

**CGIAR Research Program on  
Climate Change, Agriculture and Food Security (CCAFS)**

**Village Baseline Study:  
Site Analysis Report for Nyando – Katuk  
Odeyo, Kenya (KE0101)**

**October 2012**

**L. Onyango, J. Mango, Z. Kurui, B. Wamubeyi, R. Orlale, E. Ouko**

**Edited by: C. Perez, W. Förch, L. Cramer**



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



## Correct citation:

Onyango L, Mango J, Kurui Z, Wamubeyi B, Orlale R, Ouko E. 2012. Village Baseline Study – Site Analysis Report for Nyando – Katuk Odeyo, Kenya (KE0101). CGIAR Research Program on Climate Change, Agriculture and Food Security (CCAFS), Copenhagen, Denmark. Available online at: [www.ccafs.cgiar.org](http://www.ccafs.cgiar.org)

Titles in this series 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 Coordinating Unit - Department of Agriculture and Ecology, Faculty of Life Sciences, University of Copenhagen, Rolighedsvej 21, DK-1958 Frederiksberg C, Denmark. Tel: +45 35331046; Email: [ccaafs@life.ku.dk](mailto:ccaafs@life.ku.dk)

Creative Commons License



This paper is licensed under a Creative Commons Attribution – NonCommercial–NoDerivs 3.0 Unported License.

Articles appearing in this publication may be freely quoted and reproduced provided the source is acknowledged. No use of this publication may be made for resale or other commercial purposes.

The tools and guidelines used for implementation of the village baseline study across all CCAFS sites, as well as the mapping outputs at a higher resolution can be accessed on our website (<http://ccaafs.cgiar.org/resources/baseline-surveys>).

© 2012 CGIAR Research Program on Climate Change, Agriculture and Food Security (CCAFS)

## DISCLAIMER:

This Paper has been prepared as an output for the baseline activities under the CCAFS program and has not been peer reviewed. Any opinions stated herein are those of the author(s) and do not necessarily reflect the policies or opinions of CCAFS.

All images remain the sole property of their source and may not be used for any purpose without written permission of the source. For higher resolution versions of any image, please contact CCAFS.

## **Abstract**

This is the report of the village baseline study of Kamuana village in the CCAFS benchmark site of Nyando, Kenya, which took place from 18 to 20 May 2011. Population pressure has created land fragmentation and reduction in the area of land that families have under cultivation. These conditions plus unpredictable rainfall patterns have reduced agricultural production but attempts to increase production have led to over-cultivation, soil exhaustion and erosion. Meanwhile, demarcation of land, private ownership and commercialization has reduced access to natural resources. Increased demand and commercialization has led to cultivation of cash crops and use of modern technology, but farming families have very limited resources. Not surprisingly, cultivated land has expanded at the expense of the area left under forest.

Eighteen out of the 19 organisations operating in the community were engaged in food security, which shows the importance and the fragility of food security in the community. The same organisations engage in times of food crisis. Twelve organisations are involved in supporting natural resources management. Radio Ramogi and Radio Lake Victoria are the most popular sources of agriculture-related information. The community primarily relies on observations of the environment for information on weather conditions.

## **Keywords**

Baseline; Kenya; village study; participatory mapping; organisations; access to information

## About the Authors

Onyango, Leah – Lecturer-Chairman-Department of Urban and Regional Planning-Maseno University, Private Bag, Maseno, Kenya

Mango, Joash – Senior Technician, ICRAF GRP 5 and East Africa region; World Agroforestry Centre, P.O. Box 2389, Kisumu, Kenya

Kurui, Zena – Estate management officer, Ministry of Housing, P.O Box 30119-00100, Nairobi, Kenya

Wamubeyi, Brian – Freelance GIS Practitioner/Consultant. P.O. Box 3613-40100, Kisumu, Kenya

Orlale, Ruth – Marketing and community participation officer, KARI (Kenya Agricultural Research Institute) P.O. Box 1490 Kisumu, Kenya

Ouko, Edward – Independent Consultant. P. O. Box 68, Sondu, Kenya

Perez, Carlos – Independent Consultant, 28 Wheeler Pl., West Nyack, NY 10994, USA

Förch, Wiebke – CCAFS science officer, Theme 4 (Integration for decision making); International Livestock Research Institute (ILRI), P.O. Box 30709, Nairobi, Kenya

Cramer, Laura – CCAFS consultant, Theme 4 (Integration for decision making); International Livestock Research Institute (ILRI), P.O. Box 30709, Nairobi, Kenya

# Contents

<b>Abstract</b> .....	<b>2</b>
<b>Keywords</b> .....	<b>2</b>
<b>About the Authors</b> .....	<b>3</b>
<b>Contents</b> .....	<b>4</b>
<b>Introduction</b> .....	<b>5</b>
<b>Data analysis</b> .....	<b>8</b>
<b>Topic 1: Community resources – participatory satellite imagery interpretation and visioning</b> .....	<b>8</b>
A. Current resources .....	8
B. Gender-differentiated comparison of current conditions.....	16
C. Major changes of resource conditions.....	17
D. Vision of the future.....	22
<b>Topic 2: Organisational landscapes</b> .....	<b>25</b>
A. Basic spheres of operation .....	25
B. Organisational landscape of food security.....	30
C. Organisational landscape of natural resource management .....	31
<b>Topic 3: Information networks</b> .....	<b>33</b>
<b>Conclusion and recommendations</b> .....	<b>34</b>
<b>Implications for CCAFS</b> .....	<b>35</b>
<b>Recommendations for major opportunities</b> .....	<b>36</b>

## Introduction

The CGIAR Research Program on Climate Change, Agriculture and Food Security (CCAFS) is a strategic ten-year partnership between the Consultative Group on International Agricultural Research (CGIAR) and the Earth System Science Partnership (ESSP) to help the developing world overcome the threats posed by a changing climate, to achieving food security, enhancing livelihoods and improving environmental management. In 2010, CCAFS embarked on a major baseline effort at household, village and organisation levels across its three target regions, namely East Africa, West Africa and South Asia (more information about CCAFS sites is available on our website <http://ccafs.cgiar.org/where-we-work>). CCAFS trained survey teams from partner organisations in the three regions to conduct the baseline.

The baseline effort consists of three components – a household survey, village study and organisational survey. The household baseline survey, a quantitative questionnaire on basic indicators of welfare, information sources, livelihood/agriculture/natural resource management strategies, needs and uses of climate and agricultural-related information and current risk management, mitigation and adaptation practices, was implemented by CCAFS partners in 35 sites (245 villages) with nearly 5,000 households in 12 countries to date. CCAFS partners are implementing village baseline studies (VBS) and organisational surveys in one out of the seven villages within each CCAFS site where the household survey was implemented. The plan is to revisit these villages in roughly 5 years, and again in 10 years, to monitor what changes have occurred since the baseline was carried out. The goal is not to attribute these changes to the program, but to be able to assess what kinds of changes have occurred and whether these changes are helping villages adapt to, and mitigate, climate change.

