



RESEARCH PROGRAM ON
**Climate Change,
Agriculture and
Food Security**



Workshop report: Playing out transformative adaptation in Usambara, Tanzania

November 27, 2012

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Agriculture and Food Security (CCAFS)

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Correct citation:

Twyman, J., Eitzinger, A., Shikuku, K., Winowiecki, L., Laderach, P., Koningstein, M. 2013. Participatory Workshop with Farmers in Usambara, Tanzania CCAFS Workshop Report. CGIAR Research Program on Climate Change, Agriculture and Food Security (CCAFS). Copenhagen, Denmark. Available online at: www.ccafs.cgiar.org

CCAFS Workshop Reports aim to disseminate interim climate change, agriculture and food security research and practices and stimulate feedback from the scientific community.

Published by the CGIAR Research Program on Climate Change, Agriculture and Food Security (CCAFS).

CCAFS is a strategic partnership of the CGIAR and the Earth System Science Partnership (ESSP). CGIAR is a global research partnership for a food secure future. The program is supported by the Canadian International Development Agency (CIDA), the Danish International Development Agency (DANIDA), the European Union (EU), and the CGIAR Fund, with technical support from the International Fund for Agricultural Development (IFAD).

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Abstract

This report documents the information collected during the participatory workshop hosted by The CGIAR Research Program on Climate Change, Agriculture and Food Security (CCAFS) in partnership with the Selian Agricultural Research Institute (SARI) and Lushoto District Office in the CCAFS site of Usambara Tanzania. This workshop was conducted as part of the CCAFS project “Playing out transformative adaptation in CCAFS benchmark sites in East-Africa: ‘When, where, how and with whom?’ which seeks to identify and understand, through integrated agricultural research, the adaptation process in the CCAFS benchmark site of Usambara, Tanzania. The workshop included farmers from various villages in the CCAFS site, who discussed agricultural practices and perceptions of climate change/variability. The workshop started off with an introduction/icebreaker, after which historical calendars, a discussion of crop suitability and baseline data and gender questions followed. Finally a vision for the future was made, in which the groups were asked to say what they would like to see in the future concerning climate change, food security and gender. The introduction/icebreaker and the general presentation of results were done in a large group but smaller groups were formed to do the historical calendars and to discuss crop suitability and baseline data as well as the gender questions. Most of the small groups were divided by gender, typically with two men’s groups and two women’s groups. In general it can be stated that the farmer is aware of a changing climate and the (negative) consequences this brings about. Furthermore there are differences in perspectives between men and women on the division of tasks and on the household decision-making process. Concerning the vision of the future, many farmers let us know that they would like to see more extended information and capacitation on climate change adaptation and mitigation strategies.

Keywords

Usambara; Tanzania; climate change; food security; gender

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Selian Agricultural Research Institute (SARI) is one of the research centres of the Northern Zone Agricultural Research and Development Institute (NZARDI) and is one of the seven zones under the Department of Research and Development (DRD) in the Ministry of Agriculture, Food Security and Cooperatives (MAFC).

Lushoto District Office

Acknowledgements

CCAFS and the authors would like to extend its appreciation to the Selian Agricultural Research Institute (SARI) including especially George Sayula, Dr. Charles Lyamchai, Dr. Lucas Mugendi, and the Lushoto District Office, especially Elizabeth Msoka and Moses Elieza, who greatly assisted in the facilitation of the program activities and for their role in co-facilitating the Participatory Workshop with farmers in Usambara.

CCAFS and the authors would also like to express its gratitude to all the participants who attended. We are grateful for the time they took from their busy schedules to join the workshop and make it a success.

The authors are grateful to Chris Jost, Patti Kristjanson, Kayte Meola, and Andrew Jarvis, for their comments on an earlier draft. Furthermore we would like to thank Anton Eitzinger for the photographic recordings of the workshop and for having these pictures made available to use in this report.

The views expressed herein cannot be taken to reflect the official opinion of these agencies, nor the official position of CCAFS. The authors are responsible for any errors and gaps in the paper.

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1. Introduction

There is a growing consensus within the scientific community that climate change is a real and serious threat for many people throughout the world. Agricultural productivity will be especially hard hit since it depends heavily on climate conditions. Furthermore, the negative effects of climate change will likely impact developing countries the most owing to their geographic location, their reliance on resources sensitive to climate change such as agriculture and fishing, and their low adaptive capacity. Eastern Africa is a region where reliance upon agriculture and fishery is high. Also, this region is expected to endure some of the worst weather changes, in the form of extreme droughts, erosion, erratic and severe rainfall and in general unpredictable weather conditions. Recent attention has been paid to how farmers could adapt to these changing conditions, and to build their resilience when the consequences of climate change affect their daily activities. Furthermore, there is likely a distinction in the way men and women are affected by climate change. This report describes participatory workshops conducted as part of the larger project, *Playing out Transformative Adaptation*, which seeks to identify feasible climate change adaptation strategies for both male and female farmers in East Africa. The overall objective of the project is to identify and understand, through integrated agricultural research, the adaptation process for four CCAFS benchmark sites in East Africa, namely Nyando, Kenya; Hoima, Uganda; Usambara, Tanzania; and Borana, Ethiopia. The aim is to fulfil the objectives of CCAFS, ***which seeks to overcome the threats to agriculture and food security in a changing climate, exploring new ways of helping vulnerable rural communities adjust to global changes in climate.***

In late 2010 and early 2011, CCAFS research teams conducted household surveys in the benchmark sites in order to understand the main changes in crops, land and soil management that farmers had made in the last ten years. After initial crop modelling and analysis of CCAFS baseline household surveys, workshops were carried out in order to understand and foresee reactions by farmers. The workshops, conducted in November 2012, used participatory methods such as the use of diagramming and visual sharing to communicate ideas with the farmers. The project worked with partners in the CCAFS sites to facilitate effective communication between the research team and the farmers and to enhance a balanced participation by stakeholders including both male and female participants. The final outcome is directed towards the understanding of the level of consciousness of the local farmers concerning current climate change, and how they perceive that it might affect their daily activities. A special focus was put upon the differences in gender-roles, especially concerning the intra-household decision making and division of daily tasks. In general, it is hoped/expected that the results presented in this report will contribute to developing adaptive initiatives to address the predicted consequences of climate change within Ethiopia, Tanzania, Kenya and Uganda.

1.1 Objectives

The following are the main objectives of the workshops:

1. To share with stakeholders (farmers and local partners) the results from previously collected baseline information;
2. To understand perceived historical changes in natural resources and land management strategies.
3. To perform a “reality check” - compare crop suitability maps with the perceptions of farmers in the village.
4. To identify specific perceived constraints (including biophysical, economic, and environmental constraints) to climate change adaptation and intervention requirements,
5. To understand farmers’ perceptions of the benefits and risks associated with land management strategies designed to adapt to climate change; and
6. To perform gender and vulnerability analysis, including assessment of institutional capacity and
7. To identify and share lessons learnt from past experiences.

