



SUSTAINABLE AGRICULTURE TANZANIA  
SOLUTIONS FOR A BETTER FUTURE



# Farmers and Pastoralists Collaboration (FPC) Project

Impact Assessment Report

June 2023

**COVER:** A female farmer and a male pastoralist from Kilosa, Morogoro, both beneficiaries of SAT's Farmers and Pastoralists Collaboration (FPC) Project holding hands to signify their new-found solidarity and peace.  
Photo: iDev Consulting

## ACKNOWLEDGEMENTS

The study team would like to extend our sincerest gratitude to all those who contributed to the successful completion of this assessment. We are particularly grateful to the communities and individuals in the project districts who gave their valuable time and shared their experiences, perspectives, and wisdom with us. We would also like to express our gratitude to Sustainable Agriculture Tanzania and the Farmers and Pastoralists Collaboration (FPC) project teams. Their support, knowledge, and insights were instrumental in understanding the project context and its impacts. Finally, our thanks go to the extension officers, district agriculture and livestock officers, and other key informants who shared their expert knowledge and insights with us. This assessment would not have been possible without the collaboration, participation, and dedication of all those mentioned above. We sincerely appreciate your contribution to this important work.

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### Commissioned by:

Sustainable Agriculture Tanzania (SAT)

### With support from:

The Biovision Trust

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# EXECUTIVE SUMMARY

This report presents an extensive analysis of the Farmers and Pastoralists Collaboration (FPC) project, aimed at enhancing the sustainability and resilience of farming and pastoralist communities through the adoption of agroecological practices. It discusses the project's background, the purpose of the impact assessment, methodologies employed, and key findings, in addition to outlining challenges and recommendations for further improvements.

The assessment covered all the four (4) districts of FPC project implementation, thus ensuring that the findings reflect the realities and impact of the FPC project across its entire operational landscape. These included the districts of Mvomero, Kilosa - both located in the Morogoro region - Same in the Kilimanjaro region, and Hanang in the Manyara region.

## **About Sustainable Agriculture Tanzania (SAT)**

Sustainable Agriculture Tanzania (SAT) is a reputable non-profit organization in Tanzania founded in 2009 and registered in June 2011 under the Societies Act. Currently the organization employs a staff of 70, operates in 4 regions with an annual consolidated budget of USD 1.5M. SAT is headquartered in Morogoro region, which is known as the country's breadbasket, with offices in Arusha and Dodoma. SAT runs the first centre for organic agriculture and agro-ecology in Tanzania located 20kms from Morogoro town. SAT has an outreach of up to 90,000 farmers in East Africa through extension work, running a training centre and through consulting activities. While marketing PGS products, SAT creates awareness about organic agriculture in the local market, and processes more than 15 products. SAT works as a state-of-the-art organic agriculture training and research organization with local and international partners and experts, e.g., with the largest Agri. University in East Africa, Sokoine Agriculture University SUA, located 7km next to SAT's main offices. SAT validates and creates knowledge: next to on-farm research and participatory research, it conducts long-term research with ETH Zurich on agro-ecology and using ICT. SAT's foundation is built on 4 main pillars which guide the project implementation. These are: Dissemination of Knowledge, Application, Research and Networking.

## **Project Overview**

**Project overall developmental goal** - enhancing sustainable livelihoods of farmers and pastoralists through agroecological practices in Tanzania creating a solution where both parties can create local circular economies, where everyone benefits, and conflicts are drastically reduced.

## **FPC phase I**

**Phase I Project purpose** - practice of agroecology in Mvomero and Morogoro Rural Districts by farmers and pastoralists creates mutual benefits for both parties which are increased income, balanced nutrition, reduced conflicts and strengthened climate resilience.

## **Phase I Projects' objectives**

1. Farmers and pastoralists are engaged in agroecological production in Mvomero District, which increases food security, balanced nutrition, climate resilience, soil conservation and reforestation and enables other regions to learn from this approach.
2. Agricultural value chains in Mvomero District are developed/strengthened through improved infrastructure at SAT Farmer Training Centre (FTC) and in the community, implemented machinery ring, introduction of draught animals, processing farmers' crops locally, and through strategic marketing.
3. Farmers and pastoralists benefit through on-farm action research which produces practically orientated solutions for their problems.
4. Farmers in Morogoro Rural District (former project area) are further strengthened through facilitation in agriculture, marketing, and other entrepreneurial activities.
5. M&E activities including impact assessments are strengthened, and knowledge and experience from FPC is integrated into ongoing policy and research dialogues.

## **FPC phase II**

**Phase II Project purpose** - The cementing of existing FPC activities in Mvomero, their scientific proof and the scaling to Kilosa District for creating mutual benefits for

### **Phase II Projects' objectives**

1. Farmers and pastoralists benefit from increased productivity and provide ecosystem services through practicing agroecological methods and their lesson-learnt are made accessible to other regions and extension service providers.
2. A strengthened circular economy whereby farmers and pastoralists benefit from increased income as a result of high-quality value-added organic products, reliable markets and improved infrastructure.
3. Experiments and Research on existing and new challenges are continuously carried out with farmers and pastoralists and their results shared with the public, building scientific evidence for support of agroecological agriculture.

### **Purpose of the Impact Assessment**

This impact assessment was carried out with the goal of documenting intended and unintended impact registered based on the outcomes and lessons learned over the project period in terms of the project design, implementation, and sustainability among other basic assessment components in a table. The assessment focused on:

- Assessing the impact registered by the project over the course of implementation (what did it really change for the life of the participants?), is it different for non-project participants?
- Attributing the impact of the project (does the impact registered really reflect the impact of the project interventions?)  
Identifying unintended impact/side effects (negative and positive)
- Assessing the sustainability of replication and scale out of the project activities (what results are likely to be sustained beyond the project duration? Which activities and outcomes are self-sustaining or self-replicating? What kind of structures are needed to assure sustainability, how will they be financed, how will they be accessible?)

- Assessing which activities show (greatest) impact and why the expected changes happened or did not happen; what the contributing or hindering factors were and what prerequisites were necessary to achieve the desired impact.

## **Methodology**

The assessment adopted a mixed-methods approach, combining quantitative and qualitative research methods to provide a comprehensive picture of the project's outcomes. Quantitative data was gathered through surveys, measuring key indicators such as yield increase, income change, and changes in nutritional habits. Data collection in the field was conducted between May 15th and 19th, 2023, covering the districts of Hanang, Kilosa, Mvomero, and Same. The assessment involved a substantial participant count of 487 respondents.

Qualitative data, collected via interviews and focus group discussions, offered valuable insights into community perceptions, personal experiences, and the contextual factors influencing project outcomes. To add another layer of depth and reliability, observational methods and document reviews were also utilized in the assessment. Direct observation gave the research team a firsthand view of the agricultural practices, interactions, and changes happening on the ground, while document review provided a historical perspective, allowing for the comparison of pre-and post-intervention data.

## **Key Findings**

Looking at the demographics of respondents, the study saw a significant female majority (68%) in the beneficiary group, while the non-beneficiary group was more balanced, with a slightly higher representation of males (53%). Looking at average age, both groups were in the working age, but with beneficiaries being slightly older, with an average age of 44 compared to 40 among non-beneficiaries. The younger demographic, those under 35 years old, made up a crucial 38% of all respondents. As for educational attainment, half of the respondents had completed primary education, while 39% had no formal education. Only a small fraction had reached secondary education and beyond.

When examining the diversity of crops grown by the farmers—an essential aspect of the agroecological approach—the data shows a significant increase in crop diversity among the FPC project beneficiaries. Crop diversity, which contributes to resilience against climate variability and pests and offers various nutritional benefits, rose from an average of 3.14 to 3.86 crops per farmer following the project implementation. This change, contrasted with a lesser average of 3.02 crops per farmer among non-beneficiaries, these results suggests that the FPC project successfully promoted and facilitated crop diversity. While the majority of farmers farmed between 3 and 5 crops, the proportion of beneficiaries who did so was greater (67%) than the comparison farmers (58%), or that of the beneficiary farmers themselves before the project (51%).

As for crop yields, the study revealed substantial improvements among beneficiaries post-FPC project. Regardless of the specific crops, the yield in kilograms per acre demonstrated significant growth for the top three crops identified as most important by most farmers. For instance, the farmers' yield of maize, the most important crop for a majority of the farmers, yield increased from an average of 774 kg per acre before the FPC project to 1,324 kg per acre

after. The beneficiaries' yield post-project surpassed that of the non-beneficiaries, affirming the project's effectiveness in enhancing agricultural productivity.

In terms of plant protection techniques, beneficiaries utilized an average of 1.84 different methods, compared to 1.08 among non-beneficiaries. The techniques ranged from using natural pesticides made from local materials to specific cultivation practices and crop rotation. Simultaneously, the study observed a considerably higher adoption of organic fertilizers such as compost and manure among beneficiaries, underscoring the success of the project's investments in promoting these natural alternatives.

Lastly, the study revealed a distinct disparity in the adoption of improved livestock breeds between beneficiaries and non-beneficiaries. Beneficiaries exhibited a significantly higher adoption rate, with around 49.65% reporting the use of improved breeds. The average number of improved cows per household rose from 1.4 to 6.4, surpassing the 5.0 average of non-beneficiaries. The adoption of improved goat breeds was even more striking, with beneficiary households seeing an increase from an average of 1.0 to 17.7, compared to 4.3 for non-beneficiaries.

The implementation of the FPC project has significantly increased income levels for its beneficiaries. From 2017 to 2022, their average annual income surged by approximately 143%, from TZS 578,493 to TZS 1,407,445. In comparison, non-beneficiaries had a lower average income of TZS 1,076,325 in 2022.

The project also markedly improved the median income of beneficiaries, which tripled from TZS 200,000 before the project to TZS 600,000 after. Non-beneficiaries reported a lower median income of TZS 500,000 in the same period.

Despite varying durations of participation in the project, all beneficiaries experienced increased incomes. This suggests that factors beyond duration, such as improvements in the project's implementation or external economic influences, may also be at play. Most beneficiaries reported that the generation of new income sources from income generating activities introduced by the project and increased productivity were the primary drivers of their income increase.

The FPC project has positively impacted beneficiaries' food security and nutrition. Post-implementation, the average number of meals consumed per day by beneficiaries increased from 2.2 to 2.8, higher than the 2.6 meals consumed by non-beneficiaries. The number of beneficiaries consuming 3 meals per day rose dramatically from 35% to 82%.

The project also affected nutritional quality. Using the Food Consumption Score (FCS) model, we observed that beneficiaries consume less staple food (cereals and tubers) but more nutritionally dense foods (milk and dairy, vegetables) daily, suggesting a more balanced diet. Beneficiaries also consume pulses more frequently and fruits at a higher daily rate than non-beneficiaries, contributing to their diverse diet. However, consumption of protein-rich foods and fruits needs to be improved for a fully balanced diet. Consumption of sugar and oil is similar between both groups, and while important in moderation, sugar consumption should be monitored to prevent potential health risks.



Surveyed farmers and pastoralists have adopted various climate-resilient techniques and technologies. This includes the use of organic fertilizers, controlled burning, planting native trees, using local seed varieties, and water resource management practices. For pastoralists, adaptive strategies include seasonal mobility, rearing drought-resistant breeds, and fodder storage techniques. Before joining the project, only 9% of beneficiaries used two or more techniques. This figure increased remarkably to 44% after the project's intervention, an almost five-fold increase. In contrast, only 25% of non-beneficiaries reported using two or more climate-resilient techniques.

The impact of the FPC project is evident in the adoption rate of these techniques. Initially, beneficiaries used an average of 0.49 climate-resilient technologies, which post-intervention, increased to 1.49, significantly higher than the 0.97 average for non-beneficiaries. This included a five-fold increase in the number of beneficiaries adopting multiple climate-resilient techniques.

Conflict resolution is another crucial aspect of sustainable development. Notably, 23% of the beneficiaries reported active involvement in conflict resolution initiatives, compared to only 13% of non-beneficiaries. Beneficiaries also report slightly higher rates of significant reduction in conflict, with 36% compared to 32% of non-beneficiaries. A majority of both groups perceive conflicts as somewhat reduced, with 54% of beneficiaries and 51% of non-beneficiaries sharing this view.

Nonetheless, there is room for improvement as a considerable portion of both beneficiaries and non-beneficiaries have not engaged in such initiatives, and some still perceive conflict levels to be the same or even increased. Further engagement of community members in conflict resolution initiatives will contribute to peace and stability.

The gender distribution among beneficiaries and non-beneficiaries of the project shows a significant outcome of the initiative's efforts. The project has been successful in ensuring greater representation of women, who comprise 68% of beneficiaries, a result that reflects strides towards gender inclusion despite traditionally excluding barriers. Conversely, the non-beneficiary group saw a slight male predominance, with 53% males versus 47% females.

Women's active participation across various districts, such as Hanang, Kilosa, Mvomero, and Same, indicates the project's substantial impact in fostering gender inclusivity in agroecological practices.

## **Sustainability**

The assessment of sustainability revealed two essential components: the establishment of sustainability structures and the longevity of the project's impacts. Sustainability structures included the creation of local groups, fostering knowledge exchange, resource sharing, and mutual support among members. Also crucial was the collaboration with local government authorities, which proved instrumental in embedding sustainable practices and mobilizing resources for rural development.

In terms of the sustainability of impact, the project's achievements in areas such as enhanced food security, improved nutrition, and greater climate resilience inherently carry the potential to advance the project's momentum. These tangible benefits serve as powerful motivators

that are likely to keep beneficiaries engaged in the long run. Increased participation in conflict resolution initiatives also promises to foster a sustained culture of peace and collaboration which are preconditions for sustainability.

However, the sustainability of the peace initiatives and the milk value chain are two areas with noteworthy considerations. First, the sustainability of peace initiatives is reliant on a shift in attitudes across all community members, not just project beneficiaries. An inclusive approach to conflict resolution is key to fostering long-term peace. Second, the milk value chain's over-reliance on a single buyer and limited sales outlets pose significant risks and constraints, calling for a more diversified market approach to ensure its longevity and reach.

Finally, the sustainability of cooperatives and SAT Saving and Lending Groups (SSLGs) is another crucial aspect to consider. While these structures have shown significant potential, they face challenges that could impact their long-term viability.

Assessing the sustainability of replication and scale out of the project activities (what results are likely to be sustained beyond the project duration? Which activities and outcomes are self-sustaining or self-replicating? What kind of structures are needed to assure sustainability, how will they be financed, how will they be accessible?)

Assessing which activities show (greatest) impact and why did change happen or did not happen, what are the contributing or hindering factors? What prerequisites were necessary to achieve the desired impact?

### **Challenges and Recommendations**

The FPC project has significantly improved livelihoods in the Mvomero, Kilosa, Same, and Hanang districts. However, challenges remain, including knowledge and skills deficits in seed storage and weather-dependent farming; resource scarcity, particularly farming equipment and water sources; external issues like pest control and wildlife intrusion; and the need for better community mobilization, especially among youth.

To address these, recommendations have been put forward. These include the mechanization of bio-pesticide and bio-fertilizer production, provision of farming resources, enhancement of training in seed storage methods and advanced farming techniques, construction of man-made water sources, and promotion of sustainable herd and grazing management practices. In addition, addressing wildlife intrusion, fostering youth involvement, supporting pastoralists' interest in farming, providing conflict resolution skills, offering nutritional education, and promoting market access were suggested.

Furthermore, promoting climate-resilient practices, implementing regular monitoring and evaluation, and expanding successful practices are considered crucial for future success. Regular monitoring ensures the project aligns with its objectives, and it enables necessary adjustments, while expanding successful practices could bring benefits to more communities. These recommendations are geared towards enhancing the sustainability of the FPC project and the long-term wellbeing of the beneficiary communities. They balance both the immediate needs of farmers and pastoralists and the long-term goal of sustainable agriculture and livestock management.

