FCS, among others, unlike previously when members only visited factories to deliver cherry of get advances. With improved incomes from coffee through SALM and use of biogas slurry, the returns through premiums would have been more, but this was affected by the poor weather that affected coffee production in the 2018/2019 crop. Such earnings from premium supports FCS's facility development and improvement of road infrastructure within the community. Given the short time to realize such impact, and given the challenge of low yields during the recent harvest, the increase in premium due to CAP and subsequent support to community projects couldn't be estimated, but the management of the various FCS's felt that there will be some improvement.

The use of the coffee roaster installed by CAP for MCU is expected to increase returns on coffee, this is expected to improve incomes of the community through better prices. It was indicated that the coffee roasting business has started to create jobs especially for the youth, with already 3 youths hired to run the facility. The promotion of IGAs and biogas

We have installed a 10kg/hr. roaster and we are targeting youth and women to work at the plant. One kg of roasted coffee goes for kes 1,000 compared to milled coffee that fetches KES 30/kg.
Mr James Ndeto, General manager Finance-MCU

construction job has already started creating employment, including to women and youth, in the rural areas, and would lead to reduced rural-urban migration. The project had

impact on policies and regulations in Machakos as MCU indicated that the county government had passed a bill to support coffee after recognizing the efforts of the FCS's.

Access to credit was promoted in Machakos; the proportion of respondents accessing credit had improved significantly in the treatment, with those accessing in treatment (23.3%) being higher than of control (16.7%) by end of 2019; compared to 1.4% and 9.5%, respectively, in 2017 (Figure 11).

The VSLAs promoted by the project were a major source of credit for most farmers in treatment and control, but was highest in the former at 47.1% compared to the latter (28.6%). The VSLA have assisted in building beneficiaries saving. The participation in VSLA was higher than the 34% for treatment during the baseline survey (38% increase). The increase for control was comparatively lower; as it increased from 22% (30%)

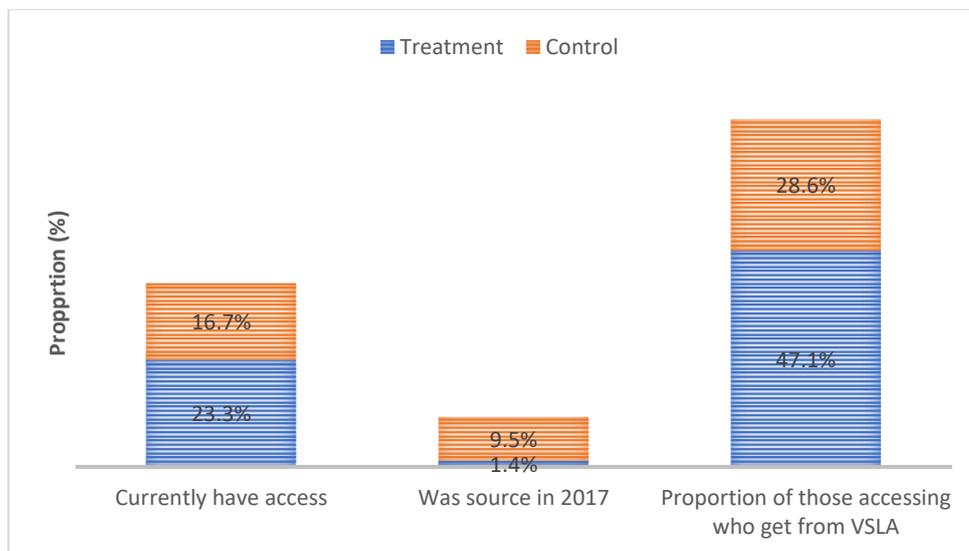


Figure 10: Access to credit among members of the participating FCS in Machakos

The impact through VSLA intervention would have been wider given that only 19.0% of beneficiaries indicated to have had training on financial literacy in Machakos, with 87.5% of those trained, rating the training was useful to very useful. There were also many who indicated that they would have accessed credit, but poor coffee produce (hence reduced income) in the previous years, due to bad weather, was their main challenge.



Woni Mulungalu VSLA, Musilili FCS

Our VSLA started in 2017. We have 30 members, 10 of them being youths. To become a member, one must be a coffee farmer. This helps reduced defaults because factory helps to recover unpaid amount through members coffee payments. We were trained on group dynamics, financial literacy among other trainings.

The trainings were done every two weeks, for two months. Each member saves about KES 100 per week (equivalent to one share, and to a maximum 5 shares per week. We give loan equivalent to maximum of three times of the value of shares. Loans are payable within a month, at an interest of 10%. We have a total saving of KES 400,000. Last year we paid each member dividends of KES 20 for each share (20% of members value of shares). We meet at the factory every Wednesday; this ensures better members' participation. The meetings have increased cohesion amongst members. We hope to expand our activities and revenue stream, through for example hatching chickens, if we are able to purchase our own an incubator, like the one CA project provided to our FCS

The beneficiaries had high expectations on the extent of impacts to be accrued from the CA projects especially at the community level, since Fairtrade is international organisation. Majority did not appreciate the fact that projects of this nature have limited resources especially finances and have to be implemented within the stipulated timelines. In addition, the project was meant to demonstrate to the beneficiaries, for instance, successful technologies to adopt to mitigate impacts of climate change or generate alternative income. Majority of those aware about Fairtrade in Machakos felt the benefits could be moderate to high; with a proportion of 44.7% for marketing linkage; 68.4% for access to productive asset; 63.2% for cost, benefits and risks sharing; 55.3% for fair and transparent governance of FCSs; 47.4% for access to services and 57.9% for innovation and technology transfer 57.9%. Most of these services were supported by the CAP project directly or indirectly in Machakos. Higher expectation was reported in Kericho with 66.7%, 90.5%, 100.0%, 95.2%, 47.6% and 100.0% rating respectively, of visualized benefits through FTA being moderate to high.

The change in prices was not positive given the challenges of weather. As in figure 12 prices dropped in all factories in Machakos between 2018 and 2019 when some benefits would have probably been realized.

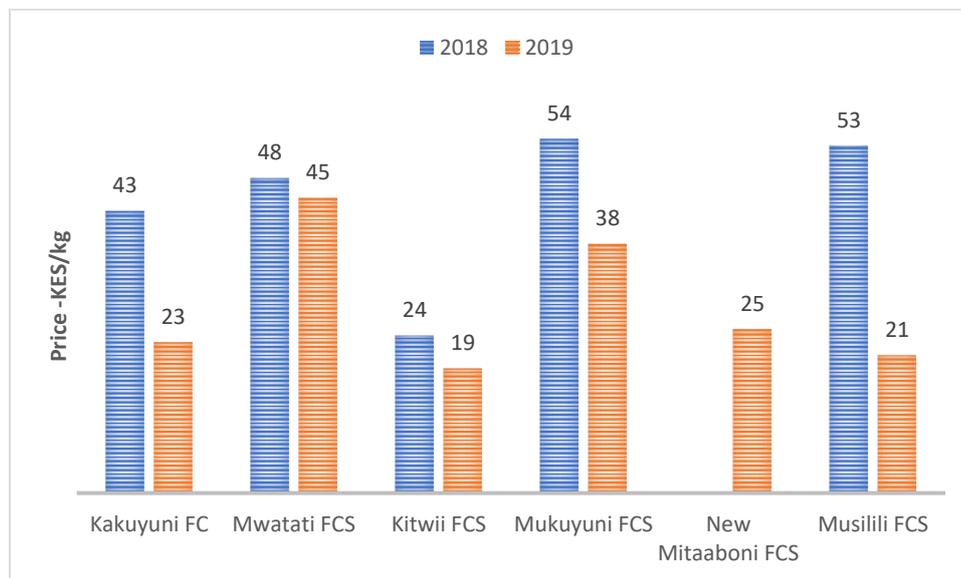


Figure 11: Cherry prices to farmers in the participating in the climate academy project in Machakos in 2017 and 2019

Access to water, sanitation; energy, 105-109

Overall given the project time frame and the time required to realise some benefits and impacts, FGD participants indicated that there was slight improvement in community (social) benefits due to the project impacts. For instance, in Machakos extension services, system of agricultural marketing, use of pesticides, resilience to climate change, environmental conditions, gender inclusiveness and access to capital and credit were reported to have improved. Other aspects such as system of inputs supply, access to education, linkages to private sector and NGOs, rural urban migration, health, affording basic services, were reported to have remained same or slightly worsened. In Kericho it is only marketing systems, extension, linkages between private sector and NGOs, ability to access capital that had remained same or worsened among the other aspects under Machakos. The variation is due to for example, differences in interventions and varied impacts of weather on coffee production.

On changes in human asset, in Machakos free time for women, women health, access to information, hired labour working conditions, use of child labour, children health had slightly improved in both Machakos and Kericho. However, a few other aspects including girl's and boys' education, and men's free time, had not changed in Machakos, although a slight improvement was reported in Kericho.

v. *Impact on environmental sustainability*

The environmental sustainability was implemented through most of the outcomes, but was more pronounced in outcome 2; improving farmer's resilience to climate change through sustainable agricultural land management, and outcome 3; increasing opportunities for Machakos Union, selected primary societies and women members to promote an energy switch to renewable energy. There were also activities in outcome 4 such as establishment of green houses and drip irrigation systems at PO level that supported this thematic area. The farmers were trained on such aspects as climate change and sustainable agricultural land management (SALM) practices and supported on various technologies. The FCS's were also supported with technologies, like the installation of solar energy systems to power activities in the office such as lighting, and power for basic office equipment like computers and printers, which is much better (has a lower carbon foot print) than running a diesel-powered generator during periods of electricity outage.

Climate change and renewable energy

Almost all respondents in Machakos were aware of climate change for both control (100%) and treatment groups (97.3%). Over one third of the respondents have been trained on climate change with 34.7% and 33.3% in treatment and control, respectively. Those trained in treatment group 68% indicated that the training was very useful, 28% indicated it was useful, while only 4% indicated it was fairly useful. Up to 96% of those trained reported to be practicing or implementing the practices on their farms currently. About 34.7% in treatment group reported to have been trained or sensitized on sustainable and renewable energy; with 44, 28, 20.4 and 4% indicating it was very important, important, fairly important, slightly important and not important. Of those trained, 50% indicated to be practicing the concept of sustainable energy. The awareness on climate change had increased from the baseline survey figure, with those aware on climate change during that time in treatment groups being 73% . Therefore, it is expected that farmers will adopt the practices demonstrated during the trainings to mitigate the impacts due to climate change in their activities. Moreover, they would be in a better position to make a decision on the choosing the most appropriate intervention to overcome a challenge or issue observed in their coffee farms as they have been empowered. This will be transferred to farmers in neighbouring regions who may not have participated in the project thereby having a multiplier effect with the potential to not only make coffee farming sustainable but also boost production.