1.2 Methodology

In order to achieve the objectives workshops were conducted using participatory methods. The following gives an outline of the workshop.

- Introduction/Icebreaker (list and discuss crops grown in the site)
- Historical Calendar (Climate, Resources, Agricultural Activities, and Infrastructure)
- Present and discuss crop suitability maps and models
- Present and discuss baseline data—why changes were made in agricultural production activities



Image 1: Map of the site of Usambara (Lushoto) within Tanzania. Source: L. Winowiecki

Discussions about gender—who does which activities and who makes which decisions?

The introduction/icebreaker and the general presentation of results were done in a large group but smaller groups were formed to do the historical calendars and to discuss crop suitability and baseline data as well as the gender questions. Most of the small groups were divided by gender, typically with two men's groups and two women's groups.

1.3 Site characteristics

The Usambara Mountains form part of the Eastern Arc Mountains. These mountains are a global hotspot for biodiversity with diverse micro eco-zones within a relatively small area. The area makes use of a mixed crop-livestock. There can be made a distinction between the higher and the lower elevated areas. The upper land makes use of quite intensive farming systems, whereas the lower land uses agro-pastoral farming systems. The Usambara Mountains make up for an important source of water for northeastern Tanzania, where especially the Pangani River is utilized for urban water supply, irrigation and hydropower generation. The area deals with many changes in the climate as well as the environment that cause serious threats to the food security of the area.

Deforestation, poor land management and inadequate funds for watershed management pose a threat to the long-term supply of quality water from the Usambaras to downstream communities. Impacts are already seen in agricultural production, municipal water supply and hydropower. Furthermore, the lack of land is a limiting factor due to increasing population and poor land productivity. By-laws are non-existing or do not possess the ability to be enforced, which has led to the failure of implementing measures to improve environmental services

(www.ccafs.cgiar.org). Approximately 24 farmers participated in the workshop conducted in this site.



Image 2: The landscape of the lower land region

2 Introduction/Icebreaker

After a brief introduction, farmers listed the crops grown in the seven participating villages. Since this site is also has livestock-production, livestock was also included into the activity. After this, participants were asked how many of them grew the different crops and whether they were grown for home consumption or for selling them in the market. Finally they were asked whether they associated the crops with men or women. Examples of the questions asked are as follows: ‘What do you grow?’ ‘Why did you decide to grow this crop?’ ‘What are the changes that you have been noticing in the past 10 years?’ and finally ‘Is the crop primarily associated with men or women?’ The results are presented in the following figures.

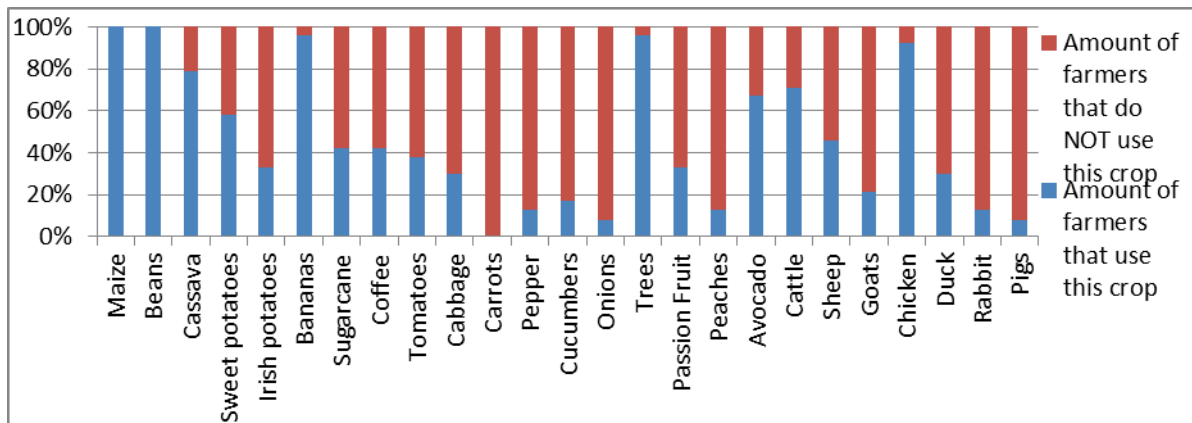


Figure 1: Percentage of participants who grow each of the crops listed as being grown in the area.

As can be seen in the graph, many crops are grown in this site and farms are quite diversified in terms of growing multiple crops. The main crops grown in the region are maize, beans, bananas and trees. Also chicken were held. Although carrots, peppers and onions were identified as crops grown in the region, few or none of the participants grew them.

2.1 Reasons to plant the crop and whether the crop is considered to be a man’s or woman’s crop

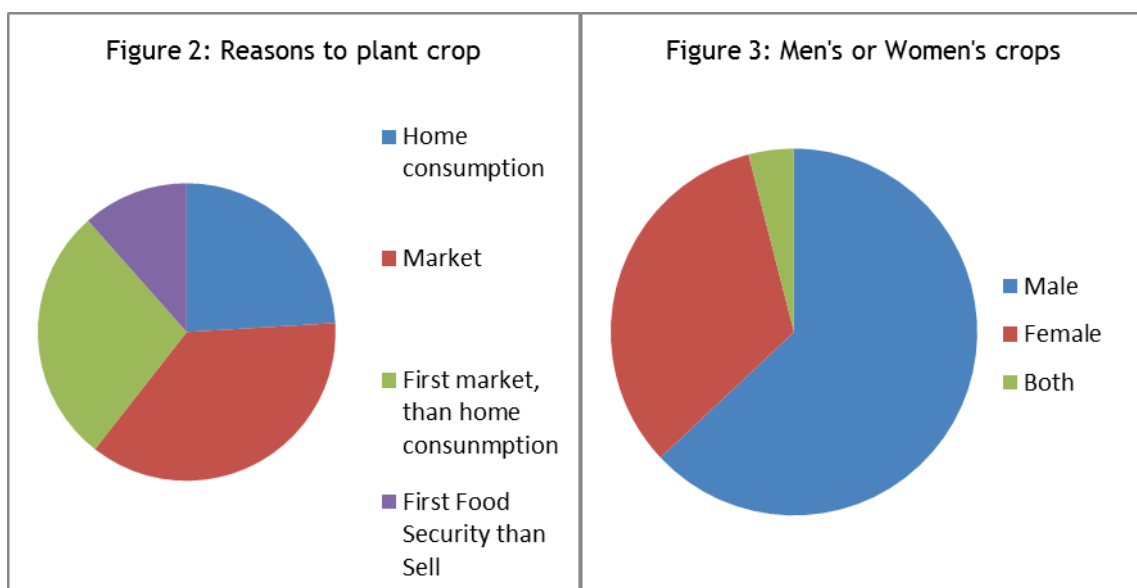


Figure 2: Reasons given for growing the crop.