# INTRODUCTION



## About SAT

Sustainable Agriculture Tanzania (SAT) is a reputable non-profit organization in Tanzania founded in 2009 and registered in June 2011 under the Societies Act. Currently the organization employs a staff of 70, operates in 4 regions with an annual consolidated budget of USD 1.5 million. SAT is headquartered in Morogoro region, which is known as the country's breadbasket, with offices in Arusha and Dodoma. SAT runs the first centre for organic agriculture and agroecology in Tanzania located 20km from Morogoro town. SAT has an outreach of up to 90,000 farmers in East Africa through extension work, running a training centre and consulting activities.

SAT creates awareness about organic agriculture in the local market, and processes more than 15 products. SAT works as a state-of-the art organic agriculture training and research organization with local and international partners and experts, such as with the largest Agri-University in East Africa, Sokoine Agriculture University (SUA).

SAT is also dedicated to knowledge creation and validation. Besides on-farm and participatory research, it conducts long-term studies with ETH Zurich, exploring agroecology and the utilization of Information and Communication Technology (ICT). SAT's operations are guided by four central pillars: Dissemination of Knowledge, Application, Research and Networking.

## Project Background

Since its initiation in 2017, the FPC Project has executed its mission through two sequential phases. The inaugural phase of the project was implemented from January 2017 until December 2019, succeeded by the second phase which ran from January 2020 through December 2022. The project's primary goal is to enhance the sustainable livelihoods of farmers and pastoralists through the adoption of agroecological practices. These practices were intended to create mutual benefits for both parties, including increased income, strengthened food security, balanced nutrition, reduced conflicts, and climate resilience.

In its first phase, the FPC Project was centered in the Mvomero and Morogoro Rural districts. The aim was to promote agroecology among the local farming and pastoral communities to generate a symbiotic relationship that would yield mutual benefits, including increased income, better food security, more balanced nutrition, the reduction of conflicts, and enhanced climate resilience.

Furthermore, the first phase endeavored to fortify agricultural value chains, promote on-farm action research, strengthen the skills of farmers in Morogoro Rural District, and integrate the knowledge acquired from the FPC Project into ongoing policy and research dialogues.

### Phase I Projects Objectives

1. Farmers and pastoralists are engaged in agroecological production in Mvomero District, which increases food security, balanced nutrition, climate resilience, soil conservation and reforestation and enables other regions to learn from this approach.
2. Agricultural value chains in Mvomero District are developed/strengthened through improved infrastructure at SAT Farmer Training Centre (FTC) and in the community, implemented machinery ring, introduction of draught animals, processing farmers' crops locally, and through strategic marketing.
3. Farmers and pastoralists benefit through on-farm action research which produces practically orientated solutions for their problems.
4. Farmers in Morogoro Rural District (former project area) are further strengthened through facilitation in agriculture, marketing, and other entrepreneurial activities.
5. M&E activities including impact assessments are strengthened, and knowledge and experience from FPC is integrated into ongoing policy and research dialogues.

Moving into its second phase, the FPC Project sought to cement the practices and achievements from its first phase in Mvomero District, validate them scientifically, and expand them to Kilosa District. This extension was planned to further the mutual benefits for both farmers and pastoralists, creating a more substantial impact.

## Phase II Projects Objectives

1. Farmers and pastoralists benefit from increased productivity and provide ecosystem services through practicing agroecological methods and their lesson-learnt are made accessible to other regions and extension service providers.
2. A strengthened circular economy whereby farmers and pastoralists benefit from increased income as a result of high-quality value-added organic products, reliable markets and improved infrastructure.
3. Experiments and Research on existing and new challenges are continuously carried out with farmers and pastoralists and their results shared with the public, building scientific evidence for support of agroecological agriculture.

Over its two phases, the project is estimated to have directly impacted approximately 3,536 farmers and pastoralists across the districts of Mvomero, Kilosa, Hanang, and Same.

In 2019, the FPC Project underwent an external evaluation that provided valuable input for the design of Phase II. Furthermore, a learning journey conducted by a team of experts in July 2022 identified focal areas for this impact assessment and informed the initial development of FPC Phase III. The project's beneficiaries encompass a diverse range of stakeholders, including farmers, pastoralists, and extension workers operating within the districts of Mvomero, Kilosa, Hanang, and Same.

### Purpose of the Impact Assessment

The primary objective of the impact assessment is to quantify and qualify the FPC Project's impact across its first two phases. This analysis will provide critical evidence to persuade decision-makers to support and expand the project while identifying issues that should be considered during the ongoing implementation of similar programs. Additionally, the impact assessment will inform future FPC program interventions, enabling SAT and its partners to make data-driven decisions regarding potential improvements in project design, implementation, and monitoring and evaluation plans.

This assessment was designed following a meticulous review of all relevant project documentation, including FPC project design documents, reports, and past assessments. The analytical process centered around five crucial focus areas, each accompanied by specific assessment questions.

#### Focus Area 1: Project Impact Assessment

Under this focus area, the assessment concentrated on the direct impact of the project on the participants' everyday lives, utilizing outcome-level indicators to measure sustainable, long-term effects. This included evaluating changes in household income, food security, nutrient intake, climate resilience, and conflict reduction.

## **Focus Area 2: Impact Attribution**

Under this focus area, the assessment identified and quantified the factors that contributed to the project's impact, including an examination of how the project's design and implementation, as well as external influences, affected its outcomes. This was achieved by comparing the experiences of project participants with those of non-participants.

## **Focus Area 3: Unintended Impact**

Under this focus area, the assessment concentrated on identifying unintended impact, whether positive or negative, that originated from the project. This exploration helped highlight aspects of the project that may not have been initially foreseen, contributing valuable insight for future program planning and implementation.

## **Focus Area 4: Sustainability and Replication**

Under this focus area, the assessment sought to gauge the sustainability of the project's impact after its conclusion. It evaluated the likelihood of self-sustainability and the possibility of self-replication of the project activities. Additionally, the necessity of organizational, financial, or governmental structures for maintaining sustainability was also examined.

## **Focus Area 5: Activities and Impact**

In this final focus area, the assessment delved into which project activities had the most pronounced impact and the reasons for their success. This involved identifying the prerequisites—resources, support, or infrastructure—that were integral to achieving the desired outcomes. It also considered how external factors might have swayed these outcomes.

This impact assessment report intends to provide a comprehensive understanding of the FPC Project's results across its initial two phases, contributing significantly to the refinement of future project designs and the continued dissemination of sustainable agricultural practices.

# METHODOLOGY



The methodology for this study combined both quantitative and qualitative participatory techniques to comprehensively assess the FPC project's impact. This involved a multi-method approach, including questionnaires, focus groups, in-depth interviews, and field observations.

## Quantitative Methodology

The quantitative portion of the assessment primarily utilized structured questionnaires designed to capture the outcome and impact indicators of the FPC project. The questionnaires were developed using Kobo Toolbox, a tool well-suited for its flexible design options, ease of use, and ability to accommodate a range of data types.

A team of enumerators was recruited and trained to administer these questionnaires in the field. The training provided to them emphasized the study's objectives, ethical considerations, and accurate data collection procedures.

The actual data collection took place between the 15th and 19th of May 2023, with enumerators using Kobo Collect, the data collection application associated with Kobo Toolbox, on their mobile devices.

The table below provides a breakdown of envisioned versus achieved sample sizes across the study area:

<b>Respondents</b>	<b>Hanang</b>	<b>Kilosa</b>	<b>Mvomero</b>	<b>Same</b>
Envisioned Beneficiary Farmers	30	28	67	14
Actual Beneficiary Farmers	26	30	39	11
Envisioned Non-Beneficiary Farmers	30	28	67	14
Actual Non-Beneficiary Farmers	32	29	32	12
Envisioned Beneficiary Pastoralists	20	51	47	0
Actual Beneficiary Pastoralists	11	60	67	3
Envisioned Non-Beneficiary Pastoralists	20	51	47	0
Actual Non-Beneficiary Pastoralists	25	38	68	4
<b>Total Envisioned</b>	<b>100</b>	<b>158</b>	<b>228</b>	<b>28</b>
<b>Total Actual</b>	<b>94</b>	<b>157</b>	<b>206</b>	<b>30</b>
<b>Percent of Target Achieved</b>	<b>94%</b>	<b>99%</b>	<b>90%</b>	<b>107%</b>

The actual sample sizes for farmers and pastoralists slightly deviated from the projected sample sizes in each district, except for pastoralists in Kilosa, where the actual sample size exceeded the envisioned sample.

The Same district, which had limited project implementation, recorded a notably smaller actual sample size. Recognizing this constraint early in the project, the team decided to prioritize qualitative data collection in this district, aiming to draw valuable insights despite the smaller number of respondents. This approach provided a robust understanding of the project's effects in Same, making up for the smaller quantity with the quality and depth of data gathered.

While these variations are noticeable, they do not undermine the study's credibility. Although the achieved sample was slightly smaller than the initial target, the sample size remained large enough to ensure statistically reliable results. Furthermore, the use of standardized data collection tools (i.e., survey questionnaires, FGD, and IDI guides) helped ensure that the measurement of the project's impact was consistent and reliable across participants.

The assessment methodology's strength lies in its multi-method approach that combined both quantitative and qualitative data collection techniques, thereby enhancing the validity of the findings. The selection of study participants was carefully done, with clear inclusion criteria set for both intervention and control farmers. This ensured an accurate comparison between the two groups and an objective evaluation of the project's effectiveness. During data collection, measures were taken to confirm the control group's independence from the intervention group, including questions to assess any exposure to the FPC project's interventions among control farmers and geographical considerations in selecting control farmers. The rigorous participant selection criteria, along with the balanced representation of



intervention and control groups, also ensured that the findings could be validly attributed to the project's interventions.

### **Qualitative Methodology**

The qualitative methodology was based on key informant interviews (KIIs) and focus group discussions (FGDs). These techniques aimed to delve deeper into the experiences of individuals who were involved in the FPC project in different capacities.

#### **Key Informant Interviews (KIIs)**

The KIIs were carried out with individuals who were directly involved in the project's implementation and had unique insights about its performance. The key informants were primarily comprised of Extension Officers, Livestock Officers, and Village Executive Officers (VEOs) from the four districts.

Through structured interviews, these individuals provided invaluable perspectives on the project's impact at a community level and also helped to identify areas for improvement. The list of key informants is annexed to this report.

#### **Focus Group Discussions (FGDs)**

The FGDs were aimed at generating a rich understanding of the FPC project's impact on various beneficiary groups, such as male and female farmers and pastoralists. In each of the four districts, five separate FGDs were held for male farmers, male pastoralists, female farmers, female pastoralists, and combined farmer-pastoralist groups.

In the Same district, due to the limited scope of project implementation, only two combined FGDs and one female pastoralist group discussion were held. This adjustment was made in recognition of the particular gender dynamics in the district. It was observed that women were often hesitant to participate in discussions when men were present. By creating a female-only group, the study team provided a more comfortable environment for them to share their experiences and views. The gender-focused group also allowed for a deeper exploration of the FPC project's impact on gender relations and inequalities in the Same district.

In total, 18 FGDs were held across the four districts, offering a broad range of perspectives and experiences. The inclusion of combined farmer-pastoralist discussions was particularly important for understanding the interactions between these two groups and the potential for cooperative efforts.

The information gathered through the KIIs and FGDs was then triangulated with the quantitative findings to ensure a comprehensive understanding of the project's impact. This balanced approach allowed for both the validation of findings and the exploration of complex dynamics that cannot be adequately captured through quantitative measures alone.

# FINDINGS

The following section outlines the results derived from both the quantitative and qualitative data collected during the study. These findings provide an in-depth understanding of the impact and effectiveness of the FPC project across multiple dimensions.

## Respondent Demographics

### Gender

Among the beneficiaries, a higher percentage of females (68%) participated as compared to males (32%). The proportion in the non-beneficiary group, however, leaned more towards males, with 53% males and 47% females.

### Age

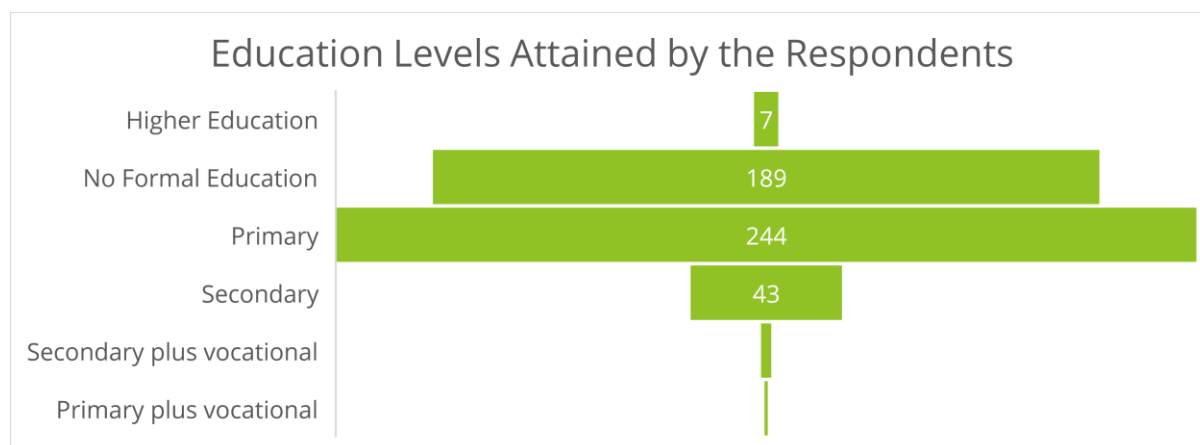
The average age among the beneficiaries was slightly higher than the non-beneficiaries, with the mean ages being 44 and 40, respectively. The median age across both groups stood at 40 years. In terms of age distribution, the beneficiaries had a larger proportion of individuals above 35 years (69%) compared to the non-beneficiaries (55%). Conversely, the non-beneficiary group had a higher percentage of individuals below 35 years (45%) than the beneficiaries (31%).

A noteworthy statistic is the number of youths involved in the study, with 185 participants falling into this category (under 35), making up approximately 38% of the total respondents.

### Education Level

The education level among the respondents exhibited significant diversity. A significant majority of the respondents had completed primary education, constituting 50% of the overall participants. Following this, a substantial 39% of the respondents did not receive any formal education. Secondary education holders represented 9% of the total. Those with higher education and secondary plus vocational education made up 1% each. Only a small fraction (less than 1%) had primary education supplemented with vocational training.

The figure below shows the distribution of respondents by education level.



## Organization of findings

Findings from this study are organized into a series of thematic areas, each representing a critical aspect of the project's intended outcomes. These include the below:

**Agroecology Adoption:** The adoption of agroecological practices among the project's beneficiaries is the first theme discussed in our findings. This theme covers multiple aspects of agroecological adoption including: examining whether and how the project has led to increased agricultural productivity for the beneficiary farmers; exploring the impact of the project on promoting crop diversification and the benefits associated with this; evaluating the uptake and effects of natural plant protection methods among the project participants; assessing the use of organic fertilizers, their availability, and their influence on the farm output; and looking into the adoption of improved livestock breeds and the effects this has had on livestock productivity.

**Income Increase:** The subsequent section focuses on the effect of the FPC project on the income levels of the beneficiary farmers and pastoralists, looking at income sources, changes, and contributing factors.

**Nutrition and Food Security:** This section addresses the nutritional impact and food security outcomes of the FPC project. 'Nutrition' explores the changes in dietary patterns and nutritional status among the beneficiary households, while 'Strengthened Food Security' assesses the effect of the project on ensuring reliable access to a sufficient quantity of affordable, nutritious food.

**Climate Resilience:** This section evaluates the capacity of the FPC project in enabling the beneficiaries to better withstand and recover from climate-related shocks and stressors.