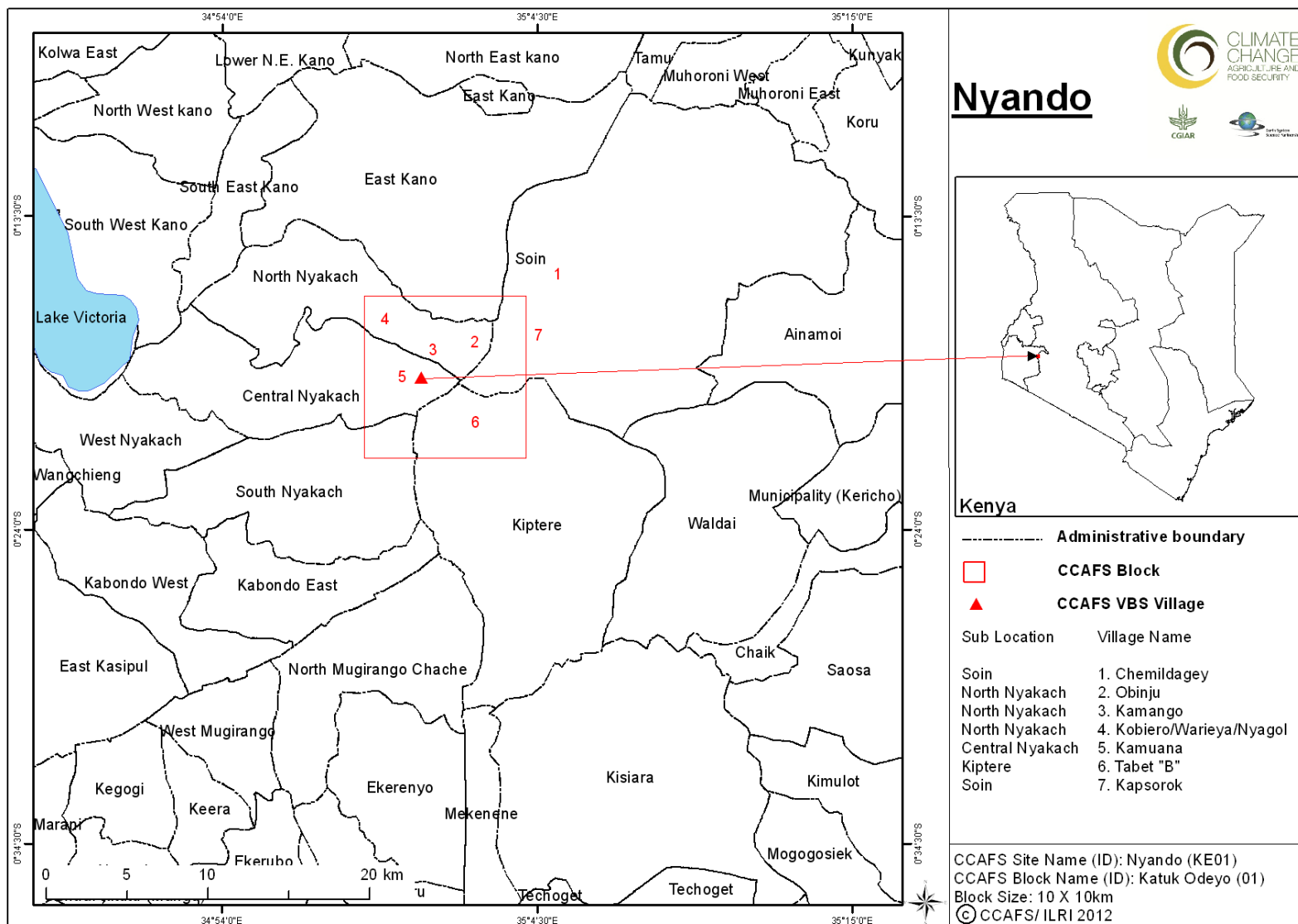
The focus of this site analysis report is the village baseline study (VBS). To date, fifteen VBS were conducted in the three CCAFS regions. The VBS aims to provide baseline information at the village level about some basic indicators of natural resource utilisation, organisational landscapes, information networks for weather and agricultural information, as well as mitigation baseline information, which can be compared across sites and monitored over time.

The objectives of the village baseline study are to:

- Provide indicators to allow us to monitor changes in these villages over time. In particular, changes that allow people to
  - Manage current climate risks,
  - Adapt to long-run climate change, and
  - Reduce/mitigate greenhouse gas emissions
- Understand the enabling environment that mediates certain practices and behaviours and creates constraints and opportunities (policies, institutions, infrastructure, information and services) for communities to respond to change
- Explore social differentiation:
  - Perceptions of women and men will be gathered separately to be able to present different gender perspectives.
  - Focus group participants will be selected to present perceptions of groups differentiated by age.

The detailed tools and guidelines used for the implementation of the village baseline study across all CCAFS sites, as well as the manuals, data and analysis reports can be accessed on our website (<http://ccafs.cgiar.org/resources/baseline-surveys>).

Map 1. Location of the Kamuana village in the CCAFS benchmark Nyando site, Kenya



This report presents the results of the Village Baseline Study (VBS) conducted on May 18-20, 2011 in the village of Kamuana, Kenya (Nyando site) (Map 1). The village's geocoordinates are -0.315; 35.011. Kamuana was chosen for the baseline survey because of its relative central location in the block, among other criteria. There is reasonable accessibility to the village although the roads can be difficult to navigate in the event of heavy rain. The survey team arranged a visit to the village to prepare for the fieldwork. The team was composed of two facilitators, two note takers, two translators and one site coordinator. Each pair was male and female. The team consulted with the village authorities concerning the time and place of meeting. It selected a hall belonging to a local CBO called FOKODEP for the women's meeting, and an empty shop for the men's meeting. Both meetings took place in Store Pamba, a shopping centre within the village.

The site coordinator sent out invitations to sets of participants who were chosen using random sampling. Each group was composed of 15 participants, men and women respectively. Three consecutive days were selected for the survey and on each day only one set of participants were expected to participate in the survey. On the first day of the survey the whole community was invited to participate in an introductory session where the team explained the survey to them and shared with them the results of an earlier household survey. After the introductory session the rest of the community was set free and only the invited group of 15 men and 15 women remained to carry on with the survey. The whole community was again invited at the end of the third day to attend a debriefing session where a summary of the findings was shared.

The survey used participatory methods of data collection. Throughout the data collection process groups of male and female members of the community worked separately. The team used a satellite image of the block and worked with each group to identify and map/sketch resources that are important to the community, their current state, past state and what caused the changes. The outputs were maps and sketches. The process of working with the community to identify the resources that are important to them depended entirely on how well they are able to understand and interpret the image.

The task on day 2 was to work with each group to understand the organisational landscape and the links that exist in relation to food security in a normal year, in a year of crisis, and in relation to natural resource management. The outputs were diagrams showing the organisational landscape. Information on each organisation was also captured in cards.