Figure 3: Proportion of crops perceived as primarily associated with men or women.

After listing the crops that they grew, participants were asked why they grew each of the crops. The main reasons to plant the crop, according to the results coming from the workshop, are to use them for selling, and in some cases for home consumption. The final part of this activity was for participants to say whether they associated each crop primarily with men or women; specifically they were asked, “Who comes to mind first, men or women, when you think of [crop]”? Using these criteria, most of the crops are considered to be representing the male gender, whereas very few represented both genders. After doing this activity, there was a brief discussion to summarize the results and ask for explanations.¹



Image 3: Example of the categorizing of the gender of the crop

2.2 Listing of the most important crops

After this introduction the most important crops grown by the farmers were identified (the most commonly grown by participants—see figure 1). After listing them they were asked whether the practices had changed over the past ten years, and if so why. In the case of a negative answer the farmers were asked to further explain.

| CROPS | Changed practices or crops in the last 10 years? | Why or why not? |
|---------|--|---|
| Maize | Application of manure Changed from using local varieties to improved varieties. There is a reduced seed density per hole now There can be seen to be an improved land preparation Line planting and increased spacing have been introduced There has been made use of chemical applications There has been made use of terracing | There is better yield, there can be noticed a climate change, but the fertility has improved The yield is better, early maturity, drought tolerant, disease resistant There are highly variable rains, low rains, so farmers are ploughing to capture more moisture Thanks to the extension service there are better yields To control soil erosion, retain moisture, soil conservation |
| Beans | There has been made use of line planting They have started using manure Improved seeds are used There can be seen an early land preparation Planting only one seed type = no mixing | In general the changed practices serve for better and increased yields. Furthermore they have started planting in time at the start of the rain. There is no mixing because the buyers don't want mixed beans. They are easier to harvest and sell (does not attract, lower quality) and they are easier to store |
| Cassava | Better varieties introduced | To get to better yields and increased yields. To get to early maturing |
| Banana | They introduced better varieties The thinning has been applied To be able to apply manure There have been bigger and wider planting holes They have made use of | To get better yields, big fingers, market availability, early maturing To get a strong and healthy banana struck To improve soil fertility for better yields To get healthy bananas |

¹ The complete data tables are included in Annex 1

| | | |
|-------|--|--|
| | irrigation | |
| Trees | They use seedlings from nursery plant nurseries They apply manure during tree planting | So that they grow faster for sale With this a timely planting is possible and it increased the availability of seedlings To get stronger trees |

Table 1: Listing of the most important crops grown in the region, and the answers from the participants on whether or not the crops have changed over the past ten years, and if so, why or why not

3 Historical Calendar

In Usambara, participants were divided into two groups—one from the “upper land” and one from the “lower land”—to identify changes in climate, resources, agricultural production activities, and infrastructure. As can be seen on the map, there is a division between the two groups. This division also appeared in their evaluations of changes they have seen over the past forty years. With stones they were asked to identify the changes. For example one stone meant little rain, whereas five stones meant a lot of rain in the area (see Annex 2 for the original tables).

3.1 Climate

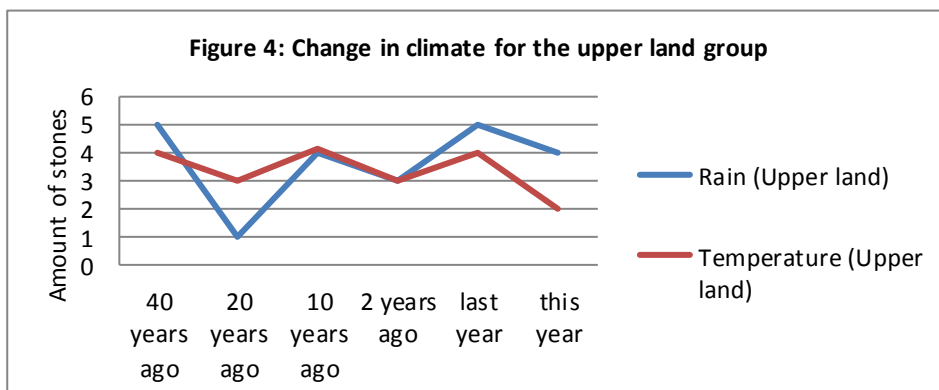


Figure 4: The change in rain and temperature over the past 50 years represented by the amount of stones, according to the upper land group

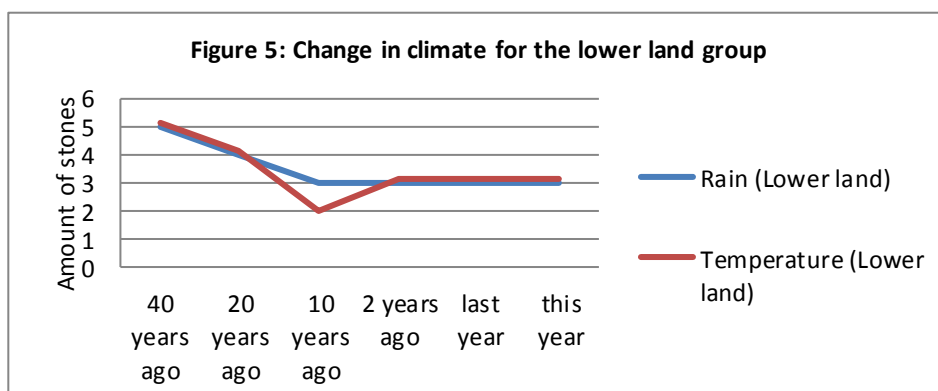


Figure 5: The change in rain and temperature over the past 40 years represented by the amount of stones, according to the lower land group

Concerning the rain and temperature in the upper land, various fluctuations seem to have been going on. Although the situation seems to have worsened in the past forty years, the situation has been worse as far as the upper land. In the lower land, both the rain and the temperature have gone down in perceived quality.