Disaster and risk management

The proportion of those trained on disaster risk management in Machakos was 15.3% for the treatment group compared to 23.8%. Of the project beneficiaries trained 54.5, 27.3, and 18.2% indicated that the trainings were very important, important, and fairly important, respectively.

SALM practices

The beneficiary farmers in Machakos reported to have undergone various SALM practices with 46.5, 36.1, 48.6, 48.6, 31.9, 41.7, 34.7, 29.2% and 12.5% reported to have been trained on agroforestry, conservation agriculture, organic farming, pest and diseases management, soil

and water conservation, agronomical practices, tree nursery establishment and greenhouse management, respectively. Majority (76.2-100%, and a mean of 92.1%) indicated to be implementing the SALM practices trained on. Seven of the trainings were reported by over 90% to be useful (rating of 4) and very useful (rating of 5) on a 1 (not useful) to 5 (very useful) rating; only organic farming and use of greenhouses were rated by 77.1 to 77.7% as useful and very useful (annex). The farmers practicing agro-forestry, conservation, and organic farming indicated they were doing these on average land area 0.85 to 1.32 acres for either of the activity and on lands ranging from 0.1 to 9.5 acres.

The farmers were supported with seedlings for coffee shade trees that were acquired through the cooperatives. At the time of the evaluation, the project farmers reported to have an average of 108 trees, compared to control group members who had 41.6 trees. The farmers indicated that 22.4% of the coffee shade trees in the farms had come through the project. A number of farmers had established their own tree nurseries, with 38.9 and 31% of the farmers in treatment and control respectively indicating they had a tree nursery or initiated planted own seedling. Of the beneficiary farmers, with tree nurseries or planting own seedlings 39.3% indicated they had done this after 2017 i.e. after attending CAP trainings. Those with tree nurseries indicated establishing the nurseries for a number of reasons with 39.3% of those in treatment group indicating that established the nurseries to plant shade trees, while 32.1% had established the nurseries to sell seedlings. The usage shade trees had improved compared to baseline where 58.8% had less than 20 shade trees, 27.8% had 21-40% and only 15.4% had over 40 shade trees on their coffee. At time of baseline, farmers expressed not knowing where to get seedlings and also the type of varieties to plant in coffee farms.

The farmers indicated they had realised benefits of shade trees such as; improved coffee production and quality due to reduced coffee drying; the litter from the trees acted as mulch; the trees acted as wind breaks and prevented coffee trees from breakages. Although farmers were supported with tissue culture bananas, avocado and macadamia as IGAs, they had planted some in the coffee farms and this acted as shade trees and also is expected to provide extra income.

Greenhouses and drip systems were installed in some FCS's as demonstration units, but adoption was yet to be noted due to associated high initial costs; with 48.5% and 29.4% indicating they didn't have money to put up the greenhouse or drip system, respectively.

The level of knowledge as reported by individual farmers in Machakos had improved. This increase was more for the treatment group than for control group. As from figure 13, 86.2% of those in treatment felt they had fair to high knowledge in 2019 compared to 76.5% in 2017.

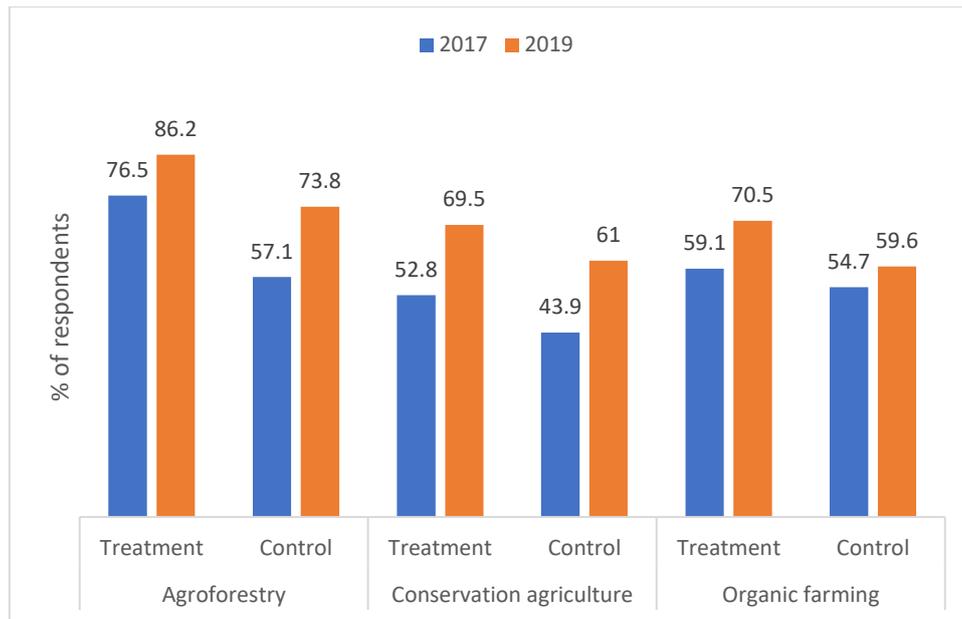


Figure 12: Proportion of respondents reporting that their knowledge was fair to high

Biogas use and management

Upto 95% of the farmers in the treatment group reported to have been trained on biogas use; compared to 16.7% of control group. Of those trained in the treatment groups, 90% indicated the trainings were very useful while 10% indicated it was useful (rating of 4). The level of knowledge, on some selected aspects, reported by individual farmers to have improved, is captured in figure 14. This increase was more for the treatment group than for control group. As from figure 14, 90.5% of those in treatment felt they had fair to high knowledge in 2019 compared to 14.3 % in 2017.

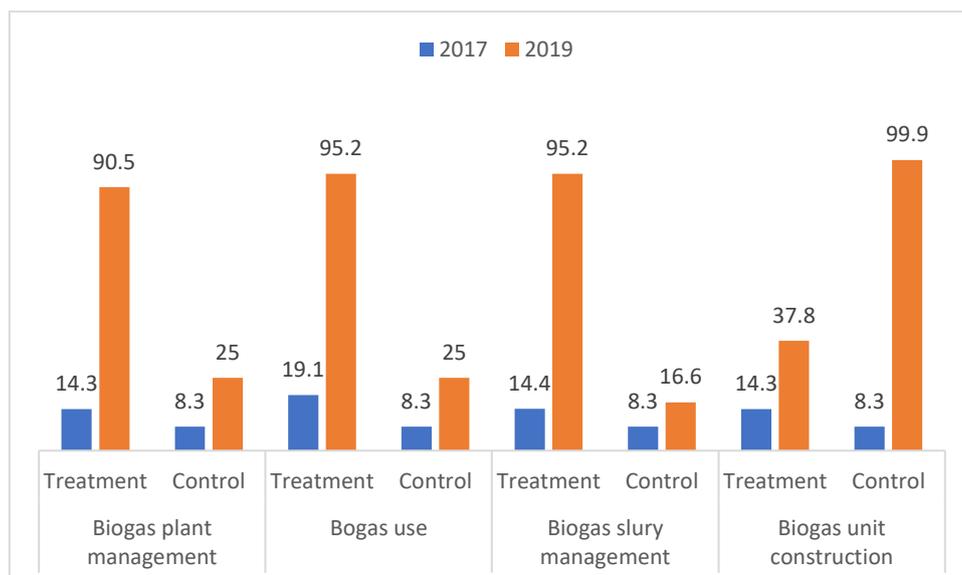


Figure 13: Proportion of respondents indicating their level of knowledge was fair to high

There were some few adoptions of biogas units, with one artisan indicating to have constructed 2 biogas units outside the projects (privately customers). There was a saving on the time spent

on gathering firewood and cost savings from use of firewood as indicated in table 9 below. A kg of firewood was estimated to be between 7.1 and 15 Kenya shillings.

Table 9: Time used to gather firewood in Kericho and Nandi

	Treatment - all respondents	Treatment- new biogas users	Control- all respondents	Control- new biogas users
Time in hrs. in 2017	2.4	2.4	2.1	2.5
Time in hrs. in 2019	0.9	0.7	1.8	1.25
Change in hrs.	1.5	1.7	0.3	1.25
% change	62.5%	70.8%	14.3%	50.0%
Amount of wood 2017 (KES)	148.6	137.2	163	258
Amount of wood 2019 (KES)	44.8	45.9	109	108
Change KES	103.8	91.3	54	150
% change	69.9%	66.5%	33.1%	58.1%

The use of biogas was indicated to bring other benefits illustrated in table 10 below

Table 10: Some parameters on the use of biogas as fuel (Kericho)

Biogas related aspects	Amount
Hours used for feeding and operating the digester per day	0.9
Cow (plus other) dung used per week, kg	133.58
Maintenance and repair cost per annum for the digester, KES	666.67
Yield of coffee from use of slurry per tree, kg	7.72
Cost of dung per tonne, KES	8633
Yield of coffee from use of normal manure per tree, kg	5.28
Time taken to fetch firewood to use/cook for a day, hrs	2.06
Total hours per day that is used to cook with biogas, hrs	2.86
Value of firewood that would be used for same cooking time used with biogas, KES	97.76
Time taken to cook supper using biogas, hrs	0.93
Time taken to cook supper using firewood, hrs	1.53

Cookstoves

About 30 cookstoves were targeted to be constructed in Machakos, some were being installed during the time of the end term evaluation survey. It was indicated that the mode of procurement delayed the installation; the initial plan was to buy ready system, but it was realised that they had to be fabricated on site. The proportion of respondents using cookstoves in 2017 and 2019 was 9.7 and 34.7% compared to control group 16.7% in both 2017 and 2019, showing a remarkable increase among project participants. The respondents who were not using cookstoves in 2017 indicated that they were using firewood worth KES 85 per day, and this had dropped to KES 67.1 per day in 2019. The respondents also indicated use of cookstove had reduced time for gathering firewood and reduced problem of excessive smoke. They

respondents who didn't have the cookstove expressed they were either intending to or did not have the funds to put up one. The consultants notes that though it will take a while for the full benefits of this intervention to be fully realised, e.g. better health, increased tree cover, better family bonds (due to women spending more time at home following savings on time spent collecting firewood) etc, the project will have made notable positive impacts from the promotion of the cookstoves.

Table 11: Time used to gather firewood in Machakos

	Treatment all respondents	Treatment new cookstove users	Control all respondents	Control new cookstove users
Time in hrs. in 2017	1.324	1.324	1.68	0.875
Time in hrs. in 2019	0.945	1.014	1.5	0.75
Change in hrs.	0.379	0.31	0.18	0.125
% change	28.6%	23.4%	10.7%	14.3%



Leah Nyambura, a coffee farmer and member of Kapkiyai coffee factory in Nandi County joined the CAP project in 2017. She had a biogas digester installed (*left photo*) for her through the project. She was trained twice (for a total of 9 days) by FTA on biogas use and operation.