There were two main tasks on day 3. The first task was to work with each group to understand information networks in relation to weather issues and farming activities. The outputs were diagrams. The second task was to bring the male and female groups together and generate a vision of what the community would like their village to be in the future. The output was a map/sketch showing "the vision of the community."

Information generated from the survey was captured on sketches, maps, flip charts, information cards and notes. All these needed to be brought together in one debriefing report from which this final report is written. The debriefing report was prepared in the field so that it could benefit from the presence of the site team. The photographed sketches and maps were inserted in the debriefing report. In this site analysis report proper maps and diagrams derived from the field outputs replaced them.



## Data analysis

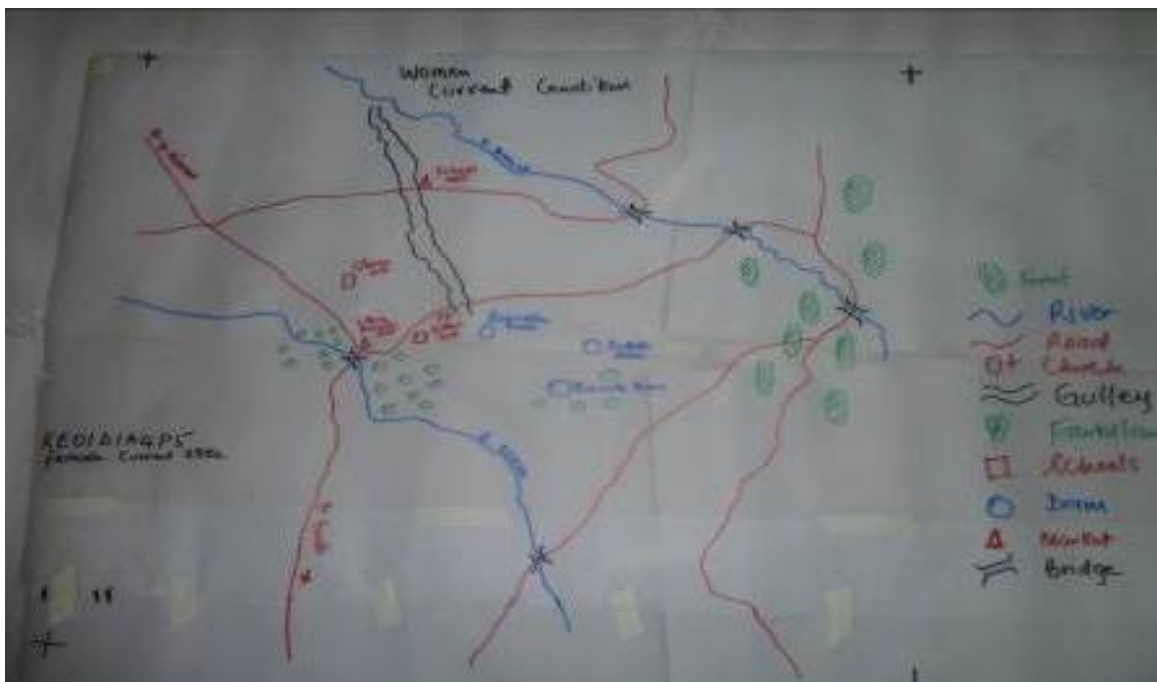
### Topic 1: Community resources - participatory satellite imagery interpretation and visioning

Community infrastructure and resources and gender-differentiated access and utilisation of those resources have been analysed, based on a process of participatory visual interpretation of high resolution satellite imagery (RapidEye). The aim was to create a basic understanding of existing community resources, as well as of community dynamics in relation to its environment. The participants discussed the current state of those resources, in terms of quality, access, management, history and potential drivers of change. Later on, a mixed group developed an image of village resources and human well-being into 2030 to understand opportunities, constraints and aspirations for the future. The detailed approach to this exercise is outlined in the CCAFS Village Baseline Study Implementation Manual (follow the link to the baseline study from our website <http://ccafs.cgiar.org/resources/baseline-surveys>).

#### A. Current resources

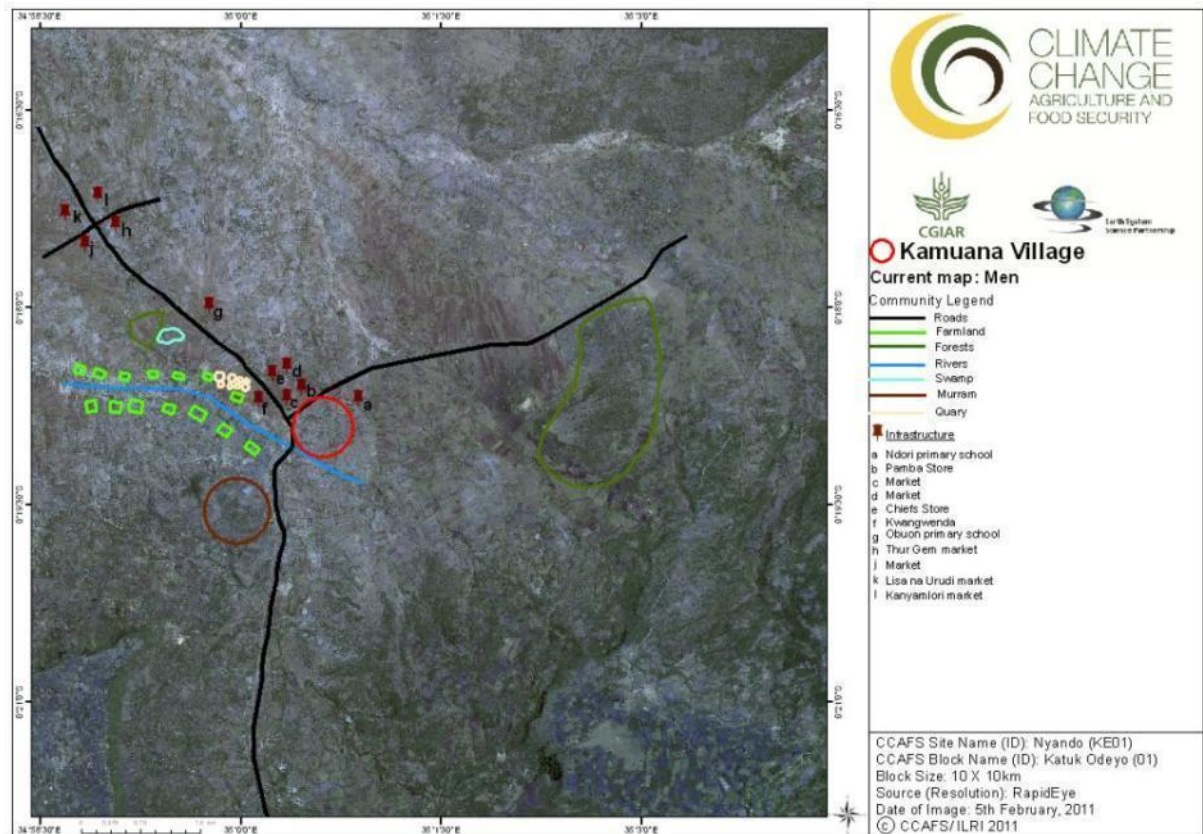
Separate meetings of male and female participants took place in Store Pamba market centre. The groups drew maps on the ground with the natural resources and infrastructure in the village. The research team transferred the maps onto flipcharts (Photo 1), and later on showed a satellite image to the groups. It took the participants less than 5 minutes to get their bearing on the satellite imagery and relate it with their own drawing of their village. The tarmac road from Kisumu to Sondu was clearly visible in the satellite image, as were other features like rooftops, farmland, forest and streams/rivers. The women started getting their bearing from finding Store Pamba market in addition to the road.