3.2 Natural resources

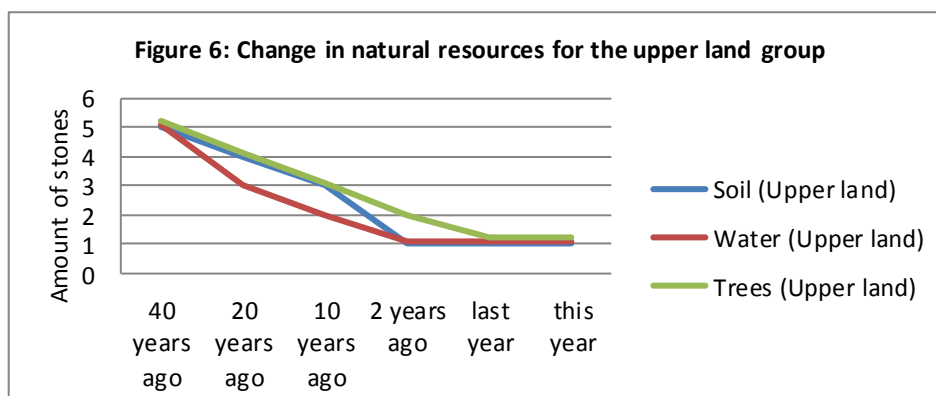


Figure 6: The change in soil, water and trees over the past 40 years represented by the amount of stones, according to upper land group

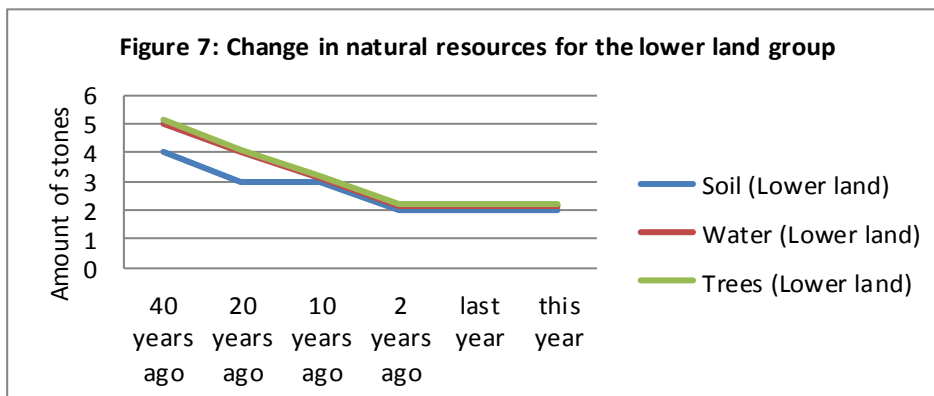


Figure 7: The change in soil, water and trees over the past 40 years represented by the amount of stones, according to the lower land group

Both groups coincide on the fact that the quality of soil, water and trees has gone down over the past forty years. The situation in the upper land, according to the participants seems to be a bit worse than in the lower land. According to both groups the quality has been stable for the past two years though.

3.3 Agricultural Activities

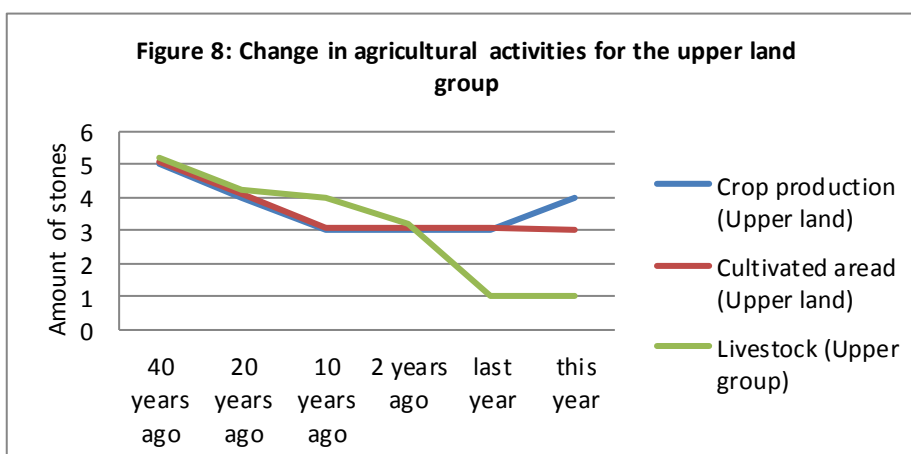
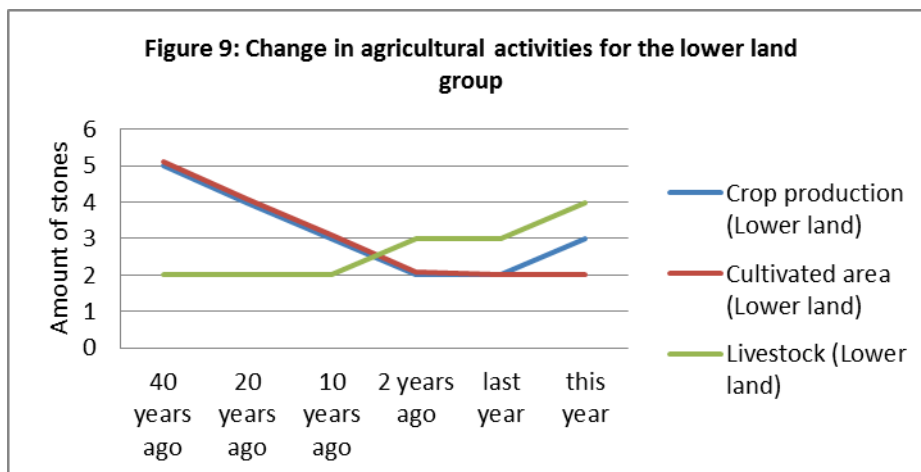


Figure 8: The change in crop production, cultivated area and livestock over the past 20 years, represented by the amount of stones, according to the upper land group

Figure 9: The change in crop production, cultivated area and livestock over the past 40 years, represented by the amount of stones, according to the lower land group



There can be seen a division on how the quality of livestock has changed over the years. The upper land group seems to perceive a situation that has severely worsened over the years. The cultivated area seems to have been stable over the past ten years, whereas the quality of crop production in both the upper as the lower land area seems to have gone up. In the lower land area, the quality of livestock has gone up the past forty years. The quality of the cultivated area has gone down, but has been stable over the past few years.