She has three cows that provides the raw material (dung) for running the biogas unit. The biogas was still operational by the time of our study. She indicated that she used to spend about 6 hours to collect firewood, from forests away from her farm; and the collected firewood would take her for a month. She spends about 2 hours feeding and managing the biodigester and cleaning the dung area. The biogas produced is able to help cook breakfast, lunch and supper for a total duration of 2 hours, for the 6 household members. She estimated that to cook with firewood for the 2 hours would require firewood worth KES 100

Leah uses the biogas slurry on her vegetable gardens and reported an increase in production, better prices, and faster growth of vegetables through use of biogas slurry, although this could not be quantified due to lack of records on the kitchen garden. She sold vegetables worth about KES 10,000 in 2019, and indicated this was an improvement by an estimated 20% from the sales she was making before. She has 1600 coffee trees, an increase from the 600 trees she had in 2017. She also uses the slurry from the biodigester on some coffee trees and indicated that she has realized an increase in productivity per tree and an improvement in greening of the trees (*photo in centre*) where she has used the biogas slurry. She predicted that with slurry production would be higher by 5kgs/tree from her normal yields; where she normally gets 5kg/tree. She also indicated that the area around the biogas (*right photo*) though not fully used supports the growth of vegetables and pumpkins, which is consumed by the household.

Through the sensitization she has received from FTA, she has installed solar lighting in her house.

Moreover, 37.5% of the respondents in Machakos reported using ash on their farms to control some insects, moisten the soil and help decompose manure faster.

vi. *Impact on gender*

The project factored gender consideration from its design up to implementation. The initial activity was gender analysis that was ‘*commissioned so as to better understand the gender*

dynamics at play related to climate change mitigation and adaptation, identify, analyze and examine gendered vulnerabilities and underlying structural norms that affect and limit women participation in climate change activities, explore the gendered power relations between men and women; and differences in their access to resources, priorities, needs, activities and constraints that they face in relation to each other and Identify existing policies, structures and practices that promote gender equality'. It covered all the 8 FCSs. The study among others identified that 90% of key decision making positions were dominated by men and that of the 8 cooperatives surveyed, only 3 had women in leadership positions; that in dry season women spent approximately 50% of their time per day working while men spend only 29% of their daily time working , and also during wet season women spent 29% of their time relaxing and 69% of the time working on their gender roles and responsibilities; that 81% of female-headed households reported that the land was not registered in their name, although they occupied it and had the right of use; and that women and children participated in the collection of firewood in 49% and 36% of households in Machakos and Nandi counties, respectively, and women ended up spending a lot of time which limited their participation in organizations' activities such as key meetings including trainings. There were also other challenges such as access to credit by women. Although the gender analysis was done after the project had started, the findings were used to integrate gender in the project. Gender mainstreaming was factored in the project but challenges in the initial phase of the project e.g. election of national and county government leaders, delayed its implementation. It is recommended to try as much as possible to consider issues of national importance like elections, early in the project concept development, and make necessary provisions to ensure minimal interruptions to project activities.

The project involved women from the start and by 2019, the beneficiaries in each of the FCS's are as indicated in figure 15 below.

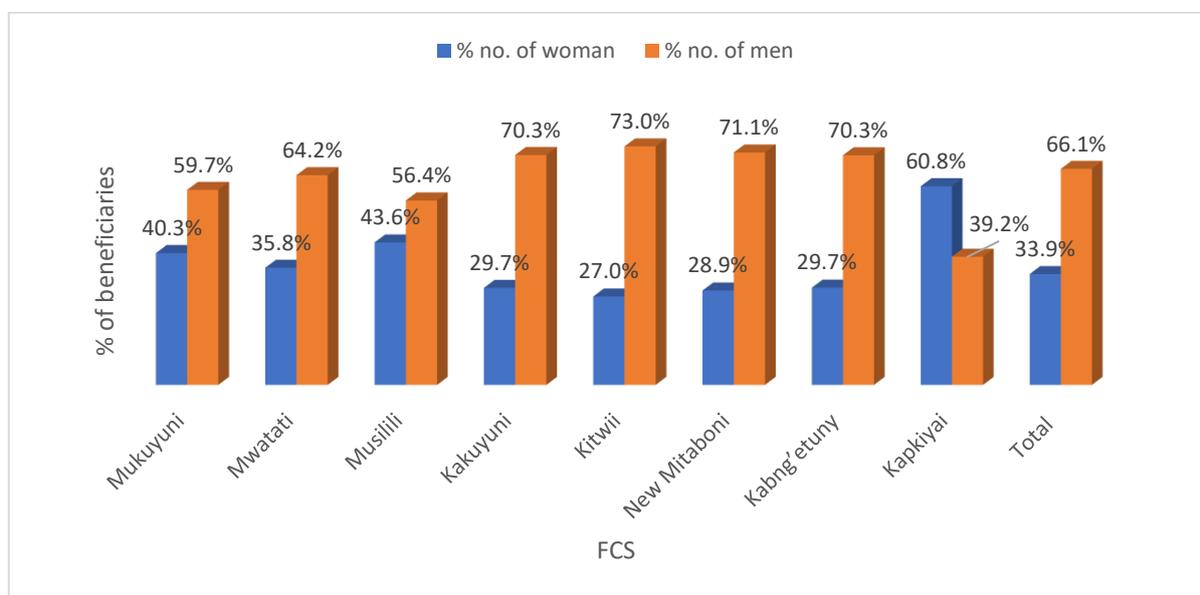


Figure 14: Proportion of female and men supported by project in each factory (2019)

Source: Coffee secretary managers, 2020

The factories reported varied levels of participation by the youth; with for example 21.7% of target beneficiaries in Kapkiyai being youth while Mwatati and Kakuyuni reported less than

1% and about 2%, respectively. There was also some realisation on factories to consider persons living with disabilities (PWDs). For instance, there are 5 PWDs listed in Musilili records, while other factories reported their participation in factory activities like clerical duties.

At the household level results indicate that more women in the treatment, were involved in decision making, alone or together with the husbands compared to those in the control group as shown in table 13 below. This has contributed in changing the attitude of women towards coffee especially ownership, as observed during the evaluation whereby some female respondents used terms such as “I employ a casual to spray” etc. This is likely to translate to more stable households (with minimum conflicts) and consequently, stable FCS’s and production, in the long term.

Table 12: Women participation in decision making on coffee

County	Expenditure on money from coffee sales				Coffee production			
	Treatment		Control		Treatment		Control	
	Female	Both	Female	Both	Female	Both	Female	Both
Machakos	17.8%	58.9%	19.0%	42.9%	19.2%	49.3%	19.0%	40.5%
Kericho	4.8%	66.7%	16.7%	16.7%	9.5%	57.1%	16.7%	8.3%

Women were involved in decision making at the household level. It was indicated by 76.7 % of respondents that women in treatment group in Machakos were involved in decision making on selling of coffee; this was higher than in control group (61.9%). This is higher than what was found during baseline survey where 31% and 11% of women and in Machakos and Kericho/Nandi were involved in the above decision making.

Table 13: Women participation in decision making on biogas

County	investing in biogas construction				usage of biogas			
	Treatment		Control		Treatment		Control	
	Female	Both	Female	Both	Female	Both	Female	Both
Kericho	28.6%	38.1%	0.0%	8.3%	71.4%	14.3%	0.0%	8.3%

In Kericho (table 13) there was also higher participation of women in making decisions on biogas construction and biogas use; with 28.6% and 38.1% reporting that women alone and with husband, respectively, were involved in decision making on biogas construction for treatment group compared to 0.0% and 8.3%, respectively, for control group. On biogas use it was 71.4% for female alone and 14.3% for both for treatment group compared to 0.0% and 8.3% respectively for control group.

The project had a big focus on women and youth in all the outcomes; and particularly in outcome 3 to promote an energy switch to renewable energy. In Machakos, 300 households will finally benefit, the project was geared to supporting women. In Nandi and Kericho, the project targeted to have 280 households switching to biogas and mainly supporting women. However, this target could not be reached due to inflation, with the CA project providing a total of 125 and 80 units in Kapkiyai and Kabngeturny, respectively. This has reduced on

firewood use, reducing cost, time to gather firewood and health problems from smoke. The 300 units of supported cookstoves in Machakos will also go into supporting women, who spent a lot of time fetching firewood, spent more firewood and were subjected to smoke that affected their health. Across all factories, there was a general agreement among beneficiaries that the free time available to women had improved.

The project was also able to have the names of deceased men replaced with those of surviving women (next of kin); giving ownership to women farmers. There was also deliberate effort to have the management of FCS's and cooperatives factories in Machakos to include more women in management and staff positions. Although the evaluation was done soon after the trainings, the status has since improved. For instance, in Kakuyuni 16% of management is female and 6 out of 12 permanent workers are female; in Mwatati there are 2 female board members (out of 9) and 4 female employees (out of 12); in Musilili there are 3 females in management (out of 12) and 2 female employees out of the 11. Bylaws of the other factories that have fewer women representation have been reviewed with support of CAP; like for Mukuyuni that have one female board member, and as a treasurer (out of 9 board members) and one employee (out of 7), Kitwii that has only one female board member and 1 female out of the 3 employee, New Mitamboni that has only the CEO as female in management and 12 female employees out of 32 employees.

The women were also empowered through improved access to credit through the VSLAs created in Machakos. The VSLAs was in particular successful in Mukuyuni, Musilili and Mwatati, with the later transforming to a SACCO. Members who are women have been able to get loans to improve on their agricultural and for some income generation activities, as well as being able to meet other financial needs like school fees. The proportion of household income generated by women in Machakos where IGAs were promoted was 40.7% for treatment group compared to 34.3% for the control. Although membership to VSLA is open to both male and female members of the FCS, the treasurer of the group is always a lady.

Women in Machakos were found to be involved more in farm activities such as weeding (42.9%) and picking (40.6%). In other farm related activities, like crop protection, their participation was less than 30%. In Kericho the women participation was 70.7%, 19.4% and 35.5% in biogas management, biogas construction and slurry disposal respectively.

vi) Documentation and information sharing

The project will have developed a Climate Academy Manual that will be used to share the learning from CAP phase 1. This will be inform of printing books and developing short films.

The project also introduced a short message texting platform. The model platform is to help reach farmers on production, climate change issues, or socio-economic activities to improve livelihoods. The system was installed by a service provider and the right was given to society to generate own messages, including giving information on weather, calling meetings, etc. Farmers reached (about 10-15% of the farmer) have expressed that the system is good. The FCSs have however not been able to populate the data for all their farmers into the sms platform database, mainly due to limited resources to collect current data from the farmers (who are spread over large catchments), as well as create more awareness on the same and partner with relevant bodies like meteorological stations to provide accurate weather data on regular basis.