**Reduced Conflicts:** In this section, we explore how the project has influenced social dynamics, particularly in terms of mitigating conflicts between farmers and pastoralists.

**Sustainability:** Finally, 'Sustainability' examines the project's long-term viability and the sustainability of the changes observed, considering the institutional, social, economic, and environmental aspects.

The final two sections of this report document the challenges that the project has faced and the recommendations provided by various stakeholders. These sections are crucial for understanding the hurdles that farmers and pastoralists encounter in their pursuit of sustainable agriculture and for mapping the way forward.

# ADOPTION OF AGROECOLOGICAL PRACTICES

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Agroecology adoption forms the cornerstone of the FPC project, given its centrality in creating sustainable, resilient, and productive agricultural systems.

In this section, we delve into the various dimensions of agroecological adoption among the project beneficiaries. This includes examining the increase in crop yield and agricultural diversity, the use of natural plant protection and organic fertilizers, as well as the adoption of improved livestock breeds. We seek to evaluate the extent of agroecological practices' uptake and the implications these have had on the farming and pastoralist communities. In this assessment, we draw upon data obtained from questionnaires, KIIs, and FGDs, providing a robust understanding of the current state of agroecological adoption and the project's role in facilitating this.

## **Crop diversity**

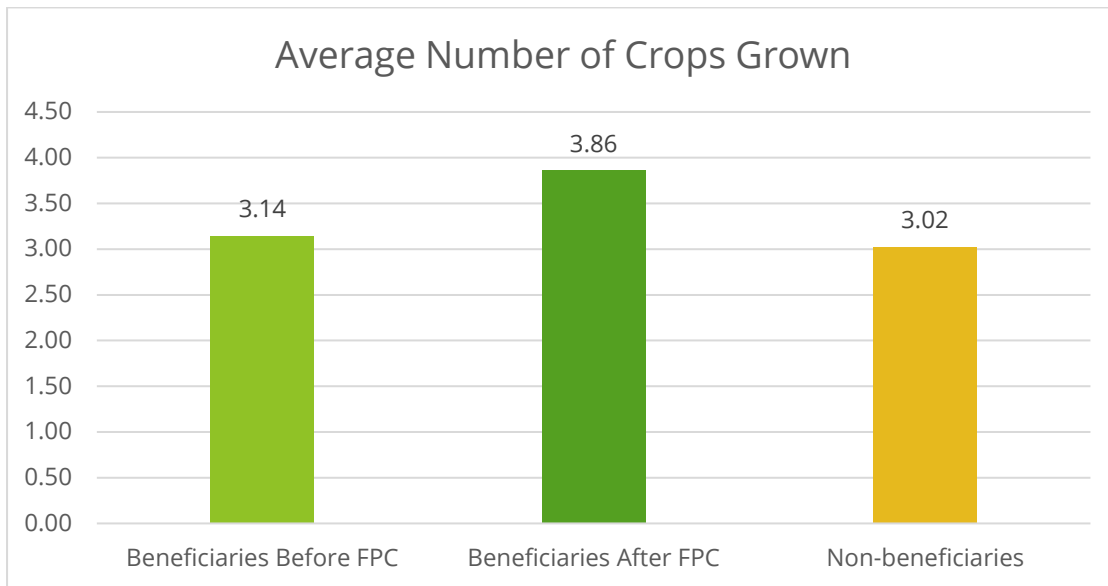
The diversity of crops grown by the farmers is a vital aspect of the agroecological approach. Greater crop diversity can contribute to improved resilience against climate variability, pests, and diseases, and it can also provide a variety of nutritional benefits.

The data collected reveals an upward shift in crop diversity among the FPC project beneficiaries, from an average of 3.14 crops per farmer before the project to an average of

3.86 crops per farmer after the project. In contrast, the non-beneficiaries, who did not partake in the FPC project, maintained a lower level of crop diversity with an average of 3.02 crops per farmer. This suggests that the FPC project was successful in promoting the importance of crop diversity and providing the necessary support to implement it.

On the other hand, the data shows that the number of beneficiaries growing only one or two crops decreased after the FPC project. This drop indicates that more farmers diversified their crop production, aligning with the agroecological practices promoted by the project.

The figure below illustrates these findings:



These findings demonstrate the FPC project's effectiveness in encouraging agricultural diversification, an essential principle of agroecology that contributes to the resilience, sustainability, and nutritional value of farming systems.

## Crop yield

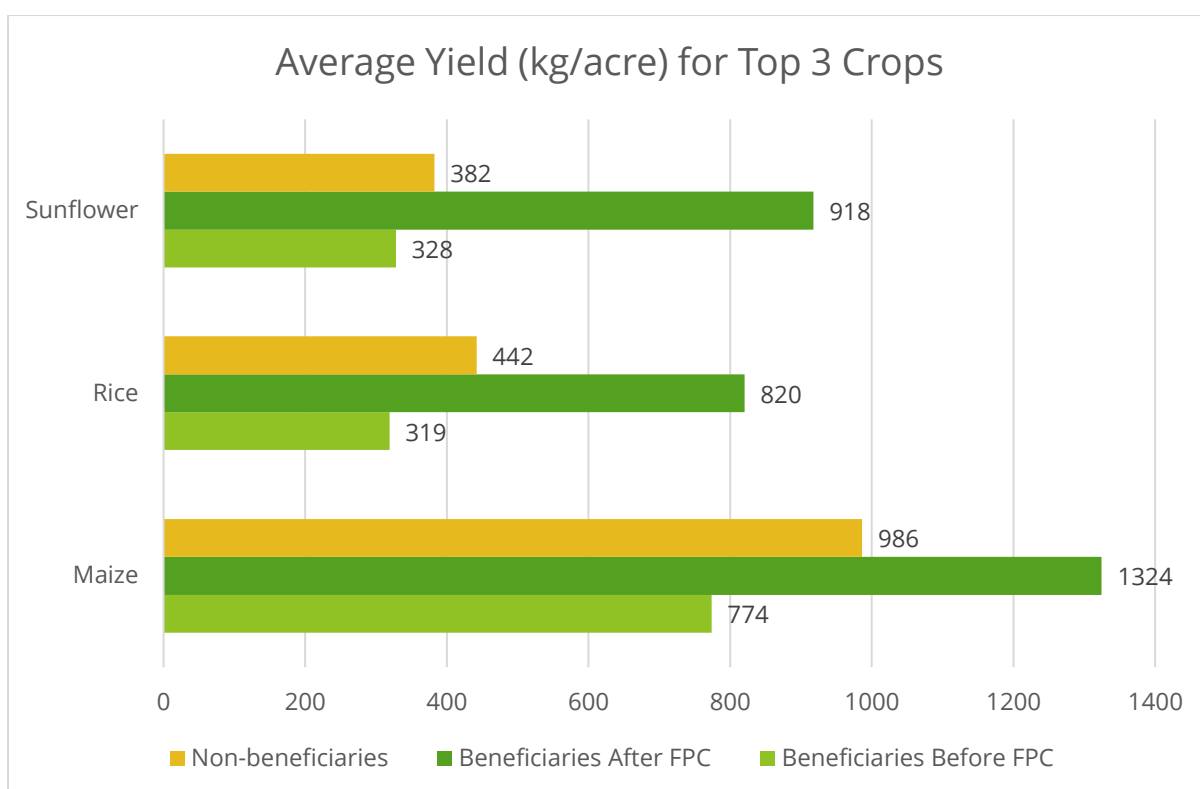
A critical aspect of agroecology adoption is the potential impact on crop yields. Enhanced agricultural practices and technologies, as propagated by the FPC project, aim to increase productivity per unit of land. As observed in the data collected, the yield in kilograms per acre for each crop among beneficiaries showed a significant improvement post FPC project implementation.

Maize, rice, sunflower, cowpeas, and pigeon peas emerged as the top five crops grown by the beneficiaries. Beneficiaries were asked to estimate yields for up to three of their most important crops. These crops varied among individuals based on local circumstances, personal preferences, and market demands. Although the specific crops differed, a comparison of before-and-after yields among beneficiaries offers a valuable overview of the project's effectiveness.

- Maize, identified as the most important by most farmers, showed an increase in yield from an average of 774 kg per acre before the FPC project to 1,324 kg per acre after.

The yield among beneficiaries after the project exceeded the yield reported by non-beneficiaries, which was 986 kg per acre.

- For rice, reported as the second most important crop, the average yield among beneficiaries increased from 319 kg per acre before the FPC project to 820 kg per acre after. This post-project average yield among beneficiaries surpassed the average yield reported by non-beneficiaries, standing at 442 kg per acre.
- Sunflower, reported as the third most important crop, demonstrated significant yield growth among beneficiaries from an average of 328 kg per acre before the FPC project to 918 kg per acre after. In comparison, non-beneficiaries reported an average yield of 382 kg per acre.




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*Previously one acre could produce 7 to 8 sacks of maize, but currently, there is an increase in harvest due to the use of agroecological practices, whereas one acre can produce 15 to 16 sacks of maize. The increase in income is mainly the result of the decrease in the cost of production due to the use of homemade fertilizers and use of natural fertilizers.*

**Minaeli Dawii, FGD Participant, Hanang District**

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These findings provide strong evidence of the positive impact of the FPC project on crop yields. Regardless of the specific crops grown, the increase in yield among beneficiaries underscores the potential of agroecology practices in enhancing agricultural productivity.

## Agroecological farming practices

The use of plant protection techniques was found to be more common among beneficiaries of the project than the non-beneficiaries. On average, beneficiaries utilized 1.84 different plant protection techniques, whereas the non-beneficiaries utilized only 1.08 techniques. Analyzing the farmer feedback, several plant protection techniques emerged, with the most common ones being:

- **Use of Natural Pesticides:** 76.8% of farmers employed natural pesticides, often made from local materials. For example, chili peppers and the Neem tree were commonly used to deter pests. In some cases, farmers also reported using other natural substances like ashes, cassava leaves and aloe vera. These techniques were almost non-existent in the non-beneficiary group with a mere 4% reporting using natural plant protection.
- **Cultivation Practices:** 42.7% of the beneficiary farmers, compared to only 12.4% of the non-beneficiary farmers mentioned using specific cultivation practices to protect their crops. This included intercropping, growing certain plants around the field like chili plants to repel pests, creating ridges for better water management, as well as practicing crop rotation and fallowing as techniques to preserve soil fertility and control pests.

The study took a closer look at the use of compost and manure, given the project's substantial investment in these areas. Farmers frequently mentioned the use of organic fertilizers, including compost and manure. Results show:

### **For the use of manure:**

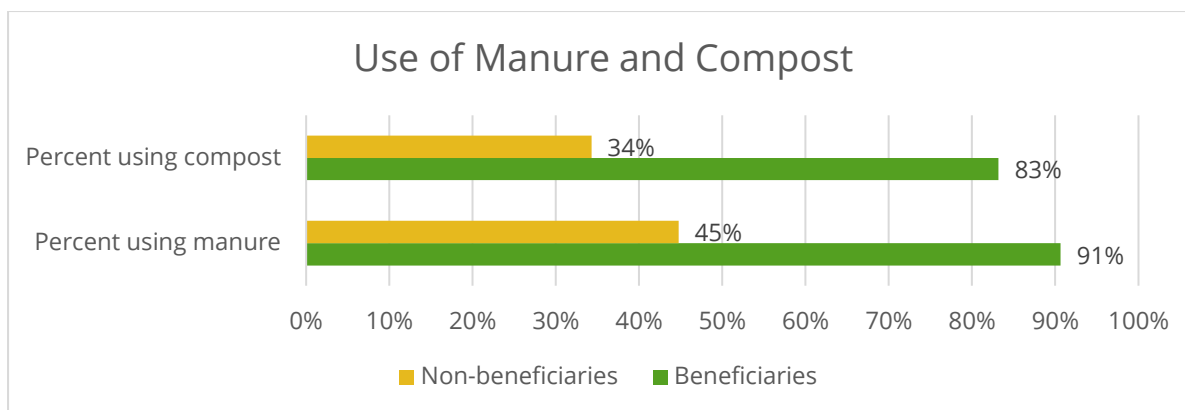
In the Beneficiary group, 97 (90.6%) of the farmers reported using manure, representing a large majority. Conversely, only 10 farmers in this group reported not using manure (9.4%).

In the non-beneficiary group, only 47 farmers reported using manure (44.8%), while a significant majority of 58 farmers did not use manure (55.2%).

### **For the use of compost:**

In the Beneficiary group, a significant majority of the farmers (83.2%) reported using compost, whereas only 16.8% reported not using compost.

In the non-beneficiary group, 34.3% of the farmers reported using compost, while a larger percentage of at 65.7% reported not using compost. The figure below illustrates these results.



These findings indicate that the beneficiary group who are receiving some support and education were significantly more likely to use natural fertilizers like manure and compost than the non-beneficiary group.

Overall, the use of natural techniques was popular in this study. They are mentioned more frequently and by more farmers, indicating a preference or a more accessible/affordable option for many. However, the use of modern techniques is also present, with 19 beneficiary farmers (7.9%) and 21 non-beneficiary farmers (8.7%) reporting usage of chemical pesticides for plant protection.

### Livestock kept

When examining the adoption of improved livestock breeds by pastoralists, a significant difference between beneficiaries and non-beneficiaries of the project was apparent.

Around 49.65% of beneficiary pastoralists reported using improved breeds, which was a substantial proportion in comparison to only 22.96% among non-beneficiaries. This represents a clear disparity in the adoption of improved breeds, reflecting the influence and support of the project for beneficiaries.

To provide more specifics, the study differentiated between the adoption rates for improved cows and goats:

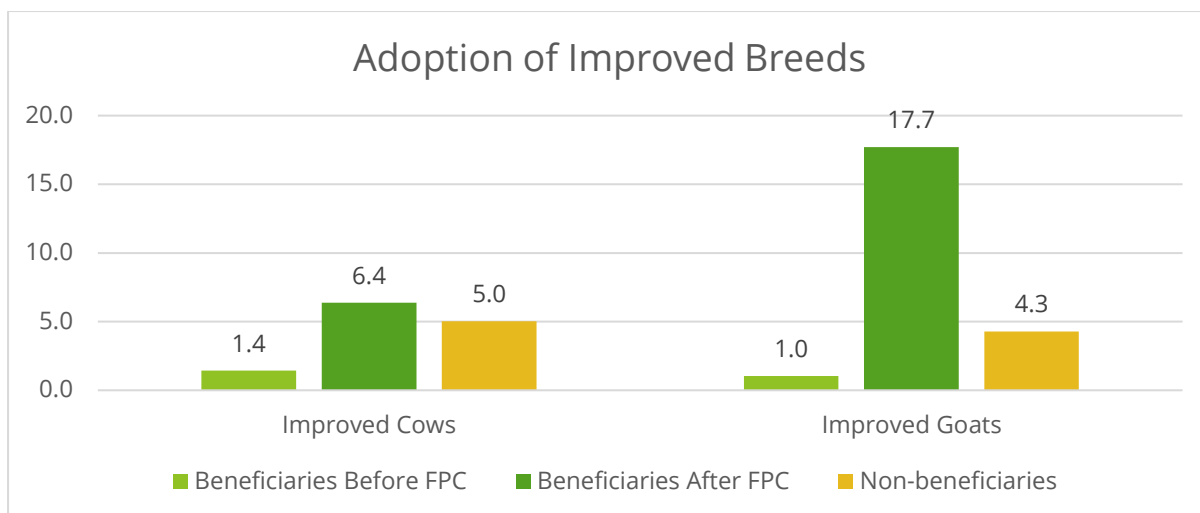
#### Cattle

Beneficiaries reported a notable increase in the average number of improved cows owned, rising from 1.4 per household before the project's initiation to 6.4 after. Non-beneficiary pastoralists, on the other hand, reported an average of 5.0 improved cows, which is less than the average owned by beneficiary households post-project.