3.4 Infrastructure

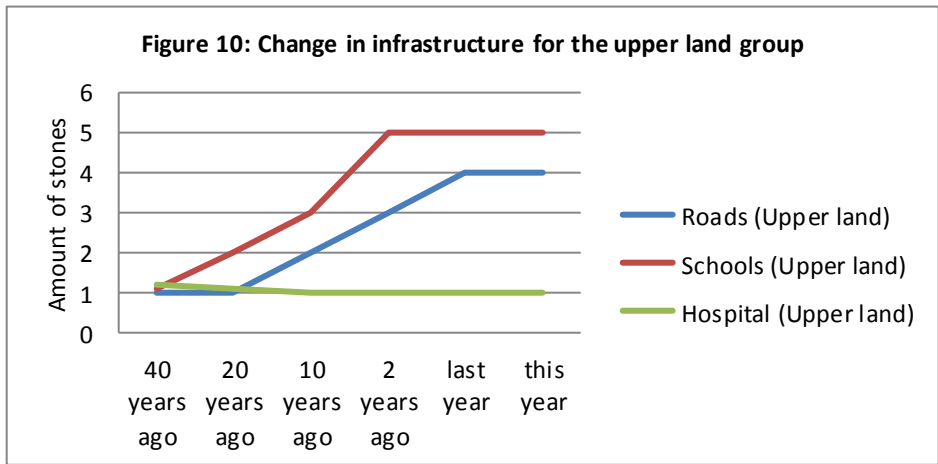


Figure 10: The change in roads, school buildings, school quality and hospitals over the past 20 years, represented by the amount of stones, according to the upper land group

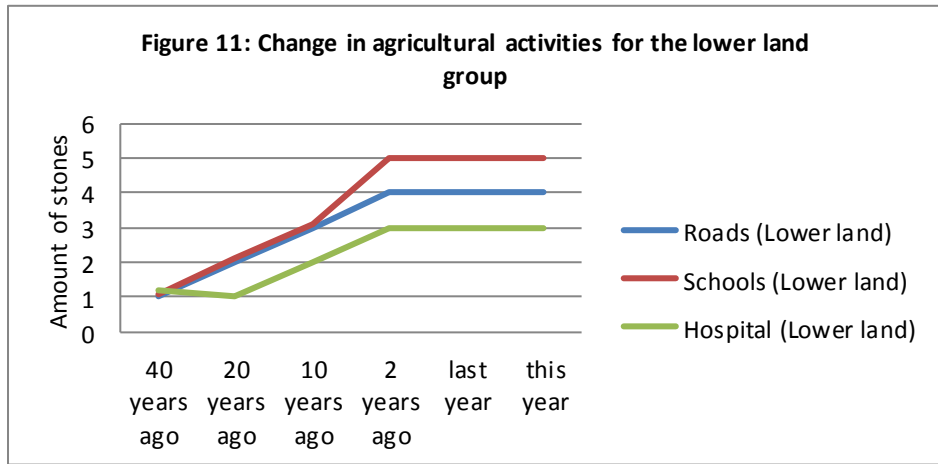


Figure 11: The change in roads, school buildings, school quality and hospitals over the past 40 years, represented by the amount of stones, according to the lower land group

Both the upper land and the lower land group seem to agree on the fact that the quality of schools and roads has gone up. Especially the quality of schools has improved a lot over the past forty years. According to the upper land group, the quality of the hospitals is not good though, and this bad situation has been stable over the past forty years. According to the lower land group however, the quality of the hospitals has gone up the last twenty years.

4 Present results of crop modeling and by the future expected impacts

The farmers received an explanation of the possible impacts of climate change to some of their main crops: beans, cassava and maize. The preliminary results from EcoCrop analysis were presented to the whole group and then a subgroup discussed these in more detail.

4.1 Reality check crop modeling - Women's group

| CROPS | Changes of crop-climate-suitability, the future? | What constraints do we have? | What actions are needed for the crops? |
|--------------|---|---|--|
| Beans | There will be more rainfall! | Pests & diseases Red cobs during flowering Drying of bean cobs during flowering stage Beans aphids Low soil fertility | No action No action No action No action Mulching Dip cultivation Soil erosion control (infiltration ditches) Use of contour lines (frash lines) |
| Maize | There will be a prolonged drought There will be less rainfall A general change of weather | Low soil fertility Lack of improved seed variety Poor crop management Mixing of different seeds in one farm Poor tillage Use of local seeds Lack of extension services during planting Lack of technical know-how on agriculture | Availability of extension services nearby farmers Availability of agriculture inputs at time (seeds, fertilizer) Use of improved agricultural inputs Practice good agriculture management |
| Cassava | The temperature will get higher There will be a shortage of rainfall The season has changed Change of climate season – Season has changed | The cassava stems are affected with pests (white aphids) There is a lack of improved cassava seedlings | Make use of the improved cassava seedlings Good and timely weeding Make use of good crop management |

Table 2: The three main crops as represented by the EcoCrop Analysis, the changes after a climate change, the existing constraints and the actions needed for preservation, according to the women's group

4.2 Reality check crop modeling- Men's group²

| CROPS | Changes of crop-climate-suitability, the future? | What constraints do we have? | What actions are needed for the crops? |
|---------|--|--|--|
| Maize | Yes it would be helpful if it would rain in time | There will be a reducing of yields The crops will be drying out if there is drought There will be an outbreak of pest and diseases There will be a hunger out break | There needs to be a planting of trees for trapping rains There needs to be a planting of drought resistant varieties There needs to be a way to irrigate the crops |
| Beans | Yes it will be helpful | The pods go rotten if it rains heavily Outbreak of aphids Outbreak of diseases Drying of crops will mean low yields | There need to be chemicals application Soil conservation for retaining (soil and moisture) Use of farmyard manure (Fym) |
| Cassava | Less sustainable due to the climate change | Very few improved seeds and cuttings are available The cuttings dry out due to short rains There is a loss of labor force Low yields | Extensionists need to be consulted Resistant varieties need to be used |

Table 3: The three main crops as represented by the EcoCrop Analysis, the changes after a climate change, the existing constraints and the actions needed for preservation, according to the men's group.

As can be seen from the results presented above, the disease and pest problems the crops of cassava and maize experience is a big concern. Therefore, there is a need for new varieties. Also, less rainfall and prolonged seasons of drought is becoming an increasing danger which makes the necessity for draught resistant varieties more present.

² Facilitated by Moses

5 Presentations of baseline survey results & reality check

5.1 Baseline Survey Results

In the second part of the participatory workshop eight household baseline indicators were presented for further discussion. The following table gives the per cent of households who reported that they made changes in agricultural production practices for the reasons listed (results based upon CCAFS household survey, 2011)³.

| Indicator 1: Reasons for change Better yield | Indicator 2: Reasons for change Better price | Indicator 3: Reasons for change Opportunity to sell more | Indicator 4: Reasons for change Variability of rainfall (erratic) |
|---|--|---|--|
| 86% | 79% | 73% | 64% |
| Indicator 5: Reasons for change Low rainfall | Indicator 6: Reasons for change Frequent droughts | Indicator 7: Reasons for change Land less productive | Indicator 8: Reasons for change Insufficient labor |
| 75% | 61% | 74% | 3% |

Table 4: Percentage of respondents to the CCAFS Baseline survey reporting they made changes for each of the eight reasons listed above.