4.3.3 Efficiency

The project implementers felt that the money was enough for the planned activities, though indications were that more time and activities would have widened the project impact. The project realized the planned activities in a shorter time than planned. It was noted that the project was to start in March, 2017, but delayed by three months. The delay was due to the need for FTA to fulfill all donor requirements before project could be kicked off. FTA also sought to have a clear definition of roles for all partners as well as planned activities. The electioneering period in the Country, starting from June to December 2017 affected the project activities, consequently lowering the beneficiaries' participation in the initial activities. However, with these challenges, some activities like project audit could not be undertaken within the project timeframe, even after an extension of project to September 2019.

The shift in method of implementation of some activities, for example in promotion of cookstoves, where the initial plan was to acquire already made units against the adopted method of fabricating them on site, also led to some delays, as the later method required more time to plan and procure materials & services.

The consultant finds that there was value for money in implementation of the CAP 1 project given that activities will finally be implemented as planned, with Euros 586,549 of the allocated Euros 609,658 being used; making a saving of Euros 15,000. The saving came from some activities, like the Fairtrade system wide learning components. The saving has been earmarked to finance extra activities like the documentation of climate change adaptation and mitigation practices. We Effect had a total budget of 19,736,400, and by the time of evaluation 14,995,168 but with total actual expenditures of 16,991,600 implying a balance of uncommitted funds of KES 2,744,800 (13.9% of budget) and unpaid balance to We Effect of KES 1,996,431 (10.1% of budget).

The project coordination and implementation were efficient. The CAP project was overseen by the project officer with support of MEL and Operations Manager East and Central Africa. In Machakos the project was implemented through MCU and We Effect, with the latter in charge of outcomes 2 and 4 and the former in charge of outcome 1 and 3 (in partnership with FTA); but MCU also implemented some activities under outcomes 2 and 4, with authority from We Effect (delegation). The management of funds for outcomes 1 and 3 and for Kapkiyai and Kabng'etuny was directly from FTA, while We Effect had direct funding of outcomes 2 and 4 for Machakos. According to FCSs and MCU, funding was smooth. The implementation approach was effective; and the partners and FTA prior experience in implementing similar components assigned to them was a key driver. The funds for implementing biogas in Kericho and Nandi were given to the FCSs who then procured the materials and services; For instance, the society with support of the project consultant came up with bill of quantities (BQ); the consultant also trained the artisans. The BQ for Kabng'etuny was higher than for Kapkiyai as the poor road network increased cost of the systems.

Of particular impact to project was the MEL framework used in ensuring that changes to project were implemented early enough. The MEL framework is illustrated below:

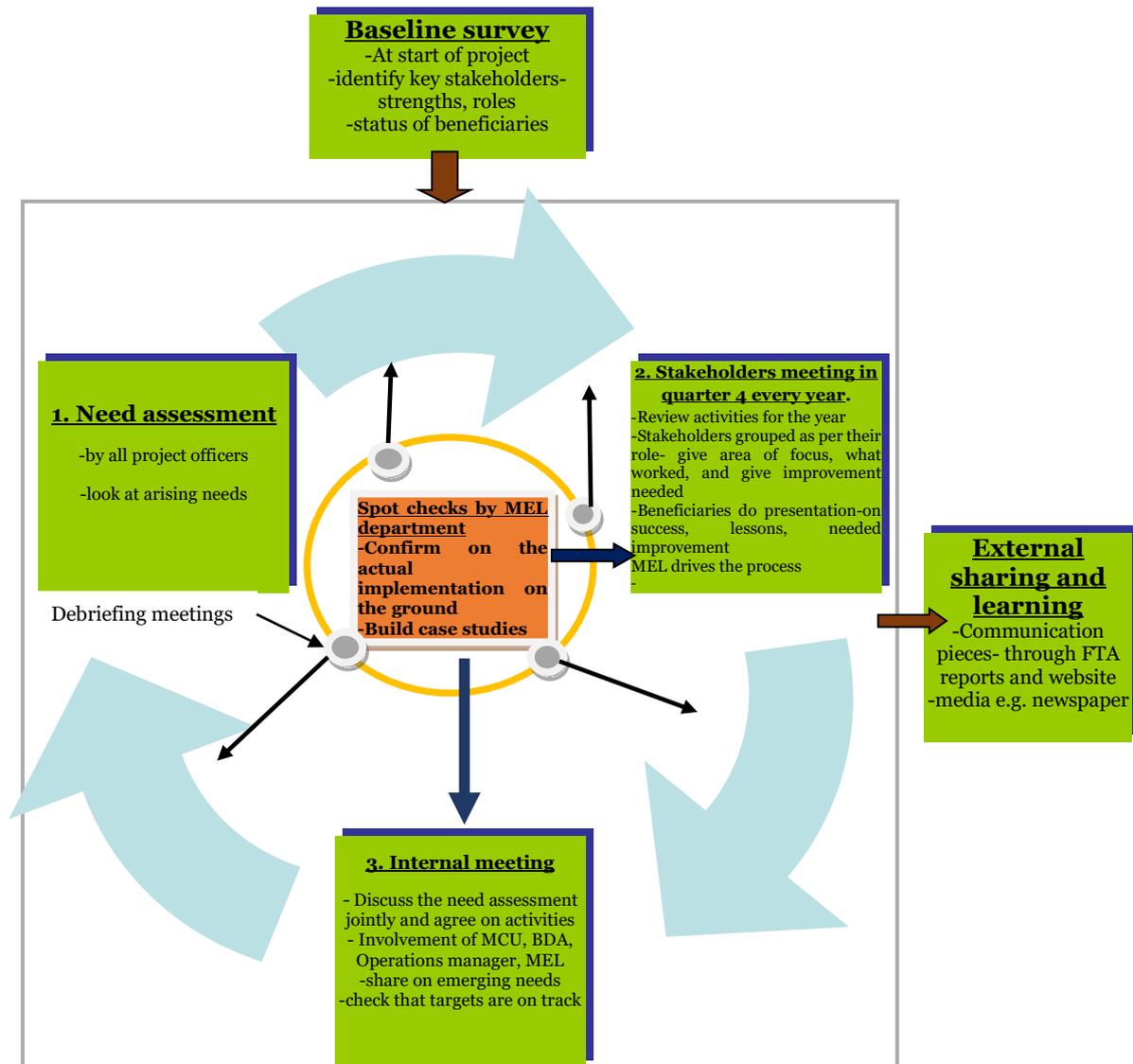


Figure 15: CAP adopted MEL activities adopted from ECAN MEL framework

The project engaged stakeholders both in implementation, planning and adjustment of project activities, especially through MEL framework (figure 5); this was more emphasized after year one when the Fairtrade Eastern and Central Africa Network (FTA-ECAN) MEL framework was fully adopted. The framework helped review targets, along the long-term objectives, with beneficiaries and stakeholders' participation. The unrealistic targets were readjusted in initial year, and this continued to the end. It also enhanced more participation of stakeholders like Ministries of Agriculture and Cooperatives as well as financial institutions (who were not much involved in the initial year). The framework saw the adjustment of initial targets after the baseline study, although this was done later than planned. The 1-2 days stakeholders meetings, normally held in quarter 4 enhanced the engagement of all stakeholders and utilised the findings from needs assessment done by the project manager. During the said meetings, stakeholders (beneficiaries, government departments, etc.) are grouped in terms of their roles; a look back is made on activities undertaken; beneficiaries are requested to present on the success and what needs to be improved; then all participants reflect at what worked, what caused challenges and areas of improvement. There were also regular quarterly debriefing

meetings where management of FCSs sit with FTA staff to discuss on project. The internal meeting (usually held around January-February) builds on stakeholders and debriefing meetings and involved Project & operation manager, MEL, and We Effect. MCU, Kapkiyai and Kabng'etuny would share their views with project manager for inputs and consideration in the internal meeting. The MEL department also would make spot checks, to gather and confirm information on activities on ground, get a view on sustainability of interventions and build case studies.

The MEL framework was strengthened through sharing and documentation of project activities. The project through the communication desk developed communication piece, show casing at a time what CAP is doing on each pillar. Moreover, documentation done by the team from MHNL for impact communication and campaigns in the south was noted to be quite useful. This documentation of information, for example, case studies on IGAs was posted on the FTA website and shared with beneficiaries and stakeholders. This would help especially the beneficiaries to learn and bench mark with other FCSs, thus improving project achievements.

The project's initial year saw the project human capacity formation and strengthening being undertaken, with new staff recruited to specifically handle the project components. The consultant however noted the little involvement of some relevant stakeholders from the start; for example, from the Ministry of Environment and the Forestry department, Machakos University etc.; organisations and departments that would have provided more synergies during project implementation. It became hard to include the organisations and departments later during project implementation.

In addition, the CA project included beneficiary exchange programmes and learning visits to other like-minded projects. In this aspect, each year a team of project beneficiary would participate in learning and exchange visits, like for example, a learning visit to Uganda by the project beneficiary representative to learn SALM best practices from the GREAN project; or the visit to Central Kenya Coffee Mills by a group of beneficiaries from Machakos to learn about secondary processing of coffee.

4.3.4 Sustainability

The project approaches and components will ensure that project activities and impacts continue to be felt even after project implementation

- The VSLA were mainly an outgrowth of existing local women savings schemes. The success of the VSLAs is a pointer to the fact that the beneficiaries associates with the approach. The associations received no seed capital from the project, and have continue to grow their capital base; currently the 300 VSLAs in Machakos have an estimated savings running into a few millions Kenyan shillings. The VSLAs in Mwatati have grown to be a SACCO, and there was an indication that many others are being encouraged to follow this path. The SACCOs which are formal organisations with defined structures and legal backing are potentially more sustainable. The experiences of Mwatati FCS, if shared with other VSLAs, would ensure more sustainability in the VSLAs.
- The use of promoter farmers as trainers will ensure that extension services and training on various aspects promoted through the project are sustained even with the project. The project targeted to train 30 promoter farmers per FCS of which 30% were to be women, and this translate to a ratio of 1 promoter for every 35 project farmers in

Machakos, which is way above the current extension service staff employed by the county government (approximately 1 per subcounty although succession following retirement has been a challenge). Thus, the consultants noted that the adoption of SALM practices was successful, exceeding the target of 1000 farmers, initially planned for.