#### Goats

The impact on the adoption of improved goat breeds was even more pronounced. The average number of improved goats owned by beneficiary households skyrocketed from 1.0 before the project to a substantial 17.7 afterwards. In contrast, non-beneficiaries reported owning an average of just 4.3 improved goats. The figure below illustrates these results.





The data clearly indicate that the project has had a significant influence on promoting the adoption of improved livestock breeds, particularly among beneficiary households.

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*"This project taught us a lot. We now know how to keep our animals well, store grass for feeding them later, take care of the new breeds of cows, and protect our animals from pests. Before, we used to do things the old way. But this project has opened our eyes to better ways of looking after our livestock. Because of it, we're getting more benefits now. Like, we get more milk from our cows and goats than we used to get."*

**Maria Wilson, FGD Participant, Hanang District**

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## Pasture Management

One of the notable achievements of the Farmers and Pastoralists Collaboration (FPC) project is the significant progress in pasture management. Training was provided to pastoralist communities on methods of managing pasture, ranging from the cultivation of fodder to its harvesting and storage. The project also involved the provision of pasture seeds, setting up demo farms, and availing farming equipment. This initiative was welcomed by the communities and has seen scaling out to individual households, despite weather-related challenges hindering the full realization of the required fodder stocks.

The development of pasture cultivation demonstration plots and conservation of natural grass has been a key aspect of this project, with hay bales now available for storage. These practices, alongside careful monitoring by pastoralists, have garnered appreciation and acceptance in the communities. This is evident in households earmarking land specifically for pasture cultivation, showcasing the potential for expanding this initiative.

Indeed, the FPC project's target was to cultivate 100 acres of pastures, a remarkable improvement from zero pastures under cultivation in 2017. By 2019, this had grown to 17 acres per group, reaching a total of 100 acres. The momentum did not stop there. In 2022

alone, 207.25 acres of pasture cultivation plots were established, with an additional 27 acres in Kilosa district. In total, the FPC Phase II project saw 256.75 acres of pasture plots established, exceeding the initial target.

It was not just the increase in the number of acres that stood out, but the enthusiastic adoption of these practices by farmers and pastoralists. In total, 47 farmers established 95.25 acres of pasture farms, while 20 pastoralists set up 52.5 acres of pasture farms.

In addition to cultivating pastures, the project aimed at improving natural grass on 150 acres and succeeded in conserving 3,333 acres and 291.5 acres of natural grass in Mvomero and Kilosa districts, respectively. In the course of the FPC Phase II project, these figures soared to 7,785 acres in Mvomero district and 924.5 acres in Kilosa district.

The significant increase in hay baling is a clear testament to the communities' growing resilience to climate change. The production of hay bales, which are typically utilized during the dry season, suggests a promising strategy to reduce animal fatalities due to hunger and malnutrition diseases over time. The project had an ambitious target of storing 9,000 hay bales, which was not only met but exceeded with a cumulative total of 48,679 hay bales stored in Mvomero district, and 1327 in Kilosa district.

The progress in pasture management under the FPC project illustrates an encouraging trajectory towards building resilience, reducing conflicts, and securing milk supply for the milk cooperative.

While the achievements in pasture management are substantial, challenges remain that present learning opportunities for future interventions. Notably, geographical factors pose logistical difficulties, as elucidated by the pastoralist community, particularly in Same District. Pastures are grown in the lower lands, while the livestock habitats are situated in the upper zones, sometimes as far as 3 kilometers away and adjacent to farmers' lands. This disparity in location between where the fodder is produced and where it is needed creates a significant challenge in transporting and managing these resources.

Moreover, despite training on pasture cultivation and storage, there is a clear indication from the community for the need for further training on how to effectively transport and handle fodder over such distances. Similarly, the provision of appropriate storage facilities is essential. During the summer season, when pastures are scarce, it is important to have well-preserved fodder reserves close to where livestock are kept. This would alleviate the necessity for herders to embark on lengthy journeys in search of pastures.

This also underscores the importance of strategic land use planning, which goes beyond mere allocation of land to various activities. Comprehensive land use planning would take into consideration the geographical peculiarities of an area, such as the division of land into upper and lower zones as reported by the communities. It would inform the placement of pasture cultivation areas relative to livestock keeping zones, and facilitate the creation of efficient transportation and storage solutions that can make fodder readily available even during the dry seasons

## Other agroecological practices

During the course of this assessment, qualitative evidence gathered corroborated the findings reported in the 2022 FPC project report. One significant achievement identified during the assessment was the effective elimination of slash and burn practices. Initially, these practices were widespread, with 37% of farmers engaging in such activities. However, the FPC project, through sustained efforts and educational initiatives, successfully brought this figure down to 8% by 2019. Strikingly, by 2022, the practice had been completely eradicated among the farmers involved in the project.

Another area where the FPC project has made significant strides, as reaffirmed by this assessment, is in the promotion of tree planting in dryland areas. The initial goal was to plant 25,000 trees, with a survival rate target of 60%. However, the data collected for this assessment confirmed considerable efforts towards meeting this target. As reported by SAT, a total of 54,697 trees had been planted by 2022, indicating an adoption rate that exceeded the project's target by 218%. Furthermore, the survival rate of the trees was 70%, surpassing the initial target.

Emmanuel James Mosha, Livestock Officer at Bassoutu ward in Hanang noted the elimination of slash and burn practices in the ward. He says:

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*The interventions have led the farmers and pastoralists to recognize the importance of environmental conservation, and many have taken the initiative to plant more trees. They understand that this practice will enhance soil fertility and biodiversity. There is a clear behavioral shift among many of them towards agroecological practices, and the habit of burning bushes has largely been eliminated."*

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Similarly, the Village Executive Officer of Kimambila Village notes that the five (5) farmer groups established as a result of the FPC project's interventions have made a big difference in his village. He says:

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*"Most farmers have abandoned the practice of burning bushes to clear land, as they have discovered its detrimental effects to their own productivity."*

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# INCOME

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## Income status

Income levels have seen a significant increase, especially for beneficiaries of the FPC project.

Before the implementation of the FPC, the average income of beneficiaries was reported to be around TZS 578,493. However, by the year 2022, there was a substantial increase in their average annual income, which grew to TZS 1,407,445. This demonstrates a surge of approximately 143% in beneficiaries' income, a testament to the positive impact of the project.

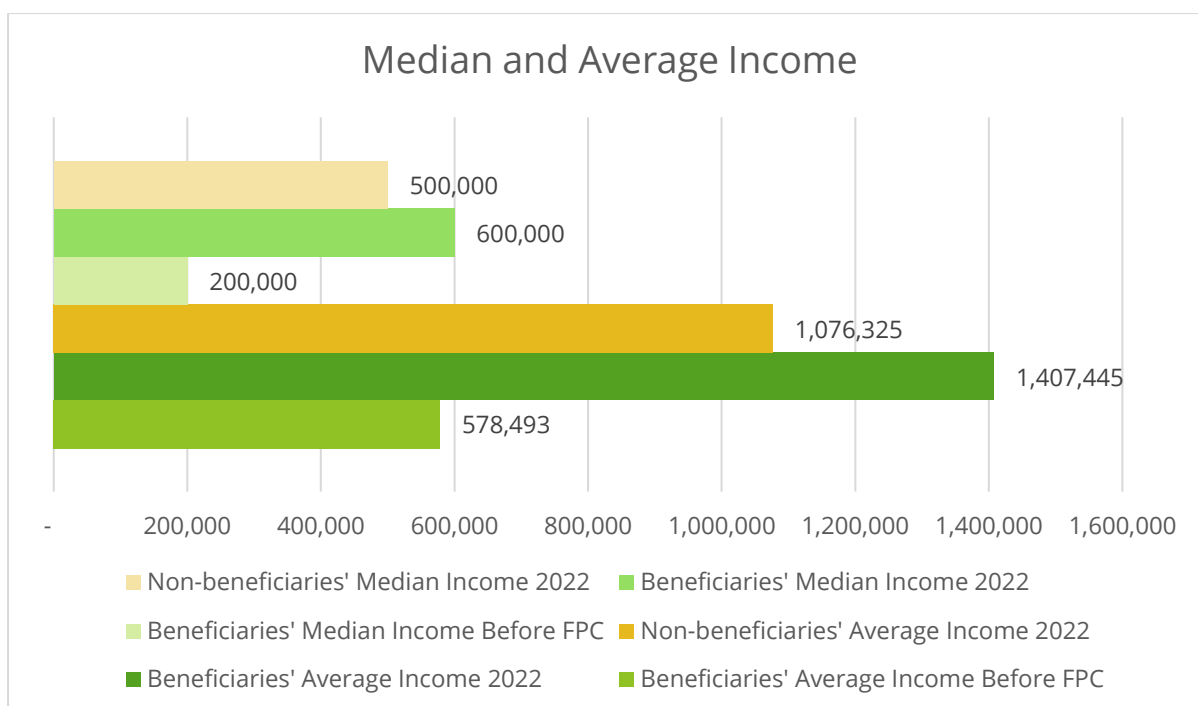
Comparatively, the average income of non-beneficiaries in the same year (2022) was somewhat lower, at TZS 1,076,325. Although this suggests a reasonable level of income compared to beneficiaries before the project, it is clear that the beneficiaries have benefitted more substantially in terms of income growth due to their involvement in the FPC project.

In addition to average income, it is also essential to consider median income to provide a more complete picture. Median income can often be a better indicator as it isn't affected by outliers and better represents the typical income for individuals within the groups.

Before FPC project was implemented, the median income for the beneficiaries was notably lower, at TZS 200,000. However, after the FPC was rolled out, the median income for these individuals experienced a significant growth, tripling to TZS 600,000. This tremendous increase further demonstrates the project's impact on uplifting the economic situation of its beneficiaries, especially those at the bottom of the pyramid.

In contrast, the median income of the non-beneficiaries in the same period was reported to be TZS 500,000, which, while higher than the initial median income of the beneficiaries, is considerably less than the beneficiaries' current median income.

This comparison of median incomes further underscores the significant income growth beneficiaries experienced after the implementation of the FPC.



The assessment shows variations in the income increase for beneficiaries who joined in different years, suggesting that other factors such as improvements in the project's implementation or external economic influences could also be playing a role.

Year Joined	Frequency	Average Income 2022 (TZS)	Average Income before FPC (TZS)	Average Change in Income(TZS)
<b>Joined 2017</b>	70	1,495,314	617,829	877,486
<b>Joined 2018</b>	7	506,571	82,857	423,714
<b>Joined 2019</b>	29	1,605,793	529,655	1,076,138
<b>Joined 2020</b>	40	1,261,875	495,875	766,000
<b>Joined 2021</b>	54	1,736,481	662,976	1,073,506
<b>Joined 2022</b>	34	979,941	570,706	409,235

First, beneficiaries who joined the project in 2019 and 2021 saw the most significant increases in income, TZS 1,076,138 and TZS 1,073,506 respectively, despite not being the earliest participants. This indicates that time in the project is not the only determinant of success and highlights the potential influence of other variables.

For instance, improvements in project implementation could be a driving factor. Over time, the project team may have refined their strategies, made changes based on lessons learned, and improved the effectiveness of their interventions. This could explain why more recent joiners have seen such significant income increases.

Alternatively, external economic factors could also have influenced these variations. Factors such as shifts in market prices, changes in weather patterns affecting agricultural yields, or larger economic trends could have differentially impacted the income of farmers who joined the project at different times.

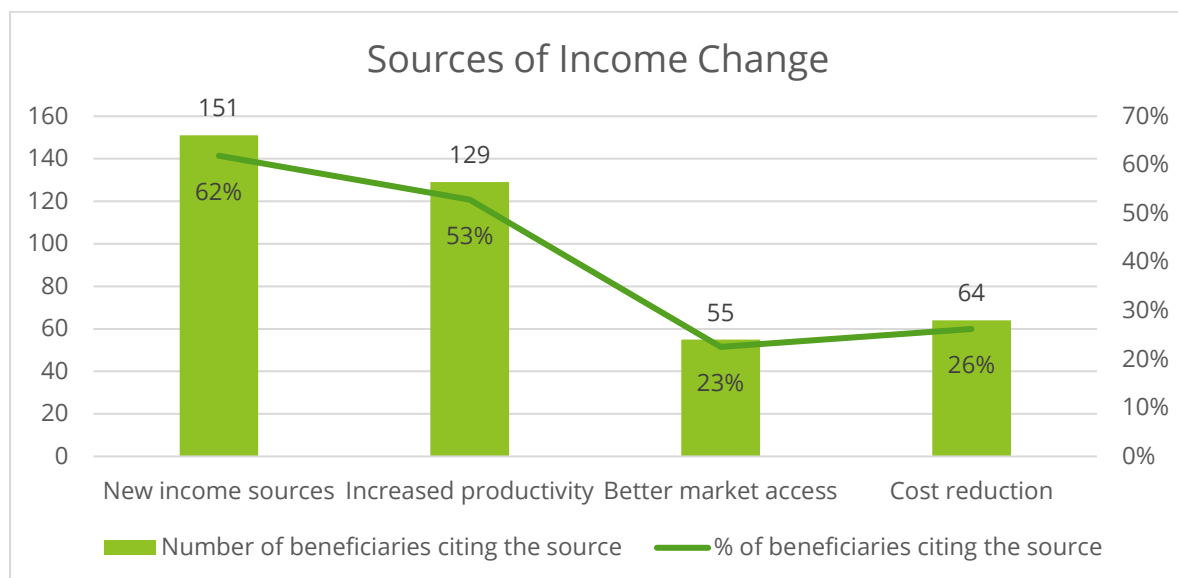
Moreover, the beneficiaries who joined in 2022, despite having the least time in the project, still experienced an average income increase of 409,235. This could imply that the project's benefits begin to materialize relatively quickly after joining, and that the positive impact of the project continues to build over time, although at varying rates.

General comment: please show which group benefited from increased income, eg farmers, pastoralists, women, men...

### Income Sources

Analyzing the reported sources of income increase among beneficiaries offers insight into the mechanisms by which the project has influenced economic outcomes. According to the data, the most prominent sources of income increase were the generation of new income sources and increased productivity, reported by 62% and 53% of beneficiaries, respectively.

The figure below illustrates these results.



# NUTRITION



## Food Security

The FPC Project had a positive impact on the beneficiaries' nutritional intake and their satisfaction with their meals. Assessment data shows that the average number of meals consumed per day by beneficiaries increased from 2.2 before the program to 2.8 after the program. This is higher than the average of 2.6 meals consumed per day by non-beneficiaries. It's worth noting that only 1 beneficiary reported consuming 1 meal per day after the FPC project, down from 25 beneficiaries (10%) before the program. The table below shows the meal consumption statistics of the respondents.

Number of meals	Beneficiaries Before FPC	Beneficiaries After FPC	Non-beneficiaries
1	10.1%	0.4%	4.6%
2	55.1%	17.4%	34.2%
3	34.8%	81.8%	60.8%
4	0.0%	0.4%	0.4%
<b>Total</b>	<b>100.0%</b>	<b>100.0%</b>	<b>100.0%</b>

There was a remarkable increase in the number of beneficiaries consuming 3 meals per day, from 35% before the program to a striking 82% after. This is a significant contrast to the non-beneficiary group, where only 61% reported consuming 3 meals per day. The number of

beneficiaries consuming 2 meals per day fell considerably from 55% before the FPC project to 17% after, possibly due to an increase in those now able to afford 3 meals per day.

## Nutrition Status

For a comprehensive understanding of nutrition, it is essential to consider not only the quantity of food consumed but also the quality and diversity. This assessment loosely adopted a model used by the World Food Program (WFP), the Food Consumption Score (FCS), to estimate balanced nutrition among the beneficiaries and non-beneficiaries.