Photo 1. Current conditions mentioned by women regarding natural resources and infrastructure



Maps 2 and 3 represent the current conditions in the community regarding natural resources (water, forest, grazing, farmland, degraded land) and infrastructure (roads, markets, education, health) according to, respectively, male and female participants. The maps lay out information prepared by the community participants super-imposed on a satellite image.

Map 2. Men's map of current community resources



Map 3. Women's map of current community resources

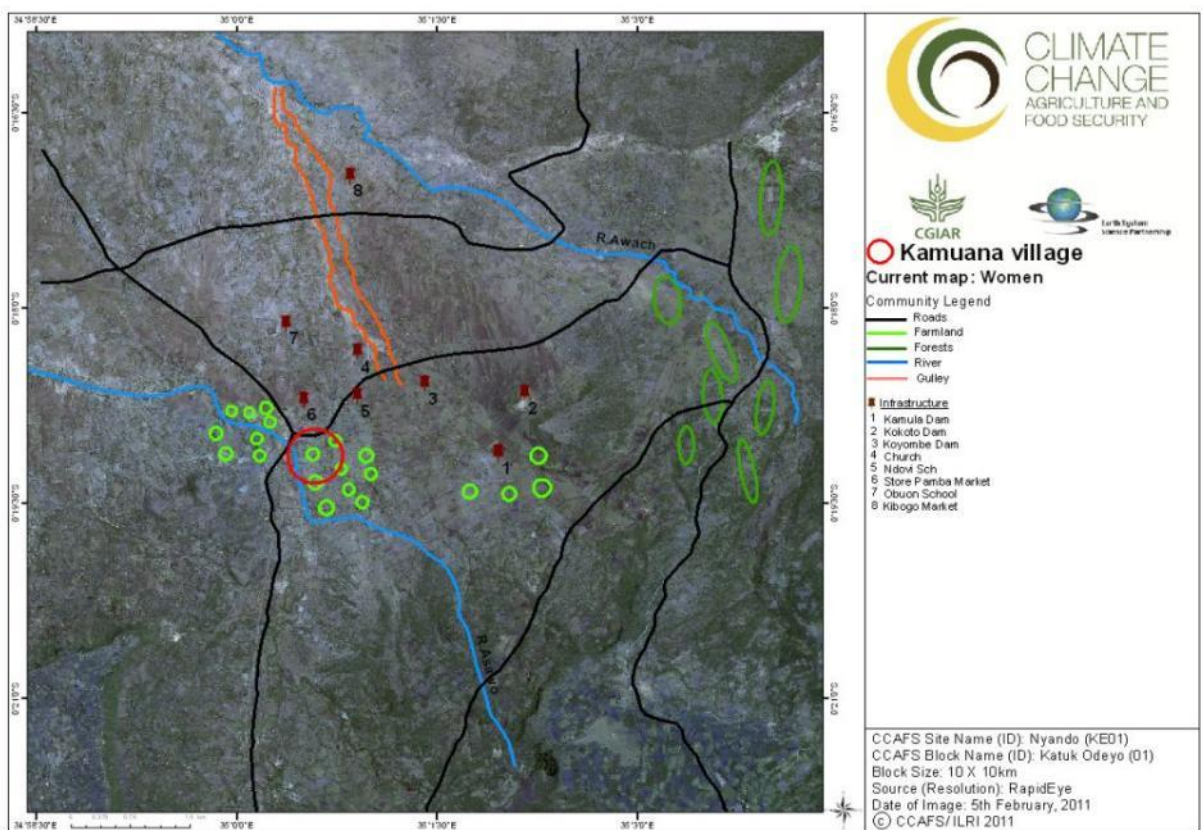


Table 1. Summary for Layer 1: current conditions, as perceived by men (M) and women (F)

Land cover class	Community determined land use	Location Names	Current state (quality)	Time to resource	Management and ownership issues	Environmental Benefits	Opportunities	Limitations
<b>Forest (M)</b>	Charcoal burning, house construction and firewood collection (for some men)	Bungu Obel	Most of forest has been converted to farmland	1 hour on foot	On individual farms of neighbouring Kipsigis community. Need permission from owner for forest exploitation	Believed to be a source of rainfall	Fuel wood and construction	Farm owner restrictions
<b>Forest (F)</b>	Firewood for domestic use	Kapsorok	Village have no bushes/trees for firewood. They pay Ksh 20/day and collect firewood from assigned land. Some sell at Sondu market.	1 hour to Kajalango forest	Owned and controlled by Kalenjin community		Soil and water conservation Increases soil fertility Attracts rainfall	
<b>Rivers (M)</b>	Harvesting of sand and stones for building. Fishing	Asawo	Rivers get sediment during the rainy seasons.	20-30 min on foot depending on distance from home Some go with bicycles	Resource for all and therefore no specific responsibility. Some even dump dog carcass in river		Water to drink, animals, domestic use. Source of fish, self-employment, sand harvesting, irrigation (fruits, potatoes, tomatoes)	Free range grazing Laziness leading to under-utilization of the water
<b>Rivers (F)</b>	Water for home use, bathing, livestock, irrigation of vegetables along river. Source of pottery clay.	River Asawo, River Awach	Water from the river is not clean for domestic use. Water level is low.	10 min by foot to R. Asawo	Owned and controlled by the community		Water is available. Source of pipe water	Water from river is not clean, one has treating costs. During dry season water levels are low