- The training of cookstove and biogas artisans in Machakos and Nandi and Kericho will ensure that aspects promoted through the project on biogas and stoves are sustained even with the project. The number of artisans (youth) on biogas and cookstoves was 60, and this translate to a ratio of 60 artisans to 280 units of biogas units in Nandi and Kericho, and 300 using energy efficient stoves in the Machakos project target area. This is enough to ensure continuous construction (on demand), repairs and maintenance of the project installed units in the three counties.
- The types of technologies promoted and the establishment of demonstration farms in the respective cooperative societies will ensure that beneficiaries continue to benefit from, for example, access to incubators; tissue culture banana suckers; skills and knowledge on greenhouse technology and drip irrigation; and tree crops seeding.
- The strengthening of FCS management on governance have shown that this is a driver to better decision makings and support to the farmers. The strengthening of the FCSs will enhance continuous improved service delivery to beneficiaries through prompt, efficient and beneficial interventions. The use of the FCSs and MCU to transfer promoted technologies will also ensure sustainability of promotion of these technologies through the FCS and MCU organisations structures. MCU will share the same with other cooperatives who were not participating in the current project, thereby having a multiplier effect.
- One of the components that majority of stakeholders in Machakos felt needed to have been factored in the project was the linkage to market especially for poultry. Thus, it is crucial to consider farm level diversification like integrating IGAs into local or regional processing and marketing networks that conserve farms, create jobs and strengthen regional economic cycles. In Kericho and Nandi, access to materials for repairs and maintenance of biogas units was identified as a challenge that hindered prompt repairs and maintenance of the installed units. This is because of long distances and rough roads that makes transportation of such materials expensive. This is seen as one of limiting factor to ensuring sustainability of biogas systems and poultry enterprise promoted by the project.
- The Climate Academy Manual and the full utilization of the short message texting will ensure continuous provision of information and help share experiences from CAP project.

4.4 Conclusion

The following conclusions are drawn from the findings and draw on data collection and analyses undertaken through a chain of arguments. The conclusion points out the factors of success and failure of the evaluated project, with special attention paid to the intended and unintended results and impacts, and to any strengths or weaknesses.

The project was relevant to the beneficiaries as reported in through challenges identified in baseline survey and during project evaluation and through the activities implemented through the project. The project activities, outputs, and outcome relate with the FTA thematic areas

and to the FT ToC; with focus on improving economic empowerment, wellbeing, diversified livelihoods, environmental sustainability, gender equity, working conditions, resilient and empowered producer organisations and farmers. The project was also aligned to the County and national government's development agenda

The project enhance value for money as activities were done as planned and in a shorter time. There was some saving on fund on some activities, with savings of 2.5% on total budget. The project only experienced a minor delay in projects start as FTA sought clarification on roles of each participant in the project. This delay only affected some few activities such as provision of cook stoves in Machakos emanating from change in approach. The project MEL framework was effective in realigning the project to its goal, and in sharing and documenting project progress-activities, outputs and outcomes. There was collaboration with some County government departments; such as Departments of Agriculture in both Kericho/Nandi and in Machakos, and Department of Cooperatives in Kericho/Nandi

The project was successful in changing the livelihoods of the beneficiaries through the various interventions as reflected in improvement in value of assets, saving in time for sourcing of energy and energy cost, and farmers perception on their wellbeing and economic status. The trainings were also effective. The project duration was short, so most of the possible impacts had not fully been realised. Some few measures that reflected changes included;

- Those who had started alternative incomes in Machakos were 16.7% in the treatment group compared to 15.1% in control group.
- Those using the VSLAs in Machakos had increased with 21.4% in treatment group compared to 9.7% in control group indicating improvement.
- Farmers perception on changes in some economic and coffee production parameters was that the parameters had slightly improved; with for example 44.5% in treatment group compared to 25% of those in control group in Machakos indicating that productivity in 2019 was better than in 2017. The low production in the previous year of comparison (2018) due to low rainfall did not limiting farmers from viewing that productivity over 3 years had improved. The farmers view was same on improvement in household incomes, income from coffee, cost of energy, and food security. The farmers also directly associated some of the changes to the project, with 24.9, 47.5, 50 and 52.5% associating the changes in income from coffee, coffee productivity, cost of energy and total household income to CAP. In Kericho 90.4% and 100% associated the changes in cost of energy and household incomes to the project.
- The value of assets, a good measure of economic status in the short run had improved; with a reported 39.4% and 27.2% increase for those in treatment and control group in Machakos and 25 and 21.2% for those in Kericho groups respectively. There was also a slight improvement in houses with for example usage of iron sheet as a roofing material increasing from 90.1 to 97.5% in Machakos.
- The FCS were trained on various aspects to strengthen their economic status; they were sensitized or trained on among others aspects; farming as a business, and record keeping, financial literacy. The levels of training in these areas was comparative higher in treatment than control group; an indication of extra trainings from CAP; for example, 61% in treatment group compared to 42.9% in the control reported to have been trained on farming as a business. The trainings were reported to be important. Also, the farmers indicated they were utilising the knowledge acquired; with for example 68.5% in treatment group compared to 54.8% in control group in Machakos indicating to be practicing record keeping

The project managed to capacity building the FCS board of management and supervisory committee members, on various aspect of management; including leadership and governance, financial management, internal management, disaster and risk management, social policies. Also, the managers had been trained on technical aspects such as soil conservation, climate change etc. These trainings were reported to be useful with an average rating of 4; on a scale (of 1 not useful to 5-very useful). Some few measures that reflected the changes included;

- According to the results of the SCOPE assessment the six participating FCSs in Machakos scored an overall average 3.4 and 3.5 on the measured management dimensions at the start and end of the project, respectively
- The various dimensions had changed from the 2017 score; with changes of internal management (0.5), operations (0), financial management (-0.3), sustainability (0.5), supply (-0.5), marketing (-0.1), enablers (0.1) and external risks (1.2) as by end of project. Some few factories such as Kitwii and New Mitamboni scored low in internal management, therefore lowering the overall mean score. The low score in financial management was more driven by external factors, including high cost of inputs, low production in 2017/2018 season and low internal coffee prices.
- The various measures on affiliation and perception about FCS showed marked difference between the treatment and control in terms of the treatment FCSs being better in most management related parameters. For example, for the treatment and control group farmers, 52.8% compared to 52.4% respectively trusted the way cooperatives calculated and explained prices, 40.2% compared to 30.9% respectively agreed that their cooperative had improved since 2017, and 40.3% and 30.9% respectively agreed the managers are able to make better decisions since 2017.

Within the broad Fairtrade framework, the project was able integrate though not directly the decent working conditions within Fairtrade projects and interventions. Some of the aspects that showed these were;

- The high use of labour (both permanent and casual) by the treatment groups in Machakos and in Nandi and Kericho; with 82% in treatment compared to 76.2% in control in Machakos using hired labour, while in Kericho it was 77.8 and 66.7% respectively.
- There was also proportionate good employment of permanent labour in many factories; with a mean proportion of 33.7% and 34.1% in Machakos and Kericho/Nandi being permanent workers. The average number of permanent workers was 12.8 and 9.5 in Machakos and Kericho/Nandi respectively.
- The study didn't find visible cases of child labour abuse. Signages were posted in most factories indicating that only persons over 18years old were engaged
- There was little participation of women in spraying activities.
- The remuneration to biogas artisans of KES 20,000 per unit through the project and KES 15,900 to 18,600 for privately constructed biogas was reported by the artisans to be good.

CAP was found to have had some community impact. This was noted in the following aspects

- VSLAs had improved social interaction and cohesion amongst the community, as members met frequently
- The general perception was that had it not been for the low rainfall in 2018/2019, productivity and income from coffee would have increased. This would have improved

the premium payment and would have facilitated the support provided by FCS to community, such as FCS and community infrastructure development.

- The coffee roaster installed by CAP for MCU is expected to increase returns on coffee, and therefore improve incomes of the community through better prices
- IGAs and biogas units constructed have already started creating employment, including to women and youth, in the rural areas, and in the long run is expected to lead to reduced rural-urban migration.
- The proportion of respondents accessing credit had improved significantly in the treatment, with those accessing in treatment (23.3%) being higher than of control (16.7%) by end of 2019; compared to 1.4% and 9.5%, respectively, in 2017. VSLAs being a major driver to this improvement. This has spread to the wider community
- Other community related aspects were also reported to have slightly improved; in Machakos such aspects as extension services, system of agricultural marketing, use of pesticides, resilience to climate change, environmental condition, gender inclusiveness and access to capital and credit were felt in either of interviewed FCSs to be somehow better. In Kericho the benefits were reported to be cover more aspects; including linkages to private sector and NGOs, rural urban migration, access to health, and affording of basic services.

Two of the project outcomes (2 and 3) had a focus on environmental sustainability. The project managed to make some positive changes on this component;

- There was high awareness on climate change in Machakos. Over one third of the respondents had been trained on climate change with 34.7% and 33.3% in treatment and control, respectively. Those trained in treatment group 68% indicated training was very useful, 28% indicated it was useful (score of 4, on a 1-5 score).
- The beneficiary farmers in Machakos reported to have undergone various SALM practices with 46.5, 36.1, 48.6, 48.6, 31.9, 41.7, 34.7, 29.2% and 12.5% reported to have been trained on agroforestry, conservation agriculture, organic farming, pest and diseases management, soil and water conservation, agronomical practices, tree nursery establishment and greenhouse management, respectively. Majority (76.2-100%, and a mean of 92.1%) of those trained indicated to be implementing the SALM practices they were taught. The trainings were indicated to have been useful.
- Use of shade trees had improved; farmers reported to have 108 trees, compared to control group number of 41.6 trees. The farmers indicated that 22.4% of the coffee shade trees in the farms had come through the project. The realised benefits of shade trees on coffee were reported as; improved coffee production and quality due to reduced coffee drying; the litter from the trees acted as mulch; the trees acted as wind breaks and prevented coffee trees from breakages
- Results indicate that 38.9% and 31.0% of the farmers in treatment and control in Machakos respectively, reported having a tree nursery or planted own seedling. A good number of them, 39.3%, reported having planted the trees after 2017, thus the trainings through the project triggered this action.
- There was a reported improvement in level of knowledge acquired on various SALM practices; with an average of 70.1% feeling their knowledge was fair to high in 2019 compared to 57.4% who felt it was fair to high in 2017.
- 95% of the farmers in the treatment group reported to have been trained on biogas use; compared to 16.7% of control group. Of those trained in the treatment groups, 90% indicated the trainings were very useful while 10% indicated it was useful (rating of 4).
- There were some few adoptions of biogas units in Kericho, with one artisan indicating to have constructed 2 biogas units outside the projects one.

- Due to promotion and use of biogas, there was reported reduction in time for gathering firewood in Kericho and Nandi with 62.5 and 70.8% reduction for all household and for only biogas users respectively for the treatment group, compared to 14.3% and 50.0% for the few biogas users in control group. There was also reported reduction in cost of firewood used in Kericho and Nandi with 69.9 and 66.5% reduction for all household and for only biogas users respectively for the treatment group, compared to 33.1 and 58.1% for the control group. There was less usage of firewood in treatment than in control; with 81.9 and 85.9% of those in treatment and control groups in Machakos respectively using firewood. This was a reduction from baseline survey figure where 100% indicated to have been using firewood. In Kericho this was 14.3 and 91.7% for treatment and control, respectively. Ownership of biogas units increased from 0.38 in 2017 to 0.95 in 2019 for Kericho and Nandi FCSs farmers.
- Use of slurry and biogas in Kericho and Nandi was reported to bring other benefits to farmers, with for example an estimated increase in coffee production per tree from 1.9 kg to 3.2 kg when using slurry and normal manure, respectively. The time taken to cook was estimated to have reduced; with for example supper taking 0.93hrs and 1.53 hours to cook with biogas and firewood, respectively.
- The promotion of cookstove in Machakos was reported to have reduced usage firewood, and therefore the time to gather firewood. The reduction in time for collecting firewood was 28.6% for all respondents and 23.4% for cookstove users for the treatment group and 10.7% and 14.3% respectively for few cookstove user in control group.