5.2 Reality Check—Group discussions about Baseline Results

Table 5: Explaining Indicators: Women's group

| | | |
|---|---|-----------------|
| Indicator 1: Reasons for change Better yield | <u>True</u> ✓ | <u>Not true</u> |
| 86% | <u>Explain why</u> <ul style="list-style-type: none"> Better practices (they do now plant in line; two seeds per hole are planted per hole, instead of 5-6 earlier) | |
| Indicator 2: Reasons for change Better price | <u>True</u> ✓ | <u>Not true</u> |
| 79% | <u>Explain why</u> <ul style="list-style-type: none"> The new varieties produce quality that attracts the buyer | |
| Indicator 3: Reasons for change Opportunity to sell more | <u>True</u> ✓ | <u>Not true</u> |
| 73% | <u>Explain why</u> <ul style="list-style-type: none"> There is a high demand for crop products. We can even sell next door | |
| Indicator 4: Reasons for change Variability of rainfall (erratic) | <u>True</u> ✓ | <u>Not true</u> |
| 64% | <u>Explain why</u> <ul style="list-style-type: none"> For example cassava has been planted in October but due to the variability in rainfall we don't plant on time. This applies even to other crops. For example the farmers were brought Irish potato seeds but they couldn't be planted because of the erratic rains. | |

³ Full report can be found at <http://ccafs.cgiar.org/publications/summary-household-baseline-survey-results-lushoto-tanzania#.UkRMOoZLMdw>

| | | |
|---|---|----------------------|
| Indicator 5: Reasons for change Low rainfall | <u>True</u> ✓ | <u>Not true</u> |
| 75% | <u>Explain why</u> <ul style="list-style-type: none"> • Nowadays the rains come late and for a very short period. In general the rains come for less than a week | |
| Indicator 6: Reasons for change Frequent droughts | <u>True</u> | <u>Not true</u> ✓ |
| 61% | <u>Explain why</u> <ul style="list-style-type: none"> • There is no change in droughts | |
| Indicator 7: Reasons for change Land less productive | <u>True</u> ✓ | <u>Not true</u> |
| 74% | <u>Explain why</u> <ul style="list-style-type: none"> • Nowadays, without applying manure you can't harvest anything | |
| Indicator 8: Reasons for change Insufficient labor | <u>True</u> ✓ | <u>Not true</u> |
| 3% | <u>Explain why</u> <ul style="list-style-type: none"> • The participants don't have the ability to hire labor for it is costly • They use most of their income to meet basic needs and not for hiring labor | |

Table 5: Explanations for why the female workshop participants agreed or disagreed that changes were made for each of the eight reasons listed.

Table 6: Explaining Indicators Men's group

| | | |
|--|--|-----------------|
| Indicator 1: Reasons for change Better yield | <u>True</u> ✓ | <u>Not true</u> |
| 86% | <u>Explain why</u> <ul style="list-style-type: none"> • Good and improved seeds brings better yields • They have a short maturity time | |
| Indicator 2: Reasons for change Better price | <u>True</u> ✓ | <u>Not true</u> |
| 79% | <u>Explain why</u> <ul style="list-style-type: none"> • Because a better price will rise the income level | |
| Indicator 3: Reasons for change Opportunity to sell more | <u>True</u> ✓ | <u>Not true</u> |
| 73% | <u>Explain why</u> <ul style="list-style-type: none"> • Because if you harvest good crops and products they are easily to sell | |
| Indicator 4: Reasons for change Variability of rainfall (erratic) | <u>True</u> ✓ | <u>Not true</u> |
| 64% | <u>Explain why</u> <ul style="list-style-type: none"> • To ensure good yields according to the climate change | |
| Indicator 5: Reasons for change Low rainfall | <u>True</u> ✓ | <u>Not true</u> |
| 75% | <u>Explain why</u> <ul style="list-style-type: none"> • In order to ensure good yields | |
| Indicator 6: Reasons for | <u>True</u> | <u>Not true</u> |

| | | |
|---|---|-----------------|
| change Frequent droughts | ✓ | |
| 61% | <u>Explain why</u> <ul style="list-style-type: none"> • In order to get good yields • Also to use drought resistant seeds and varieties | |
| Indicator 7: Reasons for change Land less productive | <u>True</u> ✓ | <u>Not true</u> |
| 74% | <u>Explain why</u> <ul style="list-style-type: none"> • In order to increase production • To get surplus products for sale to get an income | |
| Indicator 8: Reasons for change Insufficient labor | <u>True</u> ✓ | <u>Not true</u> |
| 3% | <u>Explain why</u> <ul style="list-style-type: none"> • To improve farming practices to increase production per area | |

Table 6: Explanations for why the male workshop participants agreed or disagreed that changes were made for each of the eight reasons listed.

According to the results derived from the workshops, some of the problems perceived deal with less predictable rainfalls and less productive soils. Farmers have learned to plan around the rainfall; however, there is a need for drought resistant seeds and varieties. The participants are content with the higher amount of information on best practices and the better prices they receive for their products. However, but there is always a need for improvement.

6 Discussions about gender

6.1 Division of tasks between men and women

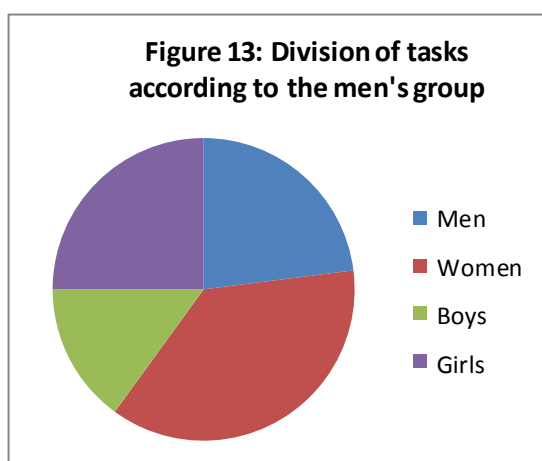
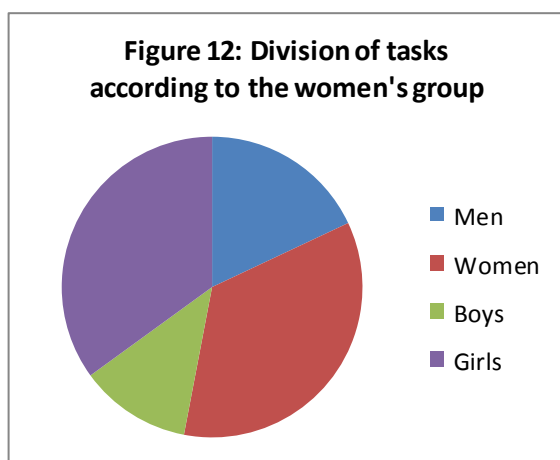


Figure 12: Distribution of tasks done by men, women, boys, and girls according to women

Figure 13: Distribution of tasks done by men, women, boys, and girls according to men

As can be seen in the graphs above, according to the women's group, a bigger part of the tasks is taken care of by the girls. The men's group reports that the male share of tasks is higher, than compared to the results from the women's group. The tables below further show the break-down in tasks by gender.