<b>Land cover class</b>	<b>Community determined land use</b>	<b>Location Names</b>	<b>Current state (quality)</b>	<b>Time to resource</b>	<b>Management and ownership issues</b>	<b>Environmental Benefits</b>	<b>Opportunities</b>	<b>Limitations</b>
<b>Wetland (M)</b>	Grazing land during dry spells. Salt licks for livestock. De-wormer and for removing livestock placenta. Cooking to soften food.	Kamuana village	Active wetland. It has an unreachable spot in it that is dangerous to human life.	5 minutes on foot	Private farm (Ayako Omwandho); One needs permission from landowner to graze cattle but not for rest of activities. Owner checks its use.	Research has been done. Community not clear yet on benefits.	The hotspot makes it inaccessible	
<b>Water pans ("Dams") (F)</b>	Bathing, water for livestock. Irrigation of horticultural crops and tree nurseries. Collect water that otherwise would cause erosion and flooding.	Kamula Kokoto, Koyombe	Agriculture is done around the place. The "dam committee" cleans silting frequently.		Controlled by "dam committee" who are members of community. Owned by the community	Control of soil erosion and flooding Water conserving.	Water is made available for agriculture and livestock.	
<b>Degraded land (F)</b>	Gully		The gully is branching. It is huge and ugly, and dangerous to human and livestock lives	Not far from the village			Sand harvesting by the nearby village.	Disrupts movement, destroys houses, roads and graves. Not passable in rainy season, washes away soil and fields. Threat to children, livestock.
<b>Murram (M)</b>	House and road construction	Onyuongo	Murram in widely available	20 minutes on foot from Kamuana village	On individual, land. Owner manages and decides on use of resource, but farmers use it secretly when owner is absent.		Source of income from construction companies and the government	

Land cover class	Community determined land use	Location Names	Current state (quality)	Time to resource	Management and ownership issues	Environmental Benefits	Opportunities	Limitations
<b>Quarry (M)</b>	Ballast for construction Stones for building houses	Kamuana village	The rocks are plenty and cannot be overexploited that easily	30 minutes to other farms	On individual farms; accessible to all; No laws barring/limiting use of quarry resources	Rocks/stones control soil erosion where they exist. Stone lines can check soil erosion	Cheaper construction since materials are available on farm. Self-employment (sale of stones)	
<b>Farmland (M)</b>	Farming of maize, sorghum, groundnuts, millet, potatoes, beans, cowpeas, trees, cotton, vegetables.	Kamuana village	Low soil fertility	30 minutes maximum on foot.	Private farms and not often leased. Originally got management support from the Ministry of Agriculture.	Trees on farmlands bring rainfall	Food Trees	Poor farming practices. Erosion of top soil leaving hard pans. Over-mining of soils, no nutrient restocking.
<b>Farmland (F)</b>	Grow horticultural crops (tomatoes, vegetables)	In the village	Size of 1.5 acres	15 min			Food production	Low soil fertility
<b>Roads (M)</b>		Kisumu-Kisii Kamuana Kanyamlori	Poor good condition, e.g., the Kamuana road is cut off by a very big Katuk Odeyo gully. Most of the other roads are pot holed	Less than 5 minutes by foot	Government owned though now neglected		Transport of farm produce and the dead. Communication, access to village. Linking communities	
<b>Roads (F)</b>		Kisumu-Kisii road	Main road from Kisumu and passes through Store Pamba market. In good condition (tarmac road). Most important.	5 min	Central government does repairs.			Current high prices increase transport cost

Land cover class	Community determined land use	Location Names	Current state (quality)	Time to resource	Management and ownership issues	Environmental Benefits	Opportunities	Limitations
Roads (F)		Store Pamba –Kapsorok road	Not in good condition, murrum road. It has been interfered by the gully.		Government does repairs.		If gully can be closed, it will connect road to Kericho town.	
Roads (F)		Kibogo-Kapsorok road	Gully cuts the road at some point.		Repairs done by government.			
Market centres (M)		Kanyamlori Store Pamba	Expanding with time	30 min on foot to Store Pamba, 1 hour to Kanyamlori on foot, 5 min by car	Villagers	Sources of household products	Markets for goods. Employment	Markets not under local authority. Lack of houses to rent, factories to work. Low incomes
Market (F)		Store Pamba market	Local market where people buy and sell few items	5 min on foot				Few traders compared to Sondu
Market (F)		Kibogo market	Main market for firewood, permanent buildings, sale of vegetables, food items, second hand clothes, pots and baskets.					
Health centre (F)		Kibogo	They get basic services only.		Government institution.			
Water (F)	Tap water for human and livestock.		Available only in few homes (20%), not reliable, sometimes dry for 2 weeks. Cost 2ksh/20ltrs, some people fetch water illegally.		Some village households own it.		Water availability.	Not reliable and costly.

Land cover class	Community determined land use	Location Names	Current state (quality)	Time to resource	Management and ownership issues	Environmental Benefits	Opportunities	Limitations
<b>Bridge (F)</b>		Kibogo, Store Pamba	There are bridges on river Asawa after Store Pamba, R. Awach crossing Store Pamba-Kapsorok road.					
<b>Schools (F)</b>		Primary: Ndori, Aasawo, Obuom, Ndori secondary	The schools are not far from the village and their children get access to education.		Owned by government		Provide education thus reduce illiteracy level	Poor facilities in the schools
<b>Settlements (F)</b>		Kajulu, Kaouta, Kandong	The homes are arranged in Luo traditional set up.					

Male and female participants provided the following information on their community's resources, including infrastructure (building on Table 1).

**Rivers** - The community lives between two rivers, Asawo and Awach. The rivers are the main source of water but water quality is bad. The rivers provide the community with water for domestic use, watering livestock, sand harvesting and clay for pottery. The river is often used as a dumping ground, which pollutes the water. Traditional beliefs dictate that no one should be denied water, which promotes open access to the river and its resources. The river is a very important resource for the community but it is generally taken for granted and there are no organised efforts to manage or conserve the resource.

**Water pans (locally called "Dams")** - Within the community there are several water pans or ponds that were constructed by the government primarily as soil and water conservation structures. The pans provide the community with water for domestic use, watering livestock and irrigation horticulture. Each pan has a management committee, whose responsibilities include de-silting the pan, repairing the pan walls and regulating use. The pans attract the attention of both the community and other stakeholders who came to the area to implement different aspects of development. There are many community activities centred on the pans, and there are several initiatives to manage and maintain them. The community are aware that too much surface flow is one factor that contributes to erosion and gully development in the area. They have been informed that the pans play an important role in reducing surface flow by collecting and storing surface runoff.

**Wetland** - There is wetland within the village, which falls within an individual's land holding. The wetland provides pasture for livestock during the dry season. It also serves as a salt lick providing mineral salts to livestock. The water from the wetland contains some form of bicarbonate and is used for cooking in order to soften food quickly. There are parts of the swamp that manifest characteristics similar to bogs/quick sands and pose a danger. The owner monitors the wetland and those seeking to use the pastures within must obtain his permission. The swamp covers a small area and it is not considered a resource of great significance to the community. However the bog/quick sands present an interesting phenomenon that has potential to attract tourists and researchers. The local people refer to it as "the soils that breathe."

**Forest** - There are no forests within the village, and the tree population in the community is very low. The closest forest is referred to as "Bungu Obel". The community collects firewood, burns charcoal and gathers building materials from the forests, but depend heavily on the neighbouring Kipsigis community for their supply of wood fuel. Some form of permission must be negotiated with the neighbouring community/individuals before the forests/tree resources are exploited. The community believes that the forests attract rain and their loss would therefore lead to reduced rainfall in the community. The community rely almost exclusively on wood fuel as a source of energy for cooking. Many households purchase wood fuel in the market, which is not common in most of rural Kenya and is an indicator of environmental stress.