The FCS is a composite score based on dietary diversity, food frequency, and relative nutritional importance of different food groups. Different food items consumed by a household over a period (usually seven days) are grouped into various categories, such as cereals and tubers, pulses, milk and dairy, meat and fish, vegetables, fruits, oil, and sugar. The model assigns different weights to various food groups according to their nutritional density, reflecting their importance in a balanced diet.

**Cereals and Tubers:** These are staple food groups, and they provide the majority of energy in most diets, especially those of low-income populations. They are high in carbohydrates, a primary source of energy, and contain significant amounts of fiber, vitamins, and minerals. While important for daily sustenance, they are less nutritionally dense compared to other food groups. The study shows that around 65.6% of the beneficiaries consumed cereals and tubers on a daily basis as opposed to 74.2% in the control group.

**Pulses:** Pulses, known for their rich nutritional content that includes proteins, fiber, iron, potassium, and folate, hold an important place in a balanced diet. From the data, we observe that beneficiaries have a combined daily and a few times a week consumption rate of 77.7% (33.2% daily and 44.5% a few times a week). In contrast, non-beneficiaries have a slightly lower combined rate of 75.4% (35.0% daily and 40.4% a few times a week). Although the overall consumption rates are relatively close, beneficiaries consume pulses more frequently throughout the week.

**Milk and Dairy:** This group is a significant source of high-quality protein, essential for growth and maintenance of body tissues, and also provides key nutrients like calcium and Vitamin B12. The higher intake among beneficiaries (68.4% versus non-beneficiaries' 61.7%) suggests a higher quality diet.

**Vegetables:** A diet rich in vegetables provides essential vitamins, minerals, and dietary fiber. They're also linked with decreased risk of chronic diseases. Again, a higher intake among beneficiaries (68.8% versus 61.7% for non-beneficiaries) indicates better nutritional diversity.

**Fruits:** Fruits, packed with various vitamins, minerals, and fiber, are key for maintaining overall health and boosting immunity. According to our data, beneficiaries consume fruits daily at a higher rate (23.1%) compared to non-beneficiaries (11.3%). Despite this higher daily consumption rate, there's a need for more regular consumption across both groups, given the health benefits associated with fruit consumption. Increasing the frequency of fruit consumption will ensure a more nutritionally balanced diet for both beneficiaries and non-beneficiaries.

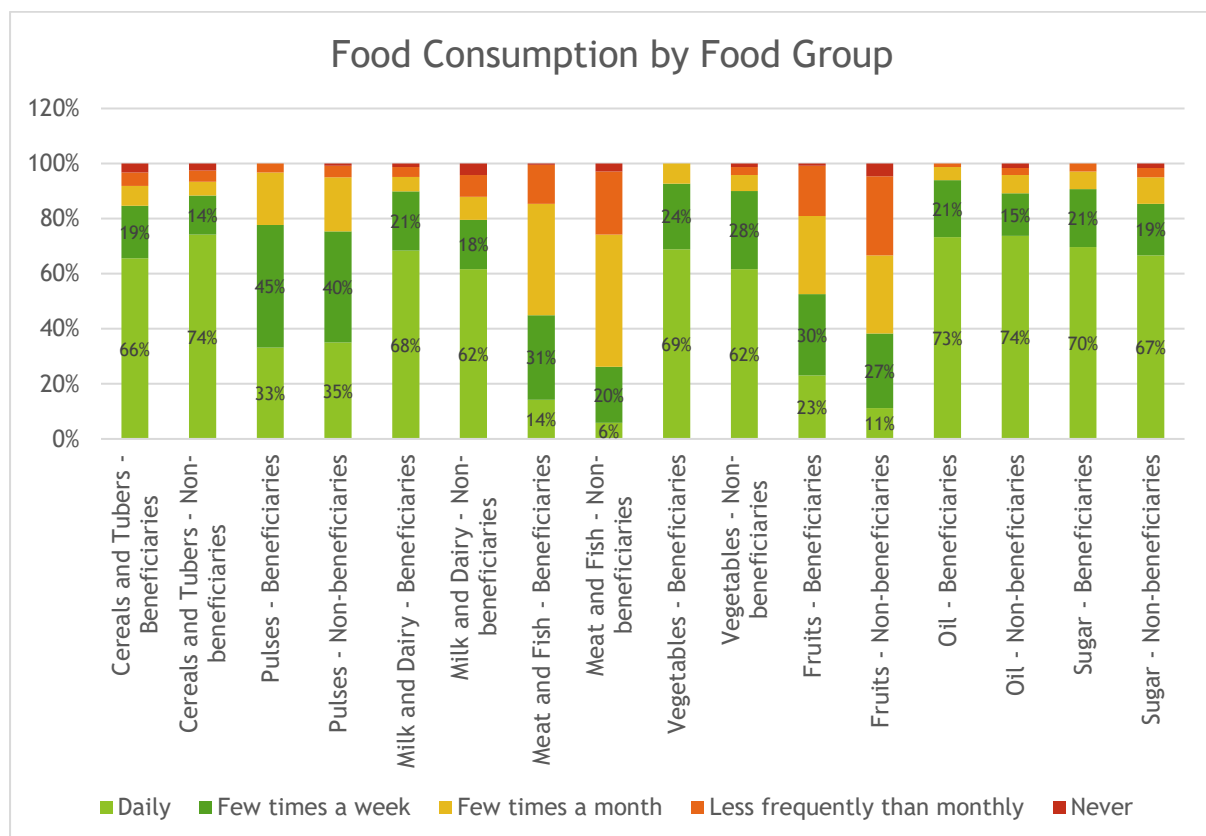


**Oil:** While high in calories and fat, oil is essential for the absorption of fat-soluble vitamins (A, D, E, K) and providing essential fatty acids. A balanced consumption is crucial, and similar levels of daily intake among both groups (73.3% for beneficiaries versus 73.8% for non-beneficiaries) indicate an adequate intake of this food group.

**Sugar:** Although it provides immediate energy, sugar is a source of 'empty calories' with no additional nutritional value, and excessive intake can lead to health issues. The similar levels of consumption between the groups (69.6% for beneficiaries versus 67% for non-beneficiaries) need to be monitored to ensure it does cause harm.

The fact that beneficiaries consume less of the staple food group (cereals and tubers) but more of the nutritionally dense ones (milk and dairy, vegetables) daily suggests that the food consumption pattern among beneficiaries is more balanced. However, it's crucial to strive for improvement, especially in the consumption of protein-rich foods and fruits, to ensure a fully balanced diet for all.

The chart below illustrates the food consumption patterns of the respondents:



# CLIMATE RESILIENCE



The surveyed farmers and pastoralists have adopted a number of climate-resilient techniques and technologies to adapt to fluctuating environmental conditions and ensure the sustainability of their agricultural and livestock-keeping practices.

- A significant fraction have embraced the use of organic fertilizers and the controlled burning of field grass and leaves. These techniques help in soil rejuvenation and weed management, creating a healthier environment for crops to thrive.
- Indigenous flora plays a crucial role in the strategies of these individuals, with many choosing to plant native trees and use local seed varieties. These practices aid in preserving biodiversity and strengthening the resilience of farming systems against environmental stressors.
- Water resource management is a notable theme among the respondents, with practices such as well-digging and irrigation coming to the fore. Alongside these methods, the use of ash and local medicinal herbs is employed as an unconventional strategy to manage pests.
- For the pastoralists in the group, mobility during dry seasons is a critical adaptive strategy. Moving livestock to areas with better grazing conditions is key to their survival during such periods. Some pastoralists also invest in supplemental feed during dry spells and prioritize rearing drought-resistant breeds, which are more likely to survive and thrive under harsh conditions.

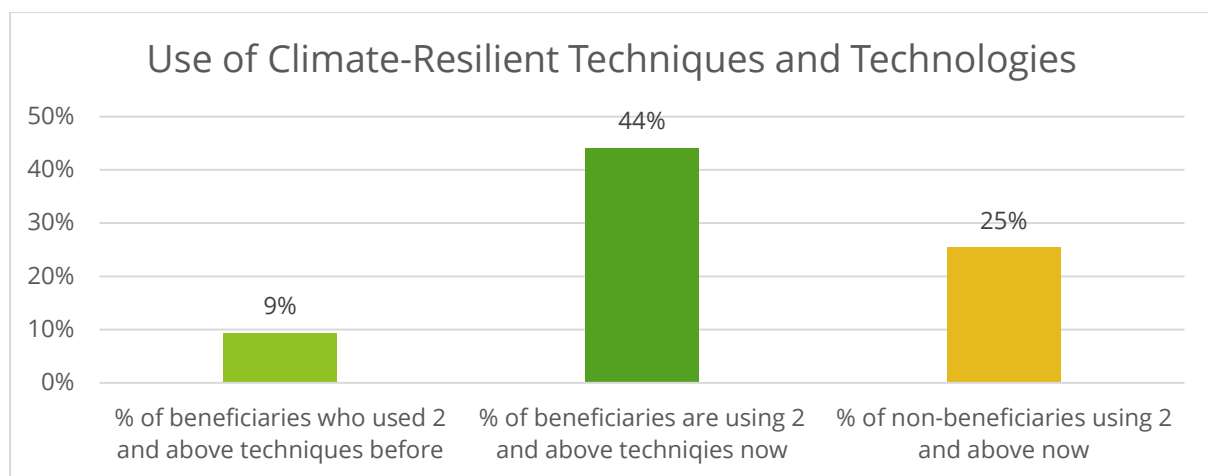
- The use of specific storage techniques, such as grain storage in plastic bags, also emerged as a technique to reduce post-harvest losses and better manage resources amidst changing climate conditions.

The diverse techniques and technologies highlighted by these farmers and pastoralists offer insight into the strategies employed in their respective areas to enhance resilience to climate change.

Quantitative findings affirm the impact of the project on beneficiaries' adoption of climate-resilient technologies and practices. Initially, before the project's intervention, beneficiaries were found to be using an average of just 0.49 climate-resilient technologies. However, post-intervention, this figure significantly increased to an average of 1.49 climate-resilient technologies per beneficiary. In comparison, the average for non-beneficiaries stood at 0.97, suggesting the project's positive effect on the adoption rate of such technologies.

There were striking improvements seen in the adoption of multiple climate-resilient technologies. Before joining the project, only 9% of beneficiaries used two or more techniques. This figure increased remarkably to 44% after the project's intervention, an almost five-fold increase.

In contrast, only 25% of non-beneficiaries reported using two or more climate-resilient techniques. This indicates that the project has had a significant role in promoting the adoption of multiple climate-resilient technologies among beneficiaries. The figure below illustrates this.



Breaking down by the number of technologies used, before joining the project, most beneficiaries (158 out of 247) did not use any climate-resilient technologies. However, this number dropped drastically to just 59 beneficiaries post-intervention. The adoption rates for using one, two, three, four, and even five technologies all saw significant increases after joining the project.

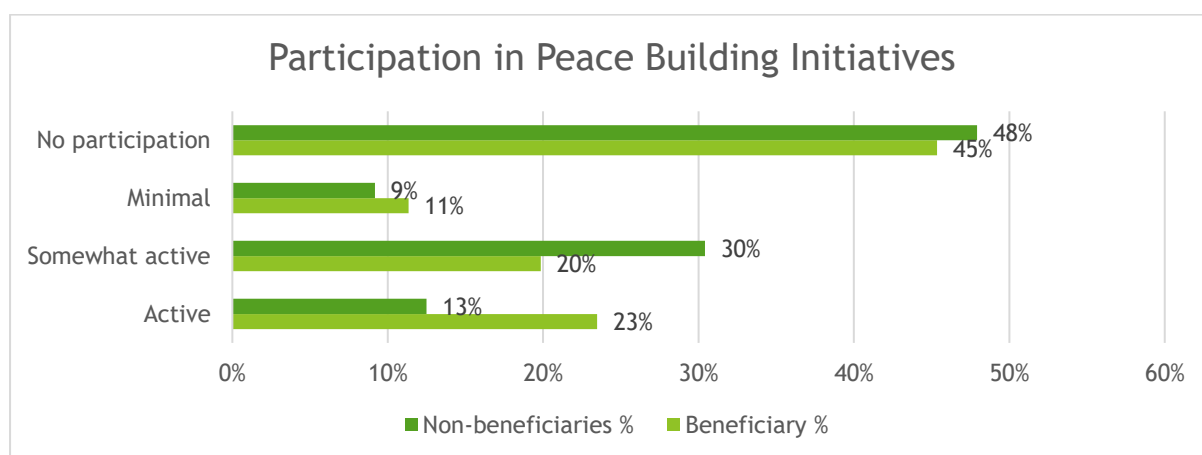
In summary, the project has evidently facilitated a substantial increase in the usage of climate-resilient technologies among its beneficiaries. This enhancement in climate resilience is a significant accomplishment, given the increasing importance of climate change adaptation in ensuring sustainable agricultural practices and rural livelihoods.

# CONFLICT REDUCTION



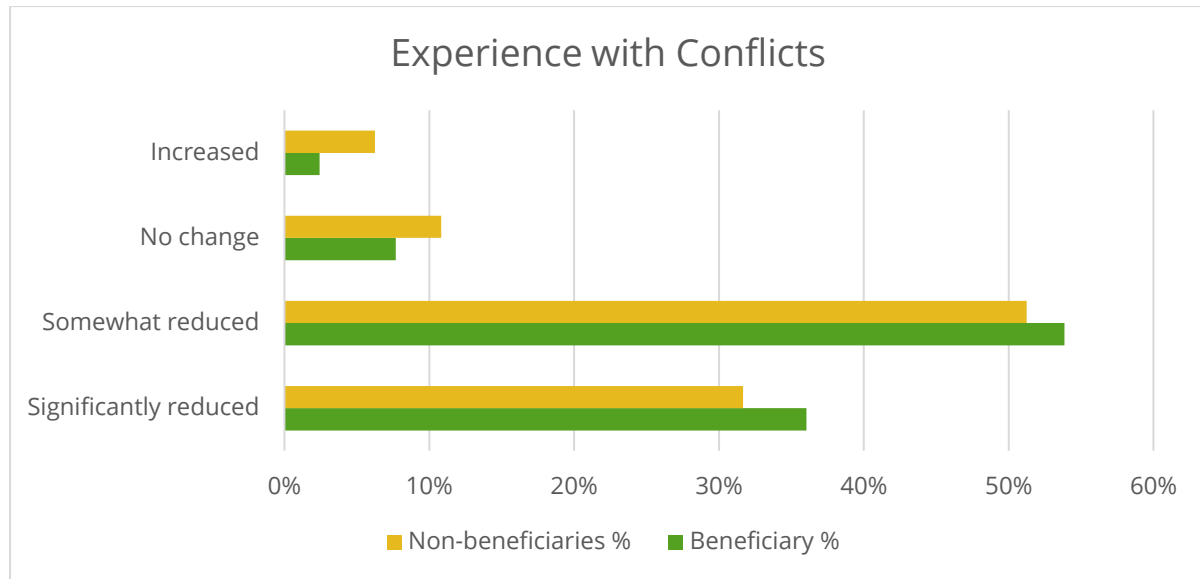
One important aspect of sustainable development and societal wellbeing is peace and stability. In this section, we delve into the community's engagement in conflict resolution initiatives and their perceptions of changes in conflict levels.

When it comes to participation in conflict resolution initiatives, there are noticeable differences between beneficiaries and non-beneficiaries. About 23% of the beneficiaries report being actively involved in conflict resolution initiatives, compared to only 13% of non-beneficiaries. This indicates a higher level of engagement and initiative among beneficiaries when it comes to fostering peace in the community. However, there's room for improvement as 45% of beneficiaries and 48% of non-beneficiaries report no participation in such initiatives.