6.1.1 Gender tasks: Women's group

| Tasks | Men | Boys | Women | Girls |
|-----------------------|-----|------|-------|-------|
| Clearing Land | X | X | X | X |
| Ploughing | X | X | X | X |
| Planting | X | X | X | X |
| Weeding | X | X | X | X |
| Spraying | X | | | |
| Watering | | | X | X |
| Harvesting | | | X | X |
| Post-harvest Handling | | | X | X |
| Storage | | | X | X |
| Selling crops | | | X | X |
| Grazing | X | | X | X |
| Feeding animals | X | X | X | X |

| | | | |
|----------------------------|---|---|---|
| Milking | X | | |
| Carrying water | | X | X |
| Collecting firewood | | X | X |
| Cooking | | X | X |
| Tending children | | X | X |
| Washing | | X | X |

Table 7: Distribution of common tasks according the women's group.

6.1.2 Gender tasks: Men's Group⁴

| Tasks | Men | Boys | Women | Girls |
|------------------------------|------------|-------------|--------------|--------------|
| Clearing Land | x | X | | |
| Ploughing | x | X | X | X |
| Planting | x | X | X | X |
| Weeding | | | X | X |
| Spraying | X | | | |
| Watering | x | x | X | |
| Harvesting | | | X | X |
| Post-harvest Handling | | | X | |
| Storage | | | X | |
| Selling crops | X | | | |
| Grazing | x | x | X | X |
| Feeding animals | x | x | X | X |
| Milking | | | X | |
| Carrying water | | | X | X |
| Collecting firewood | | | X | X |
| Cooking | | | X | X |
| Tending children | x | | X | |
| Washing | | | X | x |

Table 8: Distribution of common tasks according the men's group.

Both the men's as the women's group coincide on the fact that tasks like ploughing, planting and feeding the animals are communal tasks within the family. The women's group thinks of more tasks as a family activity, whereas the men's group sees these tasks as conducted solely by men and boys. Furthermore, according to the women's group, all household tasks as well as harvesting, post harvesting, storage and selling are female chores. The men's group does not consider these tasks completely female. Finally, there can be found a distinction in the task of 'tending the children'. According to the women's group this is a female task, whereas the men's group sees it as a joint task.

⁴ Facilitated by Moses

6.2 Decision Making Matrix

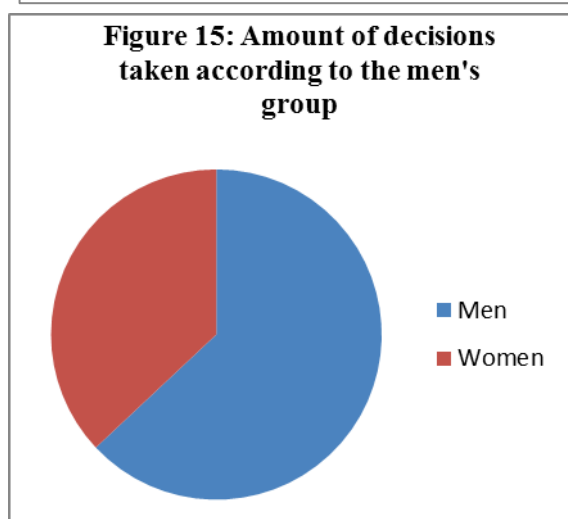
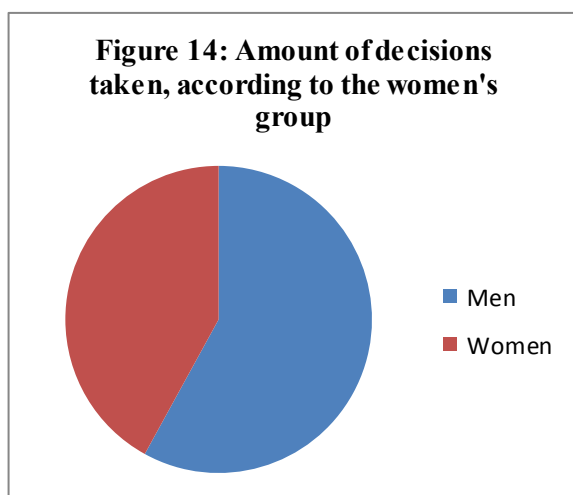


Figure 14: The division of decision taking between men and women, according to the women's group
 Figure 15: The division of decision taking between men and women, according to the men's group

As shown in the graphs above, both the men's as the women's group report that men take slightly more decisions than the women. The following tables show which decisions are typically made by men and women according to the women's and men's groups.

6.2.1 Decision Making Matrix: Women's group

| Decision | Man | Woman |
|----------------------------------|------------|--------------|
| Crop selection | X | |
| Where to plant each crop | X | |
| Whether or not to use fertilizer | X | |
| Purchase cows | X | |
| Sale cows | X | |
| Care of cows | | X |
| Purchase poultry | | X |
| Sale poultry | | X |
| Care of poultry | | X |
| Purchase goats | X | |
| Sale goats | X | |
| Care of goats | | X |
| Purchase sheep | X | |

| | | |
|------------------------|---|---|
| Sale sheep | X | |
| Care of sheep | | X |
| Children's education | X | |
| Housework | | X |
| Buy clothes and shoes | | X |
| Where to take the sick | X | |

Table 9: The specific categories on which the men or the women take the final decision, according to the women's group.

6.2.2 Decision making matrix: Men's group

| Decision | Man | Woman |
|----------------------------------|------------|--------------|
| Crop selection | X | |
| Where to plant each crop | X | |
| Whether or not to use fertilizer | X | |
| Purchase cows | X | |
| Sale cows | X | |
| Care for cows | | X |
| Purchase poultry | | X |
| Sale poultry | | X |
| Care for poultry | | X |
| Purchase goats | X | |
| Sale goats | X | |
| Care for goats | | X |
| Purchase sheep | X | |
| Sale sheep | X | |
| Care for sheep | | X |
| Children's education | X | |
| Housework | | X |
| Buy clothes and shoes | X | |
| Where to take the sick | x | |

Table 10: The specific categories on which the men or the women take the final decision, according to the men's group

These tables show minor differences in terms of how men and women perceive that decisions are made. In general the men are in charge of decisions concerning the crops and the purchase and sale of livestock. The women are in charge of the poultry and the taking care of livestock. Interesting is that according to both groups the men is in charge of the education of the children and the sick.



7 Final Activity—Vision of Future

The final activity of this participatory research/workshop was conducted by an open discussion with the participants. The farmers were asked what their visions for the future were. What changes should be made in the future to lead to food security and better future perspectives.