**Farmland** - The community cultivates land within the village and produces crops such as maize, sorghum, groundnuts, millet, potatoes, beans, cowpeas, trees, cotton and vegetables. The farmland is characterized by low soil fertility and poor farming practices. Farming in the village is constrained by low income, low rainfalls, high cost of farm implements and lack of seeds which, when available, are too expensive. Every household is engaged in cultivation regardless of the low yields. There have been efforts by the Ministry of Agriculture and other development agencies to work with the community towards improving agricultural production but the community still speaks of reducing yields. Other livelihood activities of the community include basketry, business (firewood, fish, food products) and pottery.

**Degraded land** - Although the whole area is prone to gully formation due to the nature of its soils, in the village there is a big gully called "Katuk Odeyo Gully" which is a big problem to the community. The gully is very deep and continues to spread. The community says it poses a danger to both people and livestock. Many organisations have visited the main gully and worked on it but the community says the gully is still growing. Apart from the main gully there are many smaller gullies in the region.



**Quarries** - There are rocky areas in the community and these are exploited to produce ballast for construction and stones for building houses. The rocks are on individual farms and there are no laws/restrictions limiting their exploitation. They provide cheap construction materials and create employment.

**Gravel** - There are gravel soils in some parts of Onyuongo, which is a neighbouring village. The gravel is used for construction of roads and housing. Excavating and loading the gravel provides employment in the area. However this activity scars the landscape and exposes the soils to agents of erosion. It also creates pits where water collects and poses a hazard to people and livestock while providing a breeding ground for mosquitoes.

**Markets** – Kanyamlori, Store Pamba and Kibogo are market centres where the community obtains household items and markets their goods and services. They are all small shopping centres under the local authority. Kibogo market is the main market because of the high number of buyers.

**Schools** – There are no schools in the village, however schools are not far from it, and include Ndori primary, Asawo primary, Obuom primary and Ndori secondary.

**Health centre** – The community goes to a public health centre at Kibogo where they get treatment and take children for immunization. The centre does not have facilities to admit patients or treat any serious illness.

**Roads** - The main road from Kisumu to Kisii passes through Store Pamba market. It is a tarmac road and the most important road to the community because it connects the area to other regions where they trade and obtain higher-level services. The Store Pamba to Kapsorok road and the Kibogo to Kapsorok road are both murram roads. The bridge near Kibogo has been damaged by the gully, and another cuts off the road near Store Pamba. Other smaller feeder roads are also at risk of destruction by gullies because the soil in the area is sodic and crumbles easily, thus forming gullies. The costs of goods tend to increase when the roads are bad because transporters charge higher rates. This has a negative impact on business in the community.

**Piped water** - The community is supplied with water from the Nyakach water supply. The water is clean but the supply is not regular because the pipes break frequently and water pumps do not run constantly due to power shortages.

## **B. Gender-differentiated comparison of current conditions**

A comparison of male and female groups' responses reveals commonalities and differences.

**Rivers** - Men and women identified different uses for rivers resources. Among the uses, men highlighted sand harvesting and fishing while women emphasized water for domestic use, watering livestock, irrigation along the river (horticulture crops), bathing and a source of pottery clay. The women also identified the water pans as important resources to the community. The men viewed the river resources from an income generation point of view whereas the women tend to view it as a source of subsistence.

**Forest** - Only women mentioned fuelwood as an important forest resource and discussed details of where it was collected in the neighbouring community and the conditions that had to meet. The women collected firewood for both domestic use and also for sale in the nearby markets. The men, on the other hand, mentioned charcoal burning and construction materials as important forest resources. These are activities dominated by men in the community.

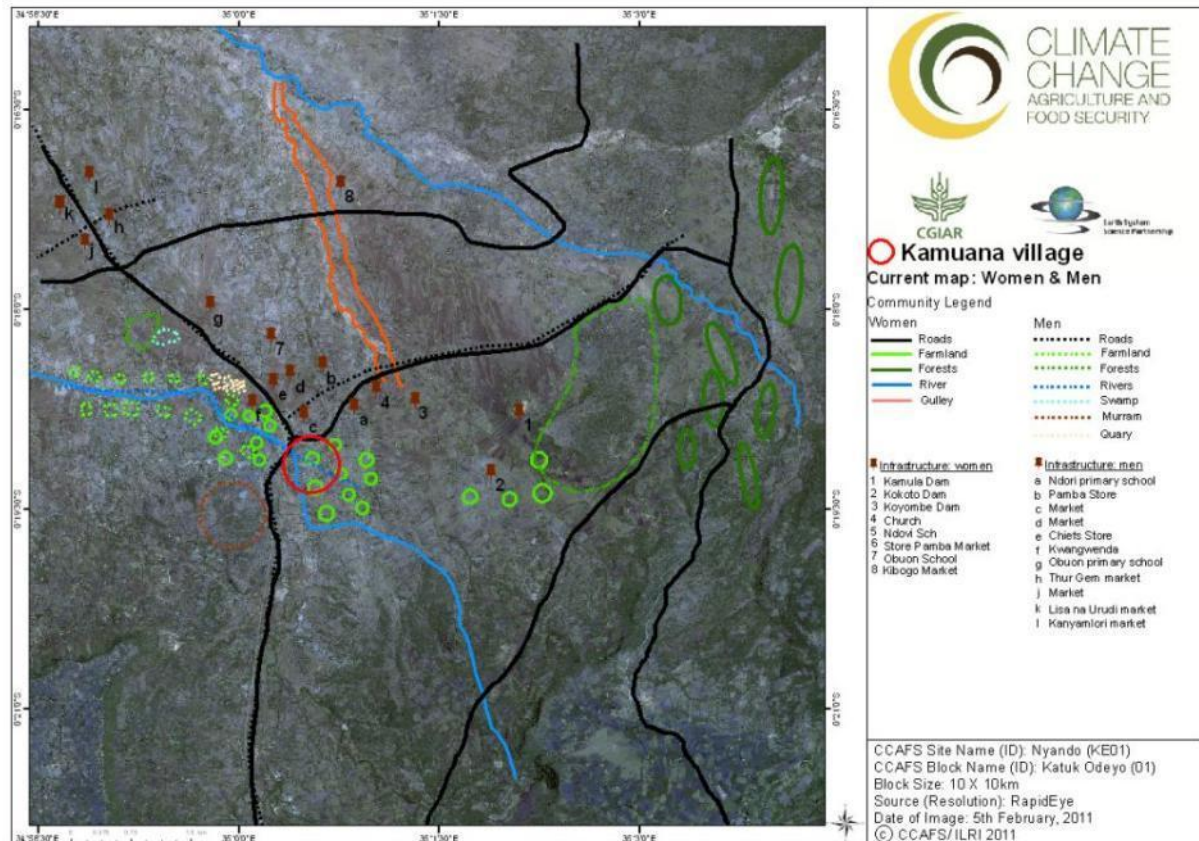
**Infrastructure** - The men gave a more detailed account of roads, while the women gave more details about markets, health and educational services.