In addition, the extent to which individuals are experiencing changes in conflict levels also varies between beneficiaries and non-beneficiaries. Beneficiaries report slightly higher rates of significant reduction in conflict, with 36% compared to 32% of non-beneficiaries. A majority of both groups perceive conflicts as somewhat reduced, with 54% of beneficiaries and 51% of non-beneficiaries sharing this view.

However, it's worth noting that 8% of beneficiaries and 11% of non-beneficiaries report no change in conflict levels, and a small percentage even observe an increase in conflicts (2% of beneficiaries and 6% of non-beneficiaries).




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*"In Hanang, we haven't had big problems between farmers and pastoralists. In fact, this project has helped us work together even better. We farmers get cattle manure from the pastoralists, and they get leftover harvest from us. It's rare for there to be serious trouble between us. And if something does happen, we usually sort it out peacefully, because we're used to living and working together."*

**William Migire, FGD Participant, Hanang District**

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In summary, while progress has been made in reducing conflicts and encouraging participation in conflict resolution initiatives, especially among beneficiaries, more work is needed to engage more community members in these initiatives and to further reduce conflict levels.

It is important to note that peace and stability are communal attributes that benefit all members of a society regardless of individual status or participation in specific initiatives. Thus, while the data shows some differences between beneficiaries and non-beneficiaries in terms of active participation in conflict resolution and perceived reduction in conflicts, it's important to note that peace initiatives typically have a community-wide impact.

# GENDER RELATIONS



The gender split between beneficiaries and non-beneficiaries highlights a significant result of the project's efforts. Among the beneficiaries, there was a larger representation of females, accounting for 68% of this group. This reflects a successful stride towards gender inclusion, especially considering traditional barriers that often exclude women from such beneficial projects. This result is particularly encouraging as it indicates that the project has been successful in empowering women and involving them in sustainable agriculture, thus helping to foster gender equality.

In contrast, the non-beneficiary group exhibited a slight predominance of males, with 53% males compared to 47% females. While this is relatively balanced, the noticeable difference in the gender split between beneficiaries and non-beneficiaries underlines the project's impact in targeting and reaching women.

The project has had significant positive impact in fostering gender inclusivity in agroecological practices. The numbers across various districts, including Hanang, Kilosa, Mvomero, and Same, show that women are actively participating in these activities. Of the total 487 participants, 282 are women and 205 are men.

The initiative promotes women's involvement in the entire farming process from seed planting, cultivation, weeding, to harvesting. Their engagement is not only in crop farming but also in livestock keeping. They play a substantial role in ensuring that livestock are well maintained, from feeding them and preparing their meals, to milking.

Damiano Karani, a project participant, remarked:

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*"I have noticed women taking part in most of the farming activities, clearly showing that there is no discrimination of duties between men and women."*

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Philimina Gicharo also adds to this sentiment, saying:

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*"The project supported women's involvement in agroecological practices, and it also provided us with entrepreneurship skills, which enable our families to increase income."*

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Women have not only been involved, but they have also been proactive, forming groups to enhance their farming activities. According to Magritta William:

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*"Women are highly motivated to participate in agroecological practices and are involved in other economic activities to boost the family income."*

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Participants also note the increase in productivity associated with women's involvement. Carmela Jacob, a farmer, remarked that women have shown a high level of commitment to farming, which has led to an increase in crop productivity in the area. Men's collaboration with women, particularly in livestock keeping activities, has also significantly contributed to improved livelihoods among pastoralists.

The project has successfully managed to integrate and empower women in agroecological practices, creating a gender-balanced environment that allows for mutual benefits and shared responsibilities. This has not only resulted in increased productivity and income but also fostered stronger community relationships.

**Note:** Notwithstanding the significant progress achieved in bridging the gender gap, this assessment highlights that more focused efforts are required to engage pastoralist women. Field observations and focused group discussions (FGDs) revealed unique sociocultural dynamics within pastoralist communities that merit special attention.

During these discussions, pastoralist women, particularly in Kilosa and Same Districts, exhibited high levels of restraint in mixed-gender settings. The presence of their male counterparts seemed to create an atmosphere of inhibition, preventing them from participating freely and voicing their opinions. Such behavior not only hampered the full potential of these discussions but, more importantly, it mirrors the larger patriarchal structures that tend to marginalize women in these communities.

This observation underscores the necessity of implementing gender-responsive approaches that account for the particular socio-cultural nuances of the pastoralist community.

## Case: Empowering Maasai Women: Transforming Gender Dynamics in Pastoralist Communities

The Farmers and Pastoralists Collaboration Project, via its intensive training programs, has significantly boosted gender empowerment among Maasai women in Same District. This change has been manifested through their newfound ability to access government services, as well as the gradual shift in community mindsets towards gender roles.

Namayani Luka, a Maasai woman, shared her transformative journey, "Previously, my husband used to squander our income on drinking and would physically abuse me if I objected. But after attending the gender empowerment training by the project, I sought help from government officials, and my husband was briefly imprisoned. Now, I manage our finances, and his drinking habits have remarkably improved."

However, age-old Maasai traditions still pose challenges to women's empowerment, as Magdalena Ikayo, a member of the Matonyo women's credit-collaborative group, lamented. "Initially, our husbands lent us money for the group but never repaid the loans. The elders didn't support us, leading us to the decision only to lend to each other, excluding our husbands."

The surrounding community and project participants have been instrumental in educating Maasai women on gender equality. Monica Abdallah, another member, remarked, "They have advised us to save money through mobile banking to prevent our husbands from misappropriating our cash."

According to Namayani, there has been a noticeable shift in gender dynamics and women empowerment that was previously nonexistent in the pastoralist community. "Those who have received training are beginning to see change. For instance, my husband now asks for my opinion when it comes to finances."

Ruti Thomas, another participant, acknowledged the project's contributions but called for further efforts, "The project has initiated change, but we still face significant challenges. Our husbands control the sale of livestock, often spending the proceeds unwisely. They also have outdated views about family responsibilities. Therefore, we need the project to further address gender inequality, possibly through separate training sessions."

Naseriani appealed for further exposure for Maasai women. "We request the project to provide opportunities for us to visit places where other women have benefited from gender equality education. This exposure will allow us to learn from their success and implement changes in our own community," she said.



# CIRCULAR ECONOMY

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This assessment sought to establish the extent to which the FPC project promoted a circular economy. The analysis was undertaken qualitatively, through the comprehensive examination of the project's design and implementation, and the observed outcomes within the farming and pastoralist communities. At the core of this inquiry was an exploration of the degree to which the project succeeded in creating an environment in which farmers and pastoralists coexisted and benefited mutually from each other's activities.

The most significant manifestations of this cooperative relationship were found in the project's efforts to establish and operationalize various infrastructures, including a milk collection center, a sunflower processing infrastructure, and an animal feed processing unit.

The milk collection center and processing plant, for example, provided an avenue for pastoralists to add value to their milk products and generate higher income. Meanwhile, the waste from these processes provided valuable organic manure for the farmers, boosting crop yields and promoting sustainable farming practices.

On the path to fostering this mutually beneficial relationship, the FPC project also committed to educating and equipping the farmers and pastoralists with the necessary skills and certifications. Notably, 880 farmers were certified under the EAOPS system, which improved their farming methods and ultimately enhanced the quality of their products. The knowledge dissemination also extended to encompass organic farming practices, giving the stakeholders the necessary tools to fully participate in, and benefit from, the circular economy.

The relationship between farmers and pastoralists was also enhanced by the successful market initiative that brought them together. The farmers' organic produce and the pastoralists' high-quality milk were processed, branded, and sold together, promoting a system that encouraged both communities to work together towards common goals.

This peaceful and collaborative coexistence could be attributed to the project's successful promotion of the exchange of farm by-products, livestock manure, and other resources. Such a system of exchange provided a mechanism through which both farmers and pastoralists saw direct benefits in cooperating and coexisting peacefully.

For instance, pastoralists in Lubungo Ward in Mvomero noted the increased collaboration they experienced as a result of the FPC project. As one participant, Kimorowayi Sekeni, shared,

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*"I have been collaborating with neighborhood farmers in the exchange of manure from my cows and they, in return, provide me with maize residue, significantly contributing to the feeding of my cows and goats."*

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This is confirmed in a combined FGD between farmers and pastoralists in the same ward, where the participants noted that the collaboration between the two groups has also increased through the exchange of resources that each group produces. For example, in many cases, farmers normally obtain manure from pastoralists and so do the pastoralists obtain harvest residues from farmers. Juma Makulugila, a farmer, testified,

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*"I have been supplying my harvest residues to neighboring pastoralists and they have been supplying me with manure that helps me in my farming activities. Such types of exchanges were previously unheard of."*

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While the strides made by the Farmers and Pastoralists Collaboration (FPC) project have significantly contributed to the establishment of a circular economy, several challenges persist. These have been thoroughly detailed in the Learning Journey Report, and this assessment underlines the critical importance of addressing them to ensure the continued success and sustainability of the project.

Market insecurity stands out as a notable concern for farmers engaged in horticulture and other crops. The unclear contracts between farmers and SAT, specifically regarding quantities to be purchased and the often-lower prices, have resulted in some farmers questioning their loyalty to the project. This situation poses a risk of side selling of crops, threatening the steady supply necessary to sustain the circular economy.

The functionality of the circular economy is also challenged by traditional beliefs and customs, especially within the Maasai community. These traditions inhibit the exchange of byproducts like cow manure, often used in farming practices, and discourage crop production, viewed as a potential cause for conflicts. Addressing these deeply ingrained perceptions is crucial to furthering the progress of the FPC project.

# UNINTENDED IMPACTS

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The successes of the FPC Project have largely been achieved through careful planning and effective project management. However, several unintended impacts have also emerged alongside the planned outcomes.

One unexpected development was the interest among livestock keepers to venture into crop farming, particularly maize. This diversification into crop farming by livestock keepers implies an expansion of the project's sphere of influence. However, it will also necessitate increased support from SAT to ensure these new farmers adopt sustainable and environmentally friendly farming practices, and successfully navigate the challenges of farming.

Furthermore, the assessment noted a significant increase in livestock numbers, without a corresponding growth in grazing land and pasture. For instance, as noted in the Learning Journey Report, in Lubungo village, the land set aside for pasture in 2020 was 302.79 ha, while the projected requirement by 2030 is 4,750 ha, showing a land deficiency of 4,447.21 Ha, about 96%. This discrepancy has led to livestock invasions in pasture areas and farms and forced cattle migration, especially in the dry season.

The increase in livestock numbers, while indicative of the success of pastoralists, comes with challenges. As pastoralists find success, it is not guaranteed that their expansion will solely focus on improved breeds. There might be an inclination to increase flocks of traditional breeds, given the deeply ingrained practices associated with them. The risk here is that such unchecked expansion could exacerbate conflicts over land use between farmers and pastoralists.

To mitigate this, SAT could respond by promoting more resource-efficient livestock breeds and improving pasture management practices. There is also a need to emphasize the importance of balance in expansion, advocating for the consideration of available resources and the potential implications on community relations.

# SUSTAINABILITY

In this section, two primary points emerge related to sustainability structures, both essential to ensuring the enduring impact of the Farmers and Pastoralist Collaboration (FPC) project. The first point emphasizes the formation and effective utilization of local groups. It argues that creating organized groups is instrumental in disseminating knowledge and skills, fostering social cohesion, and encouraging the adoption of sustainable agricultural practices.

The second point underscores the necessity for robust collaboration with local government authorities. These entities are well-positioned to institutionalize sustainable practices, enact supportive policies, and mobilize public resources for rural development.

In addition to discussing structures, the report delves into the crucial aspect of ensuring the sustainability of the project's impact.

## Sustainability Structures

### The formation and use of groups

The group system employed by the Farmers and Pastoralist Collaboration (FPC) project is a powerful mechanism for promoting sustainability. By creating and fostering a community-driven structure, the project empowers individuals to share knowledge, pool resources, and support each other, which fosters a sense of mutual responsibility and ownership of the project's success. This is likely to contribute to sustainable outcomes in the following ways:

- Group systems encourage an exchange of ideas and experiences. The collective learning environment enables the spread of best practices and innovative solutions, helping all members adapt and improve their farming and pastoral techniques. This knowledge transfer is an ongoing process, supporting sustainable agricultural and livestock practices well beyond the life of the project.
- By pooling resources, group members can achieve more together than they would individually. This collective approach can help overcome financial limitations and allows for shared investment in tools, seeds, or other resources. This model can contribute to financial sustainability by sharing costs and risks.
- Groups provide a network of social support that is invaluable in dealing with challenges, whether they are related to conflicts, market access, or weather extremes. This social fabric can enhance resilience and mitigate the impacts of stressors.
- The group system provides a platform for peaceful dialogue and collective problem solving. This could prove instrumental in resolving conflicts that may arise between farmers and pastoralists, thereby fostering sustainable peace.

The group system is a sustainable model for the FPC project as it encourages continuous learning, promotes shared resources, builds social resilience, and facilitates conflict resolution. The future success of the project will largely depend on the strength and unity of these groups and how effectively they can apply the skills and resources they have gained to overcome future challenges.

However, while these structures show great promise, certain caveats must be acknowledged. The cooperatives established under the FPC project, although functioning effectively in their early stages, face potential sustainability challenges. The issues largely emanate from limited capacity, low production leading to high transaction costs such as transportation to collection centres and the market, and the seasonal migration of cattle and inadequate cattle feed and water during dry seasons. These factors collectively contribute to an unsustainable production model and could compromise the effectiveness and longevity of the cooperatives if not adequately addressed.

Furthermore, the operations of farming groups and SAT Saving and Lending Groups (SSLGs) seem to be facing similar challenges. Their sustainability is contingent upon addressing these underlying issues.

### Collaboration with local government authorities

The project's success is not solely based on the efforts of SAT but also on a critical partnership – government involvement. This cooperation and collaborative effort have shaped the path towards a sustainable future in agroecological practices.

In the Mvomero district, Lubungo ward, the FPC project liaised with the Extension Officer, enabling capacity-building for farmers. As Justin Muhdini Momba, the Extension Officer for Mvomero stated:

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*“As the project started, the district extension office played an intensive role in collaborating with SAT for the formation of farmers' groups. I also participated effectively in various trainings that the SAT organized; this helped me to gain knowledge on the skills that was taught as well as adding inputs to the content of the training.”*

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Simultaneously, Livestock Officers also found productive collaboration in mitigating conflicts between pastoralists and farmers.

In Kilosa, Madoto ward, and Hanang, Garawja ward, the FPC project collaborated with Extension Officers to conduct consultative stages and provide capacity-building training for farmers. An estimated 100 farmers participated in these sessions, demonstrating the project's extensive reach.

Meanwhile, in the Bassoutu ward of Hanang, the Livestock Officer reported effective collaboration in "enhancing the collaboration between the pastoralists and farmers... as well as monitoring all the trained agroecological practices that are well implemented."

In the Same district, Ruvu Darajani, the Extension Officer acknowledged the project's role in mobilizing newly-formed groups for sustainable agriculture.

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*"My office was directly involved, and the village executive officers were also involved and so far, there are two groups. The Bustani group, and the Kijito group."*

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## **Sustainability of Impact**

The FPC project has made notable strides in enhancing food security among beneficiaries. With a noticeable increase in the number of meals consumed per day and a decrease in food insufficiency, these individuals are on a path towards achieving sustainable food security. However, the continued success of this will depend on various factors, including the continued access to and use of productive assets, the viability of markets, and consistent collaboration between farmers and pastoralists.

On the nutrition front, the project has resulted in beneficiaries having a more balanced diet compared to non-beneficiaries, especially with the consumption of fruits and pulses. This is a positive sign towards improved nutritional health, which is crucial for the long-term physical and cognitive development of the communities involved. However, maintaining this balance will require continued education on nutrition and the availability of diverse food options.