The study found that the project had mainstreamed gender in its implementation. These was reflected through;

- Planning for gender integration was done; a gender analysis was undertaken in first year of project implementation to understand gender dynamics and to enable factoring of gender in the project.
- The project involved women from the start and by 2019; with 27 to 43.6% (average of 33.9%) of those supported by project in either of the FCSs in Machakos and Kericho/Nandi being women.
- The project factored gender and youth in its MEL and other reporting. For example, the FSCs reported youth composition in their membership, with 21.7% of target beneficiaries in Kapkiyai being youth, Mwatati less than 1% were youth and Kakuyuni reported about 2% were youth
- Participation of women in decision making was high for treatment group; for example, 76.7 % of respondents reported that women in treatment group in Machakos were involved (singly or jointly with husbands) in decision making on selling of coffee; this was higher than in control group (61.9%). In Kericho and Nandi 28.6% and 38.1% reported that women singly and with husband respectively, were involved in decision making on biogas construction for treatment group, compared to 0.0% and 8.3%, respectively, for control group
- The project focused on women in outcomes 2 and 3. In Machakos, 300 households and mainly through women were supported with cookstove; and in Nandi and Kericho 280 households were to be supported on biogas, majority being through women. This project anticipated that supporting women by reducing the time they spend on gathering firewood, would provide them with time for other activities, a result that was realised in the three counties.
- More women are now involved in management and are also employed in factories, as from the scope study and interviews with secretary managers. For instance, two FCSs in Machakos have female Secretary Managers, a role traditionally occupied by men;

moreover in Mukuyuni FCS, the treasurer is a lady while a couple other women are in management of various FCS as mentioned earlier. Even where this has not been fully achieved e.g. in Kitwii, Mukuyuni and New Mitamboni, bylaws have been reviewed with support of CAP to include more women in leadership.

- The project has also empowered women through improved access to credit through the VSLAs created in Machakos.

There is possibility that there will be sustainability in most of project initiatives given that;

- The strengthening of FCS management on governance have shown that this is a driver to better decision makings and service delivery to the farmers, this capacity will remain within the beneficiaries to support future activities
- The type of technologies promoted and the establishment of demonstration farms will ensure that beneficiaries continue to benefit from these interventions
- Training of local cookstove and biogas artisans in Machakos and Nandi and Kericho will ensure that aspects promoted through the project on biogas and stoves are sustained even with the project
- Use of local promoter farmers as trainers will ensure that extension services and training on various aspects promoted through the project are sustained
- The VSLAs grew from existing practices (*chamas*) in Machakos and didn't rely on any financial support from CAP, therefore they have a high chance of self-sustaining even after the project.
- Lack of market linkage could affect some project such as poultry sustainability. Also, the challenge of acquisition of materials for repair of biogas units in Kericho and Nandi could limit operation and sustainability of the units.

4.5 Case studies; Lessons learned; Best Practices and Recommendations

4.5.1 Case studies

Case studies -Promoter Farmer

Esther Munyiva Mbithi of Mukuyuni FCS, Machakos has been trained as a promoter farmer since 2017. She was selected because of her good efforts as a farmer. She has been trained on weeding and pest management; pruning, manure application; soil and water conservation with each training taking about half a day. She has also undergone trainings on solar and greenhouse. She indicated that the trainings were very useful and have helped improve the little knowledge and capacity she had on coffee production. She has also participated in field visits to Sagana; where she was exposed to secondary processing such as roasting and coffee production. She felt that the visit was very useful and well supported. Overall, she reported that there were good arrangements on training of right selection of trainers.

Model used; She has trained about 60 farmers through visiting them, holding discussion and demonstration on coffee management practices such as on pruning; she also acts as a lead farmer by example, and also visit other farmers. In the year 2017, she trained on land preparation, planting, spraying; while in 2018 the trainings focused on pruning, fertilizer application and use and planting of shade tree. She did trainings every week for 2-3 months. She says she feel that she has made contribution to society through her training of fellow farmers. She thinks that her activities as a promoter farmer will continue as she has the trust of farmers and the required knowledge to train farmers continuously. Her services also continue to be demanded by farmers, a fact she notes is likely to continue. Previously, farmers used to rely on farmer field days organized by the national government through the ministry of agriculture, which was insufficient and unreliable. Currently, farmers can ask her questions on aspects related to coffee husbandry in any forum like women group meetings, and she is able to give a timely response. She felts that there is need for continuous skills upgrade for promoter farmers; decentralise demonstration sites so that farmers do not travel far to see technologies such as solar; support through monthly stipend to support promoters' welfare activities; and factories to expand internship opportunities for agricultural graduates who can also support promoters' efforts. She also felt that there is need to support input supply and loans access to boost production for the farmers, for example through linkage.

Case studies -Local artisans

Alice Jeptoo, 29 years, was trained as a biogas artisan by FTA, through Kapkiyai Cooperative Society, in Nandi County. The business management diploma graduate, was a farmer before, and continues with her farming business



She opted to take the work as an artisan as an employment opportunity. She started the work as an artisan on biogas in 2017 after being interviewed for the job, and thereafter after receiving 2 weeks training on construction and management of the biogas unit. She indicated that the training was useful and has helped her to construct 10 biogas units; 8 through the project and 2 for farmers outside the project. She says the job as an artisan has improved her incomes and life.

Model used: For biogas unit put up through the project, the artisans worked in pairs, with the one tasked with the digester receiving all the payment; she/he would inturn also support his partner at no fee. For the FTA systems, they were being paid KES 20,000; hence Jeptoo received KES 160,000 for the 8 digesters. The privately demanded systems (adopted systems) were charged differently with artisan charging 18,000 and 27,000 for a 4 and 10m³ digester. The artisan then hires 1 and 4 casuals for the 4 and 10m³, respectively, and pays them KES 300 per day; therefore, generating a profit of KES 15,900 and 18,600, respectively. She feels the business will continue even after the project, given that more farmers are showing interest. Being a member of the local community and a resident in the area, she feels that she will be in a position to enter in to workable agreements which are more affordable to the farmers on biogas construction. Previously, one had to raise capital and look for skilled masons from beyond the region (who were usually expensive). The road has also been repaired bringing down the cost of construction materials. She has also been marketing her work and promoting use of biogas through telephone call; but points out at the need for support to artisans to be able to sensitize farmers so as to improve the uptake of biogas. She would wish for more training on management of biogas systems. She feels that factories need to be supported

4.5.2 Lessons and Best Practices

Lessons Learned.

- Projects that have activities that lead to quick returns/incomes and technologies that are current are easily taken by the youth. Training on biogas construction was embraced by youth on simple technologies as it was seen to provide immediate employment, an aspect desired by youths. Future projects should consider similar initiatives.
- Recruitment of key project staff early in project implementation ensure smooth and effective project implementation.
- Qualified and appropriate management of institutions are key to ensuring collaboration, smooth project implementation and beneficiaries' participation. Trainings alone of management, even on relevant issues like leadership and governance, doesn't necessary fully improve these parameters, and this hinders the realization of project goals and objectives
- Timelines identified during initial project development need to be adhered to through, for example, extending projects with same time periods that delays have occurred. This ensures that activities are implemented as planned, and ensure desired impact is realized.
- Gender mainstreaming need be factored early including in concept development; delays in undertaking the gender analysis and failure to include gender considerations in project development limited effective gender mainstreaming.
- When project has a short time period some aspects might not be fully implemented and also desired benefits might not be realised within project time frame; for example, adaptation measures to climate change might require more time, compared to mitigation that could be undertaken and realised within the short time
- Variations in geographical conditions for different project sites can vary the cost of the different technologies; increasing cost in some situation
- When key stakeholders are involved from in the project, this helps bring and improves on synergies and support from other stakeholders like County government; and also promotes a sense of ownership of the project by the beneficiaries which in the long-term results to sustainability and continuity of project best practices. For example, coffee was not a priority crop in Machakos, hence the support from various stakeholders was limited. A bill passed through MCU helped to have coffee as a priority crop; this enabled more participation of County government.
- When the key value chain activities such as market linkages are not incorporated well in projects can hinder adoption of technologies and practices; for example, market linkage for poultry and poultry products.
- Difficulties in procuring materials due to the long distances, rough roads and therefore high cost of procuring by individual farmers; inappropriate planning and selection of beneficiaries; inadequate capacity building on biogas management and maintenance, poor technical backup and lack of farmers initiative among other factors can limit the biogas units use. Of the 125 and 80 units installed in Kapkiyai and Kabngertuny,

respectively, it was reported that 48.2 and 40% respectively were not functioning at the time of evaluation. Of those not functioning about half weren't because of failure by farmers to feed them, while the other half were not working due to technical challenges, such as blockages in systems etc.

4.5.3 Good practices

- An efficient and participatory MEL arrangement incorporated early in project ensures efficient implementation of projects- Involvement of key stakeholders in MEL ensures that targets developed are more realistic and this improves projects achievements.
- Tailoring interventions along local solutions or building on local systems and activities for example existing saving programme like merry go round (Chamas) enhances adoption of new technologies and approaches; it improves the success and ownership of the initiative, as beneficiaries can easily identify with it.
- Use of local institutions to promote technology is well received by beneficiaries and consequently ownership and association with the projects is enhanced.
- Proper planning in the initial stage ensures that the project implementation is aligned with objectives; helps in understand project concept, what phases to implement and when to start, how the project is aligned to initial agreement with donors, what will be done at what time, identifying or mapping of the stakeholders and define their roles and manage their expectation's.
- Undertaking baseline study early helps in understanding the needs of beneficiaries from the initial stage and include their needs in-project plans and implementation. This ensure that the concerns of beneficiaries are factored into the project; the strengths and roles of stakeholders are understood and the right stakeholders are selected; and that realistic targets are set
- The use of institutions already established in the target area, like MCU in Machakos, improves project acceptance and contributes to its success due to close monitoring. Such institutions continue undertaking some activities long after the project ends. Also use of institutions, like We Effect, familiar with project sites and with experience in handling similar project components and working with beneficiaries ensures smoother implementation of projects.
- Organizing groups meeting at the respective FCSs ensures better participation of members, this has been seen with the VSLAs. Management board allowed VSLA members to hold their meetings at the factory grounds, rather than own homes etc. This improves relationship between management and members as well as cohesion among them.
- Use of local trainers and artisans is an effective way of provision of technologies and skills, as beneficiaries have quicker access to services and also associate well with local providers of such technologies.
- Piloting technologies through the FCSs is an effective and cost-effective way of transferring technologies; there is trust, possibility of wider reach, and sustainability of the started activities through continuous support by the FCSs
- Building on lesson from previous project, and scaling efforts earlier initiated ensures a quick start and implementation of project; for example, building on Women in Coffee biogas project in Nandi and Kericho.