**Farmland** - The women talked of soil infertility and unreliable rainfall, which they linked to reduced yields, as the main problems facing them in relation to farming. Reduced yields are manifested in the fact that there is nothing to store in the granary since the output is so meagre and is quickly consumed. As a result, women no longer have granaries. The men, on the other hand, went into a detailed discussion on poor farming practices that have led to reductions in soil fertility.

**Stone and murrum (gravel) quarrying** - Men and the women mentioned these activities, but men dominate quarrying.

**Degraded land** - The women mentioned the Katuk Odeyo gully as an example of degraded landscape. This gully covers a very large area and poses danger to the community.

Map 4. Overlay of current conditions, comparing men’s and women’s maps



### C. Major changes of resource conditions

Maps 5 and 6, and Table 2, show the most relevant changes in community resources as expressed by male and female participants. From their perspective, in the past there were bigger forests that had wildlife such as leopards. Wildlife has since disappeared. River water was clean with low levels of sedimentation. There were no water pans (“dams”). There were spots where clay was collected for making pottery. Big thorny trees composed riverine vegetation and created beautiful scenery. There was only one major road, which was murrum, and only two vehicles served the population along the route. There was less land under cultivation and yields were high. Farmers made extensive use of traditional methods of production and storage, and did not cultivate cash crops. These conditions changed, and the general perception was that natural resources deteriorated in the community.

Participants identified several drivers of change pertaining to the community resources. In reference to forest resources, population pressure was arguably the most important driver of change. Population pressure created the need to expand cultivated fields while increasing the demand for construction material and particularly fuelwood, as the community relies entirely on fuelwood for domestic energy. Compounding the effects, commercialization of the economy increased the pace of change in resource use and deforestation. In the past the community did not sell or purchase fuelwood but today they do. As a result, the area left under forest has considerably decreased. Reduced rainfall has led to slower natural regeneration of forests.

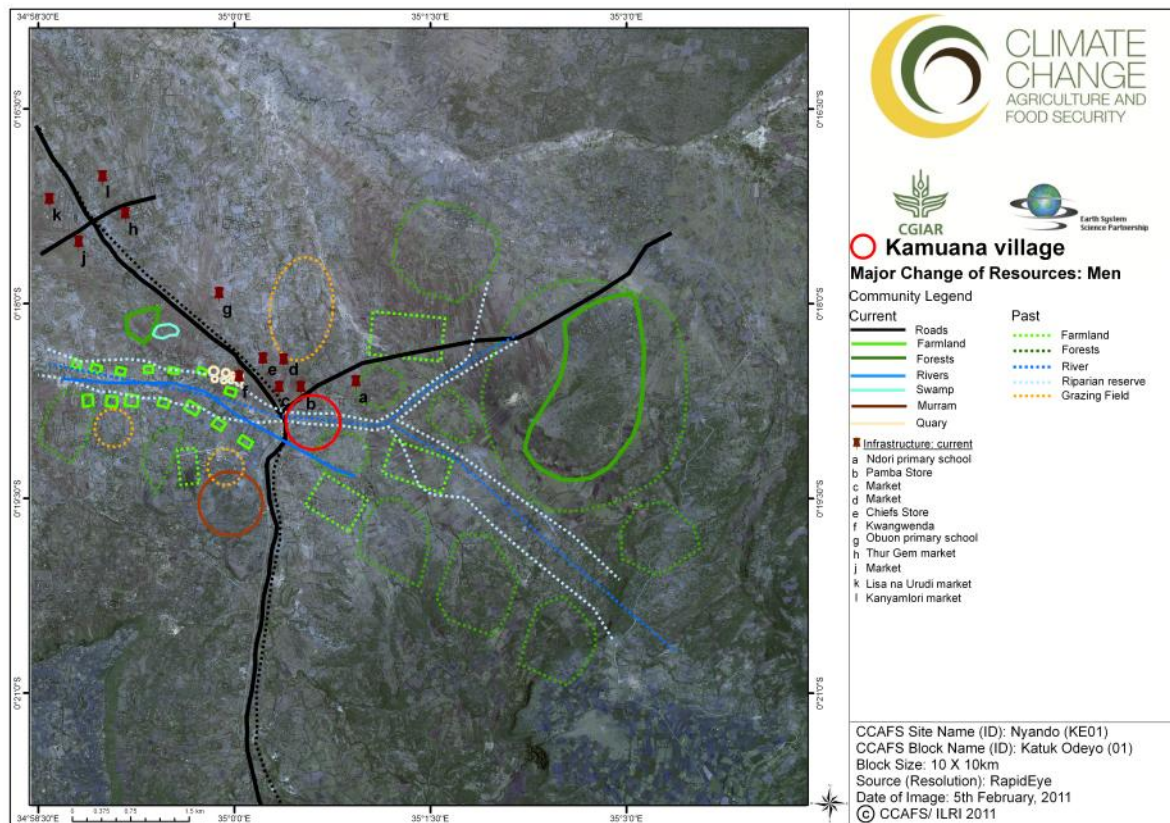
Regarding river resources, participants said that human population pressure resulted in the unrestricted cutting of trees in the riparian corridor as well as the cultivation of the riverbanks. These

changes in turn led to increasingly higher levels of siltation in the river system, but drought prevented fast growth of riparian vegetation. Meanwhile, demarcation of land, private ownership and commercialization of resources made it difficult to access clay for pottery that previously was freely available on the riverbanks.

An increasing population required more food but also more land to be distributed. All of this contributed to major changes in farmland including land fragmentation and over-cultivation of the actual area under cultivation. Attempts to increase production under these conditions led to soil fertility depletion and erosion, and ultimately a steady decrease in yields. In turn, lower yields led to expansion of land under cultivation via encroachment of virgin land. Unpredictable rainfall patterns also reduced agricultural production. Increased demand and commercialization led to cultivation of cash crops and use of modern technology.

Participants expressed that increases in population and use in the road network were matched with increments in government investment in road construction. Likewise, increased demand for transport services led to more private investments in transport.