Peace is a communal achievement, and though there may not be a dramatic difference between beneficiaries and non-beneficiaries, it's still noteworthy that more beneficiaries reported active participation in conflict resolution. This active participation could lead to sustainable peace and collaboration, provided these conflict resolution initiatives continue and further cultivate a culture of peace.

However, the sustainability of peace initiatives is contingent on widespread change in attitudes among community members. While the progress with project beneficiaries is commendable, it is crucial to ensure that these efforts reach and impact non-beneficiaries as well. The success of peace-building efforts hinges on their inclusive nature and the broader community's ability to resolve conflicts constructively.

The FPC project's contribution to increased climate resilience is a significant sustainability component. Since farmers and pastoralists are at the front lines of climate change impacts, the skills and knowledge they've acquired through the project, coupled with the productive capital assets, make them better equipped to withstand adverse weather events. This climate resilience isn't just beneficial for the individual households, but it contributes to the sustainability of the entire community in the face of increasing climate threats.

Ultimately, the sustainability of the benefits observed from the FPC project is an evolving narrative, influenced by the dynamic interaction of multiple factors over time. Continuous monitoring, evaluation, and adaptive management will be key to ensuring the gains made so far are not just sustained, but further improved upon, thereby ensuring the long-term success of the project.

One area requiring further exploration is the milk value chain, which presents both challenges and opportunities. The insights from the Learning Journey Report (2022) suggest that the sustainability of the milk chain necessitates additional research, particularly concerning markets.

Currently, the milk value chain relies heavily on one super buyer for raw milk and there are limited sales points for the milk products. This concentration risks the entire chain's stability should the buyer decide to stop purchasing or reduce their demand. Furthermore, the small number of sales points potentially limits the reach of the products to consumers.

The proposed research should encompass an assessment of product expansion possibilities and a review of the entire chain sustainability, from collection/supply, transport, and processing to packaging and market availability. The current single-buyer model and few sales points indicate a need for additional market outlets and product diversification.

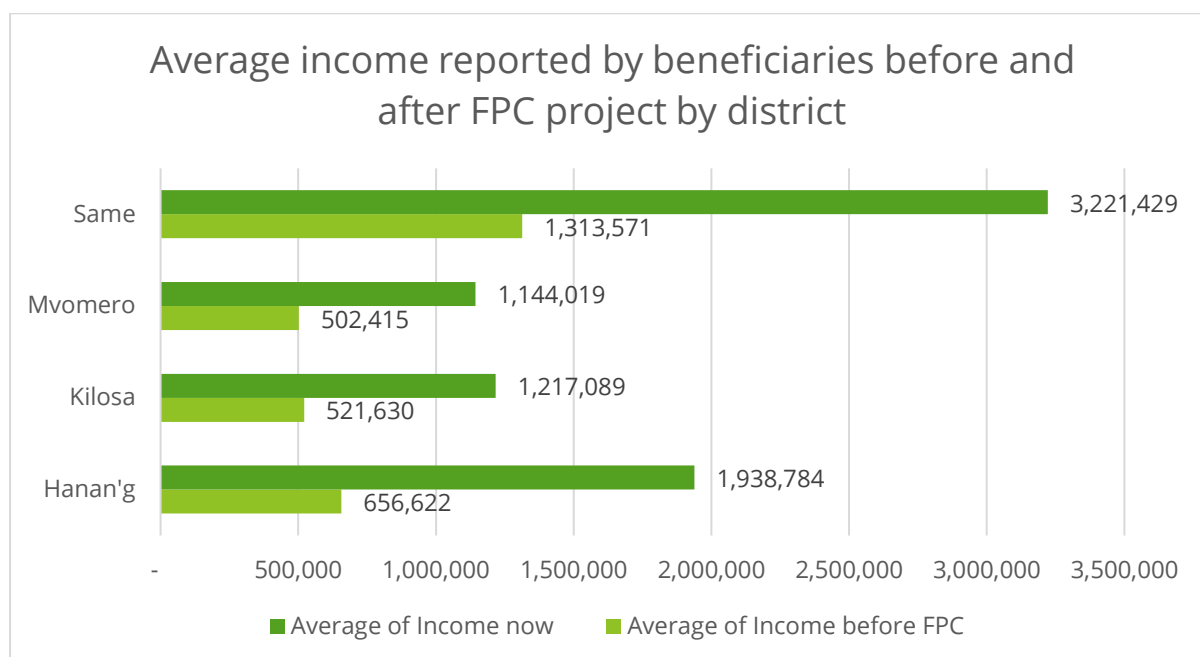
Additional market outlets would diversify the consumer base, reducing the reliance on a single buyer and increasing the overall stability of the milk chain. Similarly, exploring additional products could create new revenue streams and make better use of the milk produced.

# REGIONAL VARIATIONS

Implemented across four districts, the FPC project has yielded varied impacts on the four. To understand how this impact is differentiated across the four districts, our analysis focuses on three main facets of these impacts: income generation, crop yield - particularly of maize, a crop of crucial importance to the beneficiaries, and the use of ecological farming practices such as compost and manure. However, interpretations involving the Same district should be treated with caution due to its relatively smaller sample size.

Regarding income generation, we observe disparities in the average income reported by beneficiaries both before and after the FPC project implementation in different districts. In the Hanan'g district, there has been a considerable increase of 195% in average income, escalating from TZS 656,622 prior to the FPC project to TZS 1,938,784 as in 2022. This substantial increase surpasses those observed in the other districts.

On the other hand, the Same district, despite beginning with a higher average income before the FPC project (TZS 1,313,571), has seen a slightly lower percent increase in income of 145%, reaching TZS 3,221,429. Yet, this still signifies a sizeable income growth for beneficiaries in the Same district. Meanwhile, beneficiaries in the Kilosa and Mvomero districts have also experienced significant, but lower improvements in their income status, with respective increases of 133% and 128%.



In terms of crop yields, Same beneficiaries experienced an impressive growth of approximately 117%, increasing from about 1,128 kilograms before the FPC project to around 2,449 kilograms currently. This translates to the highest increase in real terms at an average of 1,321 kilograms per farmer.



Comparatively, the other districts witnessed modest yield improvements. Beneficiaries in Hanang saw a maize yield increase of about 123%, equivalent to 902 kilograms. On the other hand, Mvomero district saw a yield increment of roughly 94%, which translated to an increase of 434 kilograms per farmer.

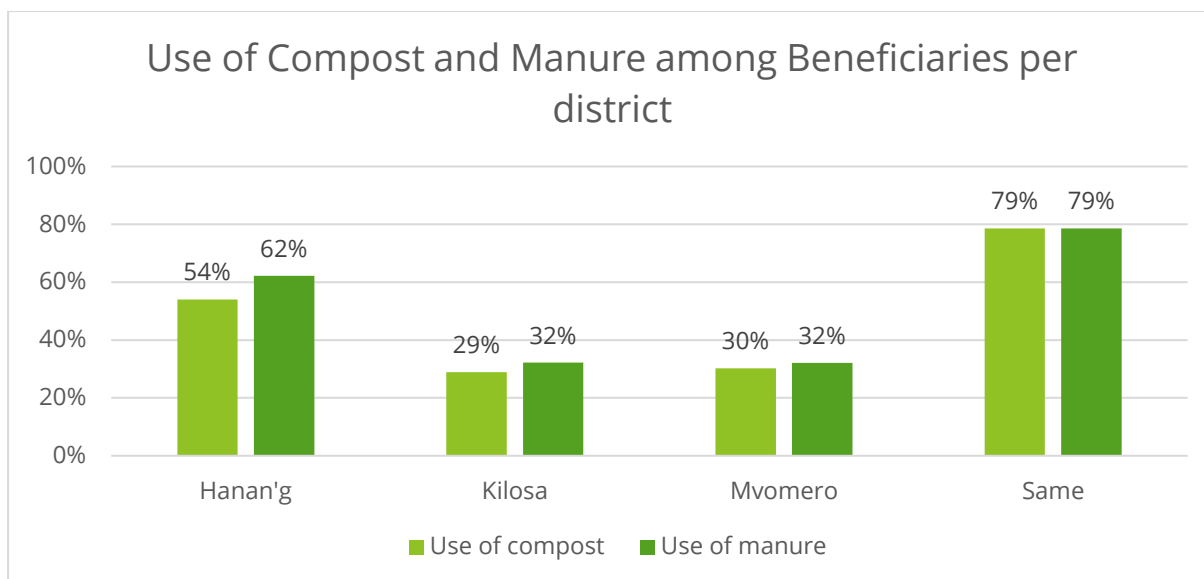
However, Kilosa district stands out with a particularly low yield improvement. The increment in maize yield in this district was only about 11%, equivalent to an increase of a mere 119 kilograms per farmer. This figure points towards a need for further investigation to understand and address the constraints limiting crop yield in this district.

The table below illustrates shows the yield differences

District	Average of Crop 1 yield before FPC	Average of Crop 1 yield now	Change in Yield of Maize
<b>Hanan'g</b>	733.85	1,635.38	901.54
<b>Kilosa</b>	1,091.17	1,209.93	118.77
<b>Mvomero</b>	464.58	899.00	434.43
<b>Same</b>	1,128.18	2,449.09	1,320.91

Finally, examining the adoption of agroecological farming practices, particularly the use of compost and manure, we observe differences across the districts. Same beneficiaries showed the highest utilization rates, with 79% of beneficiaries adopting both compost and manure use. In contrast, Hanang, which recorded the most substantial income growth, showed 54% and 62% adoption rates for compost and manure, respectively. Kilosa and Mvomero beneficiaries showed relatively lower adoption rates, both reporting 29-32% for compost and manure use.

The chart below illustrates this:



From the analysis, it seems plausible that variations in geographical and ecological conditions across the districts could be influencing the differences seen in income generation, crop yield, and adoption of ecological farming practices. According to the "Manual for crop production according to ecological agricultural zones" by the Ministry of Agriculture (Updated March 2022), the estimated current maize yield in the Eastern Zone, where Morogoro (Mvomero and Kilosa districts) is located, is lower at 1.14 tonnes per hectare, compared to 1.39 tonnes per hectare in the Northern Zone where Kilimanjaro (Same) and Manyara (Hanang) are situated. This could suggest that the friendlier ecological conditions in the Northern Zone are contributing to the higher income and crop yields seen in the Same and Hanang districts.

Additionally, Same district, which show significant increases in income and crop yields, also recorded the highest rate of adoption for compost and manure use. Despite the small sample size, this high adoption rate affirms the link between the use of these agroecological farming practices and the improved outcomes in this district.

Conversely, in Mvomero and Kilosa districts where income increases and crop yields were more modest, adoption rates for compost and manure use were also lower. This could suggest that enhanced promotion of these agroecological practices could lead to improved outcomes in these districts.

# CHALLENGES

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Several challenges arose at the intersection of agriculture, pastoralism, resource allocation, and community participation. This analysis presents some of the most widely cited challenges confronted by farmers and pastoralists; but also, those drawn from the learning journey report, classified into six broad areas: market challenges, knowledge and skills deficits, financial and operational limitations of SSLGs and cooperatives, resource availability, external, and community mobilization.

## Market Challenges for Crop and Livestock Products

SAT has been a key facilitator and buyer of organic products from farmers. However, there are uncertainties related to contracts with farmers and pastoralists regarding the crops to be planted, quantities demanded, collection frequency, prices, and payment time. Insecure markets and low prices, particularly for horticulture crops, have been recorded as disincentives for production expansion. Further, the costs of mobile transaction withdrawal fees are not covered by SAT, imposing an additional financial burden on the farmers.

## Knowledge and Skills Deficit

Farmers and pastoralists, particularly women, frequently display a lack of understanding about proper seed storage practices, which can expose seeds to potential damage and subsequently reduce crop yields. Additionally, there is a heavy reliance on rain-fed agriculture, despite the inherent unpredictability of weather patterns and the looming threat of drought. This highlights a pressing need for additional training and the introduction of alternative farming techniques.

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*"Pastoralists still have not yet received enough education on how to deal with climate change. They are a society that receives less, with difficulty and they do not understand quickly by teaching them without actions. In order to see a rapid change among this group, I would advise the availability of quality breeds for their livestock. That example will be taken by others who live around those areas to further increase their relationship and improve their ability to cope with changes in the environment."*

**Joyce M. Kibiriti, Extension Officer, Same District**

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## Resource Availability

Resource scarcity, specifically for farming tools like tractors, greatly impedes efficient agricultural activities. As one farmer, Daniel Isara, pointed out, increasing the availability of tractors within the community would significantly improve farming efficiency and potentially boost crop yields. For pastoralists, the lack of easily accessible water sources for livestock,

particularly in the Dabschand and Hanang areas, forces them to undertake strenuous journeys to Bossotu Lake, further draining their already limited resources.

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*The most prominent challenge we face is the scarcity of water sources for both farmers and pastoralists. When there's a deficit of rain, these groups grapple to secure water, which is essential for their activities. This scarcity potentially heightens the risk of conflicts over the usage of limited water resources*

***Bakari Somboja, an Extension Officer from Kilosa***

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### **Financial and Operational Limitations of SSLGs and Cooperatives**

The study affirms a significant challenge noted in the Learning Journey Report (2022) which noted that the established SAT Saving and Lending Groups (SSLGs) and cooperatives face financial and operational hurdles that impede their effective functioning and contributions to the development of agro-farming. The model employed by the SSLGs primarily relies on share purchases and social fund contributions by its members. However, the shares are typically small and fail to provide sufficient financial services necessary for business expansion, such as purchasing advanced equipment, acquiring land, or making significant investments in agro-farming.

Moreover, the SSLGs have seen a decline in membership, as exemplified by groups like Rafiki and Twende pamoja. This decrease is attributed to unfulfilled expectations such as cash dish outs and financial support. A notable concern is the merging of SSLGs with farming activities, which has led to decreased participation from group members who are less interested in production activities.

On the other hand, the cooperatives are in their infancy stages and lack the capacity to function according to required operational standards. Deficits in conducting regular meetings, record keeping, and maintaining vital operational documents such as budgets and business plans pose significant challenges. These operational issues not only affect the efficient running of the cooperatives but also hinder their ability to support the wider community's agro-farming activities.

### **External Factors**

Both farmers and pastoralists face significant challenges in controlling pests and managing wildlife intrusion. Persistent pest invasions inflict substantial damage to crops, undermining productivity despite continuous efforts at eradication.

Additionally, wild animals, notably elephants, and unregulated livestock frequently devastate farms, thereby further complicating efforts to maintain agricultural productivity.

### **Community Mobilization**

Despite demonstrated interest in agroecological practices, the level of community participation, especially among younger members, remains a concern. Demographic data

underscores this issue, with a smaller percentage of youth beneficiaries compared to non-beneficiaries, implying insufficient engagement or incentive for them to adopt these practices.

While the challenges are considerable, there is optimism among the participants about the future of agroecological practices. The farmers and pastoralists recognize the importance of these practices and are motivated to adapt for more sustainable livelihoods. As one farmer remarked:

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*"We initially had complications in making the pest repellents; it was a daunting task which nearly led many of us to abandon the project. But because we believed in its potential benefits, we persevered. However, given our limited income, we now hope the project could assist us in identifying market opportunities. Furthermore, we would appreciate help with equipment for processing pest repellents on a larger scale. We aim to match the quality and authenticity of chemically based pesticides. Additionally, equipment to help with processing our crops, especially tomatoes, after harvest would substantially enhance our yield,"*

**FGD Participant, Same District**

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# RECOMMENDATIONS

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The Farmers and Pastoralists Collaboration (FPC) project has made a profound impact on the livelihoods of the local communities in Mvomero, Kilosa, Same and Hanang districts. As SAT looks forward to enhancing its operations and sustaining its interventions, several recommendations have been proposed by farmers and pastoralists and other key informants. These are discussed below:

## **Development of Pest Control Mechanisms and Farming Resources**

Farmers have expressed the need for more advanced tools for pest control. They propose the development of machinery that can produce natural pesticides in larger quantities. The idea behind this suggestion is twofold. Firstly, this will amplify the effectiveness of pest control. Secondly, it will save the farmers' time and energy currently spent manually preparing these mixtures. This need aligns with recommendations from the Learning Journey Report, which suggested introducing a small or medium mobile bio-pesticides processing machine. This machine could be shared among groups, reducing labor-intensive hand processing currently used in bio-pesticides production. The report emphasized that supporting bio-pesticide and bio-fertilizer production is critical for the envisioned expansion of sustainable agriculture.