- Use of promoter farmers, ToTs as well as documentation of good practices, success stories and experiences like it was with the development of the climate academy manual, facilitates the sharing of the same to a wider audience thus having a multiplier effect.
- Interventions which are not complicated to adopt, and whose benefits are multiple, like the use of avocado/macadamia as shade trees (provide shade, fruits, timber and fuel) or chicken (provide eggs, manure and meat) are easier to promote among smallholder farmers as they do not require heavy capital investments like greenhouses.
- Use of locals to train youth as masons for biogas projects was well received and increased sustainability of the initiative as the knowledge to implement it is within the community.
- Smallholder farmers organized in cooperatives are influential in getting local leaders make policies in their favour, like it was in Machakos, which led to the establishment of a Chief Officer coffee position.
- Effectively documenting the project interventions adoption process contributes to the building of a knowledge base for adoption of promoted technologies and practices and facilitates subsequent similar assessments and future planning. In addition, project (FTA and We Effect) regular reporting on the elements of the process, including on projects and activities, facilitates the documentation of the process and thus promotes the archiving and sharing of information. The use of communication piece and development of Climate academy Manual, together with the quarterly reporting as per FTA requirement and We Effect monthly reporting, to document project progress strengthened project implementation.

4.5.4 Scalability and replicability

The following aspects were found to be possible immediate interventions that can be replicated and scaled up in the same project areas, MCU factories, and in other areas with similar characteristics;

- VSLAs
- IGAs and especially poultry and coffee roasting
- SALM technologies and practices especially on coffee shade trees
- Renewable energy technologies; biogas, cookstoves and solar energy and potential for carbon credits
- Use of promoter as an extension methodology and use of local artisans to support technology fabrication and transfer
- Sharing of experiences and knowledge on aspects promoted through CAP
- Women and youth participation

4.5.5 Recommendations –

General recommendations

- Developed projects should strive to enhance the success of introduced initiatives through offering more support services such as linking farmers introduced to production of for example poultry to the markets. There is also need to support input supply and loans access to boost production for the farmers, for example through better linkages.
- There is need to have activities that target the youth, like projects that have quick returns and have current aspects desired by youth; for example, training on simple technologies such as biogas, or translation of the short message service in local dialects

or any other initiative which captures the use of information technology and social media.

- Target should be in improving farmers welfare and not the enterprise, so project should also factor in support programmes or activities that improve farmers livelihoods for example irrigation in the arid areas of Machakos.
- Proper communication, especially on financial matters and expectations, should be very well communicated to all partners to avoid misunderstandings; a communication plan need be factored during project development and implemented throughout to enhance this.

Recommendation to FTA

Planning and project design

- There is need to include key stakeholders early in project planning, to ensure their continued participation and support to project.
- There is need to ensure that an exit strategy is incorporated in project design, such as development of a program for example through discussion with the County governments for project extension or new donor support, to enhance market linkage like for poultry in Machakos. A similar program could be supported to ensure in Kericho and Nandi, biogas beneficiaries' access easily and cheaply materials for repairs and maintenance of biogas units.
- Complete bill of quantities needs to be developed during project development to avoid budget escalation; for example, the poor road network increased BQs for Kabng'etuny biogas systems.
- There is need to have budgetary provision to motivate ToTs
- Differentiated budgeting based on varied conditions of each partner (FCS), would be needed. For example, for Kakuyuni production had gone down and they needed more than training to bring the farmers back. Funding and number of technologies provided should be based also on number of wet mills and not per FCS.
- FTA need to build capacity and recruit staff in the various project components instead of using other partners; this could lower the cost of project implementation. Furthermore, there ought to be proper succession planning in every project to ensure no delays in case of staff movement

Project implementation

- Baseline survey should be done early in the project cycle starting immediately after kick off, so as to establish the actual status of key aspects of the ground as well as create awareness about the project. This will enable the project implementer to measure impact easily, as well as map stakeholders and clarify their roles. Furthermore, understanding specific beneficiaries needs way early before implementation of key project activities, helps in setting realistic targets
- Piloting of technologies through demonstration farms would be more effective through decentralising demonstration sites, and taking them closer to for example farmers' farms, so that farmers do not travel far to see technologies and also farmers would relate more with results if they happen at a farmers site.
- A more supportive framework to promoters needs to be included in proposal development; for example, by providing farmers with monthly stipend to support

promoters' welfare activities in the initial phases of project, before farmers increase demand for promoters' services.

- Training on biogas construction should be longer, with artisans being taken through all aspects including trouble shooting and maintenance of the systems. In addition, a similar program, to train artisans to fabricate incubators, construct poultry houses, greenhouses or install solar systems in Machakos would have enhanced sustainability.
- A project of this nature requires longer implementation period to ensure enough time for various activities as well as realisation of results. If possible, adjustments ought to be made to make up for time lost inadvertently, like due to elections (as it was in 2017) or pandemics

Recommendations to FCS

- There is need for continuous skills upgrade to promoters and local artisans so that they can continue to support farmers with wider and emerging skills and technologies
 - The experiences of Mwatati on transformation of VSLAs to SACCO needed to be shared with other VSLAs to ensure more sustainability in the VSLAs
 - FCSs or households could support in procurement materials for biogas construction and repairs through acquisition and transportation; this would not only lower the cost and allow timely repairs as currently the materials are sourced far towns, but also improve sustainability by enhancing ownership. Moreover, projects should target sustainability at the micro (household) rather than macro (society) level especially for ownership of the activities
 - There is need to scale out trainings on financial literacy that were undertaken to few but was rated as useful, with the training impacts being felt through the VSLAs
 - The efforts of promoters can be expanded by factories expanding internship opportunities for agricultural graduates who can also support promoters' efforts.
-

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6 APPENDIX

Annex 1: The Terms of Reference (attached)



Climate-Academy_-Terms-of-Reference_-

Annex 2: : Kapkiyai and Kakuyuni FCSs Case studies (*attached*)



Case studies
Kapkiyai and Musilil

Annex 3: Photographs (*as a separate attachment*)

Annex 4: Consent forms (*as separate attachment*)

[Annex 5: Raw data](#)



FINAL cleaned HH
Data Entry Sheet - M



FINAL-Cleaned HH
Data Entry - Kericho

Annex 5: Attendance Lists for Focussed Group Discussions

Focussed Group Discussion
KAPICLYA CFS
DATE: 24/7/2020

No	Name	Telephone	PSG
1	EMOCKI K. CHUWE	0702781657	
2	SAINA JERUBET MILIER	0713651851	
3	PHUP KURAT	0725946389	
4	Chet's Silvia	0718351742	
5	Leahy Too	0712077806	
6	Nancy Kosgoy	0718338716	
7	JOHN SAINA ✓	0716877101	
8	HELLEN ARADITA	07125704165	
9	Caroline Ansel	07050760	
10	DORCAS JEPTANU	0711397261	
11	ALICE JEPIOU	0717898223	

KARUYUNI CFS
FGD

NAME	TELEPHONE NO	PSG
1. Isaac K. Raka		
2. George M. Musemba		
3. Peter K. Nzioka		
4. PATRICK MWOSE		
5. BENJAMIN W. MUKANDA		
6. James K. MUKISA		
7. John K. Mwangi		
8. Peter Kirani Nzioka		
9. FRANCIS W. MUKAMBA		
10. Alexander M. Kanyo		
11. BETH K. DANIEL		
12. Ad. Mutina Mitamba		

27/7/2020
MUSOWI FGD

Name	Telephone	PSG
1. JAMES MUKIRA	071013441	
2. DANIEL W. KIBONYI	071013441	
3. RAPHAEL M. MUKIRA	071218359	
4. MARGRETI PETER	0726144559	
5. Cecelia M. MUKIRA	0726056335	
6. Jackson Makene	0718976781	
7. AARON NGAO	0727611513	
8. Joshua Mututi	0710791135	
9. Peter M. SINE	070860408	

FGD
MUSICILI FACTORY
DATE 29/7/2020

Name	Telephone	PSG
1. Paul Mwangi	072561842	
2. Humphrey Mutha	0727520585	
3. Agnes M. Mutha	0727772040	
4. ROBERT M. NZAU	0727209196	
5. STEPHEN M. KILOMI	0720952450	
6. Anthony M. Matella	0721645997	
7. John Ndala Muli	070283448	
8. Jane Ndungu Kabuku	0724435871	
9. CAROLINE W. MUKIMBA	0701946946	
10. Paul N. Mwangi	072232930	

Annex 6:Key Informants Interviewed

Name	Position and Organisation	Contacts
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Eliud Keter	Ward Agricultural Extension officer. Songhor ward	0718351785
Ms. Joyce Mbithe Kioko	Chairlady, Pioneer VSLA	0713 291989
Ms. Kanini	Manager T Tot Hotel	0735135558
Ms. Mwende	Sales, Davis & Shirtliff Machakos	
James Mutisya	Promoter Service Provider- Kakuyuni FCS	0728333041
Esther Munyiva	Promoter -Mangaani area	0707277484
Alice Jeptoo	Artisan biogas- Kapkiyai FCS	0717898223
Josephine Kanyambu	Manager Moko Sacco	0722902558
Josephat Nzeki	Mill manager -MCU Coffee Mills	0704514004
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Annex 7: Change in some household parameter and Association to project Machakos