Solutions to the perceived climate change: Various answers and solutions to the perceived climate change have been brought up by the participants of the workshops. There seems to be a need for planting trees, soil conservations and improved varieties of crops. These improved varieties need to be disease, pest and drought resistant. The example of the introduced CCAFS beans has been given, and this proved to be a good initiative. In general the cassava crop has been considered a good crop to rely on; however, more seeds are needed to keep up with the changing environment.

Extension services: In general the participants have been asking for more extension services and farmers training. These seminars, as well as the one given currently, should take the opportunity to be expanded to reach other farmers.

Irrigation systems: According to the changes in the climate, farmers feel that there is a need for the expansion of the irrigation systems. The water is there, but especially in times of drought there is a need for a better infrastructure to make use of this water.

Provision of fertilizers and farm implements: A last point touched upon is the provision of fertilizer and farm implements. An expansion of the fertilizer markets and the market for farm inputs is required. To be able to get to these expansions, subsidizing the cost/price of fertilizers and farm inputs would be an ideal way to reach this.

Role of God: A general comment is that the farmers do accept that without God there is nothing to get done. With other words, whatever changes or applications might be introduced within the community of Usambara, God plays a major role.

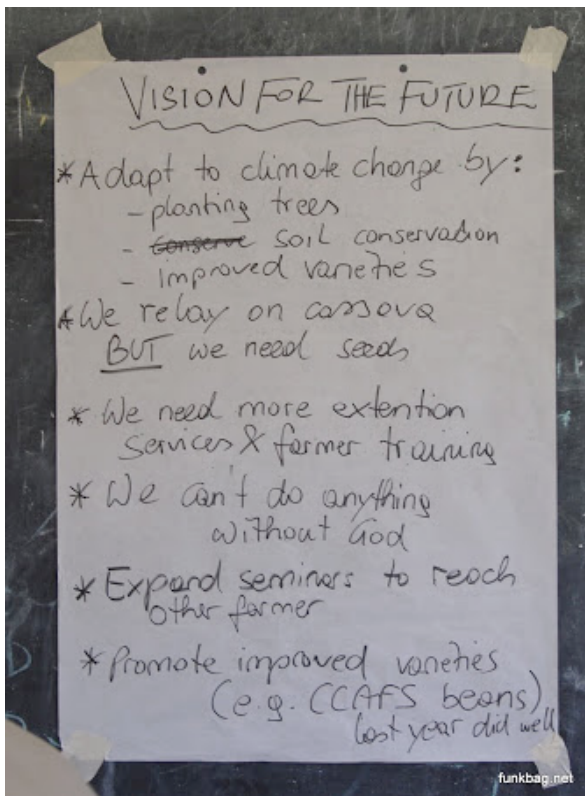


Image 5: The outcome of the vision for the future

ANNEX 1

| Crop Grown | Number of participants growing the crop out of total number participating | Ranking | Why? (Main reason listed first) FS=Food security = home consumption; income from selling used for school fees and staples like oil, sugar, etc.0 | Is the crop generally associated with men or women? |
|-----------------------|--|----------------|---|--|
| Maize | 24/24 | 1 | FS, SELL | Women |
| Beans | 24/24 | 2 | FS = SELL | Women |
| Cassava | 19/24 | 6 | FS | Women |
| Sweet potatoes | 14/24 | 9 | FS | Women |
| Irish potatoes | 8/24 | 14 | SELL, FS | Men |
| Bananas | 23/24 | 3 | FS | Men |
| Sugarcane | 10/24 | 11 | SELL | Men |
| Coffee | 10/24 | 12 | SELL | Men |
| Tomatoes | 9/24 | 13 | SELL, FS | Men |
| Cabbage | 7/24 | 16 | SELL | Men |
| Carrots | 0/24 | 25 | SELL, FS | Men |
| Pepper | 3/24 | 20 | SELL | Men |
| Cucumbers | 4/24 | 19 | SELL | Men |
| Onions | 2/24 | 23 | SELL, FS | Men |
| Trees | 23/24 | 4 | FS, SELL | Men |
| Passion fruit | 8/24 | 15 | SELL | Men |
| Peaches | 3/24 | 21 | SELL | Men |
| Avocado | 16/24 | 8 | SELL, FS | Both |
| Cattle | 17/24 | 7 | SELL, FS | Men |
| Sheep | 11/24 | 10 | SELL | Men |
| Goats | 5/24 | 18 | SELL | Men |
| Chicken (Kuku) | 22/24 | 5 | FS | Women |
| Duck | 7/24 | 17 | FS | Women |
| Rabbit | 3/24 | 22 | FS | Women |
| Pigs | 2/24 | 24 | SELL, FS | Women |

ANNEX 2

“Villages from upper land” (most participants)

| | Climate | | Resources | | | Agro activities | | | Infrastructure | | |
|--------------|---------|-------|-----------|-------|-------|-----------------|-----------------|-----------|----------------|---------|----------|
| | Rain | Temp. | Soil | Water | Trees | Crop production | Cultivated area | Livestock | Roads | Schools | Hospital |
| This year | 4 | 2 | 1 | 1 | 1 | 4 | 3 | 1 | 4 | 5 | 1 |
| Last year | 5 | 4 | 1 | 1 | 1 | 3 | 3 | 1 | 4 | 5 | 1 |
| 2 years ago | 3 | 3 | 1 | 1 | 2 | 3 | 3 | 3 | 3 | 5 | 1 |
| 10 years ago | 4 | 4 | 3 | 2 | 3 | 3 | 3 | 4 | 2 | 3 | 1 |
| 20 years ago | 1 | 3 | 4 | 3 | 4 | 4 | 4 | 4 | 1 | 2 | 1 |
| 40 years ago | 5 | 4 | 5 | 5 | 5 | 5 | 5 | 5 | 1 | 1 | 1 |

“Villages from lower land” (less participants)

| | Climate | | Resources | | | Agro activities | | | Infrastructure | | |
|--------------|---------|-------|-----------|-------|-------|-----------------|-----------------|-----------|----------------|---------|----------|
| | Rain | Temp. | Soil | Water | Trees | Crop production | Cultivated area | Livestock | Roads | Schools | Hospital |
| This year | 3 | 3 | 2 | 2 | 2 | 3 | 2 | 2 | 4 | 5 | 3 |
| Last year | 3 | 3 | 2 | 2 | 2 | 2 | 2 | 2 | 4 | 5 | 3 |
| 2 years ago | 3 | 3 | 2 | 2 | 2 | 2 | 2 | 2 | 4 | 5 | 3 |
| 10 years ago | 3 | 2 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 2 |
| 20 years ago | 4 | 4 | 3 | 4 | 4 | 4 | 4 | 3 | 2 | 2 | 1 |
| 40 years ago | 5 | 5 | 4 | 5 | 5 | 5 | 5 | 4 | 1 | 1 | 1 |