On a similar note, to overcome resource scarcity, the provision of more tractors and other essential farming equipment within the community is highly recommended. This would lead to an increase in farming efficiency and subsequent yield.

## **Training and Education**

There is a demand for enhanced training on appropriate seed storage methods, especially among female farmers. They underscored the significance of this knowledge for maintaining the integrity of the seeds, thereby guaranteeing better harvests. Further, there is a suggestion to introduce irrigation farming, which will make the farming process less dependent on weather conditions, thus increasing productivity.

While the group system is working effectively, there is potential for further improvement. More specialized training modules, such as advanced farming techniques, pastoral best practices, and climate-resilient agriculture, can build a stronger knowledge base within these groups. This will promote more sustainable practices and improve resilience.

## **Strengthening SSLGs and Cooperatives**

For improvements in the SSLGs and cooperatives, it is vital to design capacity-building initiatives that cater to the unique context and needs of the farmer and pastoralist communities. The training programs should be easily accessible and incorporate practical, hands-on lessons on financial management, governance, and record-keeping tailored to the rural setting. Encouraging local leadership development, possibly through mentorship programs and community-led initiatives, can further enhance ownership and sustainability.

Process improvements should focus on making operations more efficient and user-friendly, considering the resources available. This may involve the use of simple, cost-effective technology for tasks like bookkeeping and communication, if feasible.

### **Water and Irrigation**

Construction of man-made water sources like dams is a suggestion made by pastoralists to counter the water accessibility issue. This would not only save them the time and energy spent traveling long distances but also improve the health and productivity of their livestock. The participants also suggest more investment in wells, which would enable farmers to practice irrigation farming and enhance the sustainability of their agricultural practices.

### **Sustainable Herd and Grazing Management Practices**

In addition to the above, the adoption of improved breeds should be a part of a broader, more integrated strategy that includes sustainable herd and grazing management practices. This involves not just the introduction of new breeds, but also the provision of support in terms of knowledge transfer, veterinary care, and breed conservation.

### **Wildlife Mitigation**

A critical issue that needs to be addressed is the problem of elephant invasions into farms. The farmers urge the government to intervene in this matter. Despite all the effort put into farming, if elephants continue to destroy their crops, their hard work could be wasted.

### **Youth Involvement**

There's a call to motivate and mobilize more youths, especially among the pastoralists, to join the groups and become direct beneficiaries of agroecology practices. Encouraging youth participation will ensure continuity and the propagation of learned skills.

### **Supporting Pastoralists' Farming Interest**

Pastoralists have shown an interest in farming. Supporting them in this endeavor not only improves their livelihood but also contributes to environmental preservation.

### **Conflict Resolution**

While there has been active participation in conflict resolution initiatives, further skill-building could be beneficial. Training on negotiation and mediation, along with increased awareness of the legalities surrounding land and livestock disputes, would equip individuals with the tools to better manage potential conflicts.

### **Nutritional Education**

Although there is an improvement in the number of meals and the consumption of diverse food items, nutritional education could still be emphasized. Understanding the importance of balanced diets and how to prepare nutritious meals using locally available resources would ensure beneficiaries and their families get the most nutritional benefit from their meals.

### **Enhancing Market Access**

Insights from the Learning Journey Report (2022) suggest several actionable steps to enhance market access for beneficiaries of the agro-farming project. To strengthen the economic sustainability of the project, this assessment supports the proposal to widen the distribution network for organic products. This could be achieved by bringing services closer to customers through strategies such as opening organic shops in strategic areas like SUA and Chifu Kingalu market, and identifying targeted customers in offices for home deliveries.

Additionally, the Learning Journey Report underscores the potential benefit of a nationwide awareness campaign about organic foods. This could positively influence consumer behavior, creating a larger market for our beneficiaries. Simultaneously, exploring enhancements in packaging, particularly for milk products, in the form of eco-friendly disposable packages like degradable paper boxes, aligns with SAT's core values while potentially increasing consumer appeal.

A risk mitigation strategy suggested by the report involves diversifying outlets, given the project's current dependency on a single buyer, Shambani Milk. This could be accomplished by expanding the product offerings at the existing milk processing facility, which is currently underutilized despite evidence of high-quality milk production.

Lastly, to ensure a steady supply chain for milk, the assessment echoes the recommendation made in the Learning Journey Report to establish milk collection points extending beyond Mvomero to areas such as Parakuiyo in Kilosa, which currently lack secure milk markets. Complementing this initiative with optimized pasture production and storage, along with provision of water for cattle, could reduce the seasonal migration of pastoralists, contributing to a more stable supply of milk.

### **Promote Climate-Resilient Practices**

With beneficiaries likely to be more resilient to adverse weather events, there's an opportunity to enhance this advantage further. Providing information on climate-smart farming and pastoral practices, along with knowledge on how to interpret and respond to weather forecasts, can be crucial for future sustainability. This could involve training on selecting crop varieties resistant to climate stressors, optimizing water usage, and adopting practices that reduce soil erosion and increase soil fertility.

### **Regular Monitoring and Evaluation**

Regular monitoring and evaluation of the project will ensure that it stays on course to meet its objectives and provides an opportunity to make adjustments as necessary. This will also help in documenting the project's successes and challenges, which can inform future initiatives. These assessments should involve beneficiary feedback, field visits, and careful analysis of data on yields, income, and other indicators of success. Such a feedback loop will ensure that the project remains responsive to the changing needs and circumstances of the communities it serves.

### **Expansion of Successful Practices**

The success of the FPC project indicates a model that can be replicated or scaled up. Stakeholders should explore the possibility of expanding the project to other communities



who may benefit from similar interventions. This could involve sharing best practices, lessons learned, and success stories to inspire and guide similar projects. It might also require building partnerships with other communities, government agencies, NGOs, and other stakeholders to ensure the broader dissemination and adoption of successful practices.

These recommendations aim to capitalize on the successes of the FPC project while addressing areas of potential improvement. Their implementation would likely enhance the project's sustainability and the long-term wellbeing of the beneficiary communities.

# ANNEXES

## ANNEX 1: DETAILED ASSESSMENT OF ACTIVITIES AND THEIR IMPACT

Result	Expected Results	Details of activities contributing to the results	Assessment findings	Impact Rating	Recommendation
Result 1.1	In total 1,040 FPC I farmers and pastoralists are strengthened through technical backstopping and special training	Conduct technical backstopping to 440 farmers (10 to 15 visits) and train 275 farmers in natural pasture management, hay baling and storage (10 to 12 visits)	The technical backstopping provided to farmers was successful in introducing new practices like natural pasture management, hay baling, and storage. However, challenges like distance between livestock zones and fodder cultivation zones, inadequate storage facilities, and need for transport training were identified.	Moderate	The program should consider providing additional support in terms of logistics, for example, providing better storage facilities or devising better transport methods for fodder. Furthermore, there is a need for continuous training to help farmers overcome new challenges that may arise in the process of implementing these new practices.
		Train farmers on alternative income generating activities and establishment of profitable enterprises (average of 4 visits)	Training farmers on alternative income-generating activities was instrumental in diversifying their income sources and reducing reliance on single crops or activities. However, market uncertainties and fluctuating prices can pose a challenge.	High	The project should continue this initiative but also consider introducing marketing training or collaborations with established marketplaces to help farmers gain more secure and reliable market access for their products.

		Conducting technical backstopping sessions to farmers and pastoralists on saving and lending modules (an average of 3 to 5 visits)	The training sessions on saving and lending were critical in promoting financial literacy among farmers and pastoralists. However, the adoption and impact of these sessions could be limited due to factors such as low literacy levels and cultural practices.	Moderate	For future iterations, the project may need to explore other modes of financial education that could be more impactful. This could include practical demonstrations or using more interactive and engaging methods to convey these important concepts. Furthermore, collaboration with local financial institutions could be explored to provide more tangible financial services.
Result 1.2	New farmers and pastoralists trained in agroecological methods	Conduct training on agroecology to new recruited farmers on an average of 30 to 40 visits	Agroecology training was well-received, leading to a significant decrease in harmful practices such as slash-and-burn agriculture. However, the physical distance between crop and grazing lands presented logistical challenges.	High	Enhance training with strategies for logistical management. Include context-specific solutions for managing crop-grazing distances in the training curriculum.
		Conduct training to new recruited pastoralists on sustainable livestock keeping and pasture management	Training on sustainable livestock and pasture management was positively received. However, the full implementation of these practices has been hindered by the lack of adequate storage and transportation solutions for fodder.	Moderate	Implement infrastructural support for fodder storage and transportation. Consider partnerships or initiatives that could facilitate these logistics.

		Conduct training on saving and lending to new recruited pastoralists on an average of 5 to 7 visits	The saving and lending training was successful, with good uptake among the new pastoralists. However, insecure markets and unclear contracts pose a potential risk to the sustainability of these financial practices.	Moderate	Introduce training modules on market dynamics and contract literacy to help pastoralists navigate these challenges.
		Training and supervising farmers on Agroforestry establishment (with emphasis on soil fertility, medicinal use, and fodder)	Training on Agroforestry was impactful, surpassing the target of trees planted.	High	Continue promoting the practice and monitor survival rate of planted trees.
Result 1.3	Farmers and pastoralists reached through Peer to Peer approach	Conduct backstopping to former F2F and P2P groups on agroecological and sustainable livestock keeping (an average of 10 to 12 visits)	Backstopping activities proved successful in reinforcing agroecological practices and sustainable livestock keeping, creating an ongoing support structure for participants. However, further resources may be needed to ensure these practices are sustainable long-term.	High	Continue backstopping initiatives while considering additional support mechanisms for the longer term.
		Supervise agroecological training of farmers and pastoralists trained by others through peer-to-peer training approach (On an average of 20 to 25 visits)	The supervision of agroecological training through peer-to-peer strategies demonstrated the value of community-based learning. However, the quality of training might differ depending on individual peers' understanding and capacity.	High	Further improve the peer-to-peer training by providing additional resources or regular refresher courses to the trainers.

		Conduct technical backstopping and training on saving and lending model to F2F and P2P (average of 3 to 5 and 5 to 7 visits respectively)	The technical backstopping and training on the saving and lending model have been well-received and adopted by the communities, but there are opportunities for expansion and further customization.	Moderate	Upscale this program, while making necessary adaptations to better suit the unique needs of individual communities.
		Conduct special training to F2F and P2P committees			
Result 1.4	Lesson and experiences are shared to farmers, pastoralists and extension officers from other regions	Conduct training to farmers and pastoralists through Mobile Office Days (MOD) in Same and Hanang' every year for two up to three days	Training through Mobile Office Days (MOD) proved to be highly effective in Same and Hanang' districts, which demonstrated significant improvements in income and crop yields. This approach leveraged pre-existing conditions in these districts including higher literacy rates, prior exposure to development programs, and more favorable ecological conditions, enabling the project to achieve considerable impact with a relatively less costly and more efficient approach.	High	Considering the considerable impacts in Same and Hanang' districts, the Mobile Office Days (MOD) approach should be scaled up in other regions. However, it is crucial to thoroughly understand and account for the unique regional dynamics, including literacy levels, previous exposure to development programs, and ecological conditions in each new area of implementation.

		Conduct special ToT to 10% model farmers and pastoralists from MOD	The ToT for model farmers and pastoralists from MOD has shown a significant positive impact by creating a group of knowledgeable individuals within the community who can cascade the learning to others. This strategy proved instrumental in these regions with higher literacy rates, previous exposure to other programs, and better ecological conditions.	High	The special ToT for model farmers and pastoralists is a valuable initiative that should be continued. It is recommended to ensure diversity in the selection of model farmers and pastoralists to broaden the reach of knowledge dissemination.
		Conduct ToT course to 20 extension officers from Kilosa, Hangang', and Same districts	The ToT course for extension officers has been successful in building capacity within the extension service.		
Result 2.1	Infrastructure for FTC and communities established and operational	Construct and operationalize infrastructure for processing	The construction and operation of processing infrastructure have proven to be impactful.	High	
		Train staff in operating and managing processing facilities	Staff training in operating and managing processing facilities has been effective. However, continuous skill upgradation to keep pace with evolving technologies and practices is crucial.	High	Provide ongoing training programs for staff to keep them abreast with current technologies and practices in managing processing facilities.
		Construct staff house at FTC		Moderate	

		Make farm road accessible from the south	Making farm roads accessible from the south has improved mobility, although poor weather conditions still affect road usability.	Moderate	Continue maintaining and improving road infrastructure, while also exploring weather-resilient solutions.
		Implement land use planning (Certificate of occupancy) and community infrastructure projects that benefit the community	Implementing land use planning and community infrastructure projects have somewhat benefited the community. However, some areas still face incomplete land use plans, potentially leading to conflicts.	Low	Address systemic issues
Result 2.2	Former trained farmers are strengthened through further certification and training on specific needs in the field of production and marketing.	Conduct ploughing of the farms, maize shelling during harvesting and transportation of materials and products using tractor and drought animals			
		Conduct training on PGS certification process and facilitate farmers on certification procedures under EAOPS (15 visits)	The training on PGS certification process and facilitation of farmers on certification procedures under EAOPS has been positively received, but more efforts can be made to ensure broader reach.	Moderate	Extend the reach of training and certification support to more farmers and consistently update the farmers on any changes in certification requirements.
		Construct screen houses to 3 model farmer groups with well-established and operating enterprises in the dryland area	The construction of screen houses for 3 model farmer groups has greatly supported farming activities, but maintenance and potential scaling up will need attention.	High	Continue supporting farmer groups with infrastructure, while also teaching them how to maintain and make the most of these facilities.

		Facilitate farmers to attend annual agriculture exhibition			
Result 2.3	Fresh vegetables, processed grains, sunflower oil and milk is successfully linked to the market.	Organize farmer committees (contract arrangement) to strengthen production with monitoring through ICT data collection			
		Products certification with TBS and EOAPS and successfully marketed			
		Conduct trainings to milk middlemen and organize milk collection			
Result 3.1	Researches, experimentations and practice of innovation solutions are made at SAT Farmer Training Centre	Conduct 3 internal special trainings at FTC by (inter) national experts			
		Conduct experiments/test plots 2 acres under min. 2 agroforestry systems and 2 acres for pasture experiments, and 500m live fencing (3 systems in comparison) established 2020 and data collected till 2022			



		Engage 5 farmers from 2020 in intensive agroforestry experiments			
		Prepare a report about the experiences with the different agroforestry systems			
Result 3.2	Students practice action research for their thesis in collaboration with farmers.	Support 4 master and 4 bachelor students in conducting their action research			
		Conduct at least 2 result presentations workshops and attended by at least 100 farmers and pastoralists			
		Organize at min 8 reflection workshops			
Result 3.3	Dissemination of research findings is made for accessibility to the community	Prepare and Compile 20 agroecological researches	The compilation of agroecological researches has been a valuable repository of knowledge. However, how is it utilized to inform programming?	Low	
		Conduct 1 hands-on policy workshop	The policy workshop has been useful in __. Is 1 workshop enough to bring policy shifts?	Low	Plan for more regular policy workshops to keep abreast with the changing policy environment.

		Develop, organize, and disseminate the dissemination tools			
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