Parameter		Reduced		No change		Increased		Association of the change to project				Summary	
		more than 10%	0-10%	0%	Slight (0-10%)	Moderate (10-20%)	high (over 20%)	Strong	Moderate	Slight	None	Some change (slight-high)	Some association (slight-strong)
Total household income	<i>Control</i>	25	25	25	25	25						50.0	
	<i>Treatment</i>	16.7	14.3	11.9	26.2	16.7	14.3	17.5	22.5	12.5	47.5	57.2	52.5
Production per tree	<i>Control</i>	50	25		25							25.0	
	<i>Treatment</i>	24.4	24.4	6.7	17.8	15.6	11.1	17.5	20	10	52.5	44.5	47.5
Total production in Kgs of coffee per year	<i>Control</i>	50		25	25							25.0	
	<i>Treatment</i>	26.7	24.4	8.9	17.8	13.3	8.9	23.3	14	4.7	58.1	40.0	42.0
Area under coffee	<i>Control</i>	25		75								0.0	
	<i>Treatment</i>	4.8	2.4	83.3	9.5			4.9	4.9	7.3	82.9	9.5	17.1
Income from coffee	<i>Control</i>	100										0.0	
	<i>Treatment</i>	37.8	37.8	8.9	11.1	2.2	2.2	6.8	4.5	13.6	75	15.5	24.9
Income through alternative sources	<i>Control</i>					75	25					100.0	
	<i>Treatment</i>	2.3	2.3	11.4	43.2	22.7	18.2	14	34.9	11.6	39.5	84.1	60.5
Ability to pay for health for family	<i>Control</i>	50		25	25							25.0	
	<i>Treatment</i>	13.6	15.9	15.9	31.8	13.6	9.1	9.3	25.6	20.9	44.2	54.5	55.8
Food security	<i>Control</i>	50		25	25							25.0	
	<i>Treatment</i>	13.6	6.8	15.9	22.7	20.5	20.5	18.6	23.3	18.6	39.5	63.7	60.5
Cost of energy for cooking	<i>Control</i>			75	25							25.0	
	<i>Treatment</i>	24.4	4.4	42.2	11.1	11.1	6.7	27.3	13.6	9.1	50	28.9	50.0

Annex 8: Change in some household parameter and Association to project Kericho

Parameter		Reduced		No change	Increased			Association of the change to project				Summary	
		more than 10%	0-10%	0%	Slight (0-10%)	Moderate (10-20%)	high (over 20%)	Strong	Moderate	Slight	None	Some change (slight-high)	Some association (slight-strong)
Total household income	<i>Control</i>	0	0	50	50	0	0					50.0	
	<i>Treatment</i>	0	0	4.8	28.6	23.8	42.9	57.1	38.1	4.8	0	95.3	100.0
Total production in Kgs of coffee per year	<i>Control</i>	16.7	33.3	16.7	33.3	0	0					33.3	
	<i>Treatment</i>	0	4.8	0	19	28.6	47.6	61.9	33.3	0	4.8	95.2	95.2
Area under coffee	<i>Control</i>	16.7	0	83.3	0	0	0					0.0	
	<i>Treatment</i>		4.8	57.1	14.3	14.3	9.5	14.3	19	4.8	61.9	38.1	38.1
Income from coffee	<i>Control</i>	16.7	0	0	83.3	0	0					83.3	
	<i>Treatment</i>	4.8	0	0	33.3	19	42.9	57.1	33.3	9.5	0	95.2	99.9
Ability to pay for health for family	<i>Control</i>		16.7	66.7	16.6	0	0					16.6	
	<i>Treatment</i>	0	4.8	0	42.9	23.8	28.6	38.1	52.4	9.5	0	95.3	100.0
Food security	<i>Control</i>	0	16.7	50	33.3	0	0					33.3	
	<i>Treatment</i>	0	0	19.5	19	33.3	38.1	47.6	38.1	9.5	4.8	90.4	95.2
Cost of energy for cooking	<i>Control</i>	0	0	83.3	16.7	0	0					16.7	
	<i>Treatment</i>	66.7	4.8	9.5	0	14.3	4.8	71.4	19	0	9.5	19.1	90.4
Others Perceived health benefits	<i>Control</i>	0	0	83.3	16.7	0	0					16.7	
	<i>Treatment</i>	4.8	0	9.5	9.5	33.3	42.9	57.1	28.6	4.8	9.5	85.7	90.5

Annex 9: Trainings and effectiveness

SALM- Machakos										
Training type	Group	% practicing	% Trained	Very important	Important	fairly important	Slightly Important	Not important		
Agroforestry	<i>Treatment</i>	97.1	46.5	73.5	20.6	2.9	0	2.9		99.9
	<i>Control</i>	96.2	65.9	73.1	26.9	0	0	0		100
Conservation agriculture	<i>Treatment</i>	92.3	36.1	69.2	26.2	0	3.8	0		99.2
	<i>Control</i>	93.8	38.1	68.8	25	0	0	6.3		100.1
Organic farming	<i>Treatment</i>	77.1	48.6	57.1	20	14.3	8.6	0		100
	<i>Control</i>	87.5	38.1	62.5	31.3	6.3	0	0		100.1
Integrated pest management	<i>Treatment</i>	97.1	48.6	62.9	25.7	5.7	2.9	2.9		100.1
	<i>Control</i>	85	47.6	70	25	5	0	0		100
Integrated livestock management	<i>Treatment</i>	100	31.9	69.6	21.7	4.3	4.3			99.9
	<i>Control</i>	81.8	26.2	72.7	27.3	0	0	0		100
Soil and water conservation	<i>Treatment</i>	96.7	41.7	70	23.3	0	6.7	0		100
	<i>Control</i>	93.8	38.1	68.8	31.3	0	0	0		100.1
Agronomical practices	<i>Treatment</i>	100	34.7	68	24	8	0	0		100
	<i>Control</i>	93.8	40.5	75	25	0	0	0		100
Tree nursery establishment	<i>Treatment</i>	76.2	29.2	81	14.3	4.8	0	0		100.1
	<i>Control</i>	71.4	19	62.5	37.5	0	0	0		100
Sustainable energy	<i>Treatment</i>	50	34.7	44	28	20	4	4		100
	<i>Control</i>	85	47.6	70	25	5	0	0		100
Climate change	<i>Treatment</i>	96	34.7	68	28	0	4	0		100
	<i>Control</i>	86.7	33	53.3	46.7	0	0	0		100
Disaster risk management	<i>Treatment</i>	100	15.3	54.5	27.3	18.2	0	0		100
	<i>Control</i>	90	23.8	70	30	0	0	0		100
Greenhouse	<i>Treatment</i>	33.3	12.5	66.7	11.1	11.1	11.1	0		100

	<i>Control</i>	100	9.5	100	0	0	0	0	100
Income/Business related training- Machakos									
Farming as a business	<i>Treatment</i>		61.1	72.7	20.5	6.8	0	0	100
	<i>Control</i>		42.9	72.2	22.2	5.6	0	0	100
Record keeping	<i>Treatment</i>		43.1	73.3	20	0	3.3	3.3	99.9
	<i>Control</i>		54.8	60.9	30.4	0	4.3	4.3	99.9
Financial literacy	<i>Treatment</i>		36.1	80	16	4	0	0	100
	<i>Control</i>		19	75	12.5	0	0	12.5	100
value addition of coffee-roasting and packaging	<i>Treatment</i>		11.1	37.5	50	12.5	0	0	100
	<i>Control</i>		2.4	100	0	0	0	0	100
Gender and social inclusion	<i>Treatment</i>		33.3	56	40	4	0	0	100
	<i>Control</i>		31	69.2	23.1	7.7	0	0	100
Kericho -Biogas									0
Biogas	<i>Treatment</i>	95	95.2	90	10	0	0	0	100
	<i>Control</i>	50	16.7	50	0	0	50	0	100

Annex 10: Level of knowledge on areas capacity building was done

Level of Knowledge Machakos		2017					2019				
		Very high	high	fair	low	very low	Very high	high	fair	low	very low
Agroforestry	<i>Treatment</i>	5.6	16.7	54.2	18.1	5.6	29.2	38.9	18.1	8.3	5.6
	<i>Control</i>	9.5	11.9	35.7	33.3	9.5	26.2	28.6	19	19	7.1
Conservation agriculture	<i>Treatment</i>	4.2	12.5	36.1	22.2	25	16.7	29.2	23.6	8.3	22.2
	<i>Control</i>	4.9	12.2	26.8	17.1	39	14.6	29.3	17.1	7.3	31.7
Organic farming	<i>Treatment</i>	7	12.7	39.4	15.5	25.4	25.4	26.8	18.3	5.6	23.9
	<i>Control</i>	7.1	11.9	35.7	14.3	31	16.7	31	11.9	7.1	33.3
Level of Knowledge Kericho											
Biogas plant management	<i>Treatment</i>	4.8	0	9.5	4.8	81	47.6	38.1	4.8	0	9.5
	<i>Control</i>	0	0	8.3	8.3	83.3	8.3	0	16.7	0	75
Bogas use	<i>Treatment</i>	9.5	4.8	4.8	19	61.9	61.9	33.3	0	0	4.8
	<i>Control</i>	0	0	8.3	8.3	83.3	8.3	0	16.7	0	75
Biogas slury management	<i>Treatment</i>	4.8	4.8	4.8	4.8	81	61.9	33.3	0	0	4.8
	<i>Control</i>	0	0	8.3	8.3	83.3	8.3	0	8.3	0	83.3
Biogas unit construction	<i>Treatment</i>	4.8	0	9.5	4.8	81	33	4.8	0	4.8	52.4
	<i>Control</i>	0	0	8.3	8.3	83.3	8.3	83.3	8.3	0	75

Annex 11: Assets Owned by Households

		Machakos treatment			Machakos control			Kericho treatment			Kericho control			
		No	Value	Total	No	Value	Total	No	Value	Total	No	Value	Total	
Electricity	2017	0.52	291519	11066061	0.5	35182	738822	0.52	25657	280174.4	0.64	21375	164160	
	2019	0.74	291519	15747856	0.69	35182	1019574.36	0.67	25657	360994	0.75	21375	192375	
Draught animals	2017	0.18	24050	316017	0.42	23722	418456.08	0.095	29285	58423.58	0	0	0	
	2019	0.23	24050	403799.5	0.38	23722	378603.12	0.048	29285	29519.28	0	0	0	
Wheel barows	2017	0.79	2746	158361.8	0.98	3017	124179.72	0.38	2720	21705.6	1.1	3188	42081.6	
	2019	0.9	2746	180412.2	1.17	3017	148255.38	0.48	2720	27417.6	1	3188	38256	
hand hoes	2017	3.16	428	98731.04	3.35	388	54591.6	3.95	450	37327.5	4.6	354	19540.8	
	2019	3.91	428	122164	4.59	388	74798.64	4.92	450	46494	5	354	21240	
TV	2017	0.85	10617	658784.9	0.57	10022	239926.68	0.33	12807	88752.51	0.45	15,000	81000	
	2019	0.97	10617	751789.8	0.85	10022	357785.4	0.48	12807	129094.6	0.58	15,000	104400	
Mobile phones	2017	1.32	2669	257184.8	1.07	3793	170457.42	1.81	4110	156221.1	3.27	3516	137967.8	
	2019	1.52	2669	296152.2	1.52	3793	242145.12	2.43	4110	209733.3	4.33	3516	182691.4	
		No			42			21			12			
		73												
		Total 2017			12555141			1746433.5			642604.7			444750.2
		Total 2019			17502174			2221162.02			803252.7			538962.4
		Total 2017			171988.2			41581.75			30600.23			37062.52
		Total 2019			239755.8			52884.81			38250.13			44913.53