Map 5. Major changes in resources (comparing past and present) for men



Map 6. Major changes in resources (comparing past and present) for women

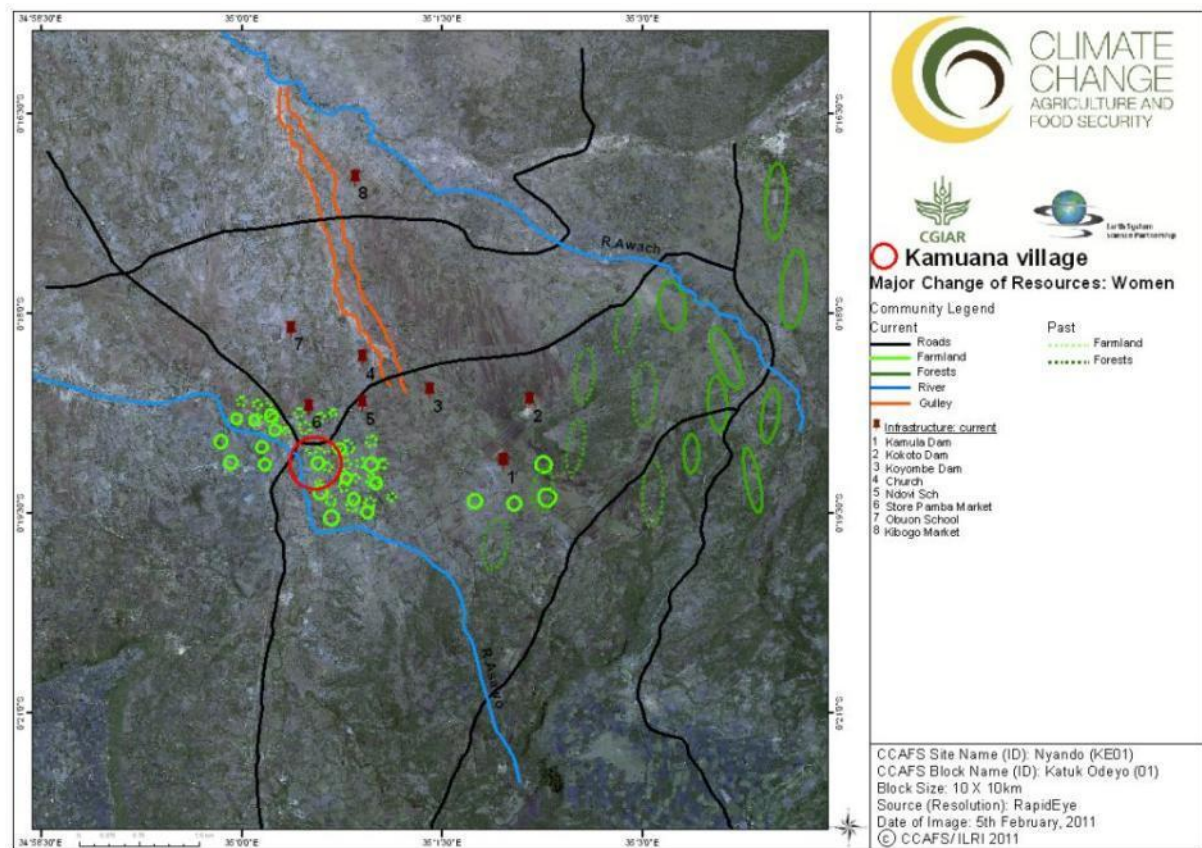


Table 2. Major changes and drivers of change in the last 10 years, as perceived by men (M) and women (F)

Land cover class	Community determined land use	Location Names	Past state (quality)	Time to resource	Drivers of change	Management and ownership issues	Environmental Benefits
<b>Forest (M)</b>	Wild fruits Bush meat	Bungu Obel	Bigger in size. It had wildlife, e.g. leopards.	1 hour on foot.	Population pressure through increased charcoal burning and construction.	Had no owner since land had not been demarcated. Forests were feared since they had wild animals. Rangers chased those who neared the forests. It was free for all when it came to grazing, hunting and cutting trees.	Plenty of rainfall then. Plenty of pasture for livestock. Fertile soils on their farms hence plenty of food.
<b>Forest (F)</b>	Fetch firewood		Never used to buy firewood or went to nearby community for firewood. It was locally available.	Within the village	Deforestation, drought		Forest brings rainfall, control soil erosion, improve soil fertility
<b>River (M)</b>	Source of water	Asawo Luanda	Big thorny riverine trees. Had spots for collecting clay for pottery that were bartered. Had sediment during rains but then reverted to clean water.	20 minutes on foot	Cutting of trees. Land demarcation. Ploughing in riverbanks leads to siltation.	Free for all	The riverine trees held soil firmly along the banks.
<b>River (F)</b>	Water for human and livestock consumption, bathing, irrigation.	R. Asawo, R. Awach	There were vegetation, trees along river. More water in river. Never destroyed lands as now. Farmers used to do a lot of fishing. Pottery used clay soils along the river.	Close by	Drought and people's old age, sickness impacted on pottery. Makers don't pass skill to new generation	The river was owned by the community and people used to collect clay to make pots.	
<b>Riverine vegetation (M)</b>		Asawo Luanda	Was a beautiful scenery	20-30 minutes to the river	Uncontrolled deforestation. Population pressure leads to more construction. Lack of work led to exploitation of forests.	Free for all	

Land cover class	Community determined land use	Location Names	Past state (quality)	Time to resource	Drivers of change	Management and ownership issues	Environmental Benefits
<b>Trees (M)</b>		Kamuana village	There were more trees than at present. Plenty of grazing land.		Encroachment into virgin lands for cultivation. Unclear land demarcation.	Free for all with no control on use.	
<b>Roads (M)</b>		Kisumu-Kisii	No tarmac but had murrum.		Access to formal education leads to new technologies.	Owned and maintained by the government.	
<b>Roads (F)</b>		Kisumu-Kisii road	There was one major road, two vehicles used to operate on route. Few traders using road, people hiked to market.		More people invest in transport. Population increase, shift in activities.		
<b>Roads (F)</b>		Store pamba-kapsorok	Road used to go through to Kericho town before destruction by gully.		Gully erosion		
<b>Water pans ("Dams") (F)</b>	Water for livestock and irrigation.	Okote, kamula, koyombe	Never existed	Close by	Lack of water. Government intervention to solve water problem		Control soil erosion, water conservation.
<b>Schools (F)</b>		Ndori primary	This was the only school in the village.	5 min	Rise in population.		
<b>Market (F)</b>		Store Pamba	It was a sisal collection point.	In the village	More activities came up		
<b>Farmland (M)</b>	Sorghum	Kamuana village	Bumper harvests with healthy outputs.		Soil erosion. Unpredictable rainfall, Land fragmentation lead to smaller arable land and loss of soil fertility.	Communal with no control.	
<b>Farmland (F)</b>	Growing cash and food crops	In the village and along the river.	The harvest was larger. They even had granaries, and grinding stones to grind maize/sorghum. Soils were more fertile, farm size was large, and there was less soil erosion.	Close	Drought. People use commercial mills. Old milling skill not known by new generation. In-fertile soil, population increase, low rainfall, high cost of living.		

## D. Vision of the future

With a mixed group of men and women, the goal was to develop an image of village resources and human wellbeing into 2030 to understand the opportunities and constraints, as well as aspirations for the future. This exercise built upon all the work completed in the previous sessions. In addition, the exercise took into account the photographs of the landscape, including things they are proud of and things that need to be improved upon in the future, that a group of young people had produced following instructions given on day 1.

In the section below we include the map that encapsulates Kamuana village's vision of the future (Map 7). We also include a few of the photographs taken by the youth. These images operationalize the collective vision of the future.

Map 7. Future map of the community

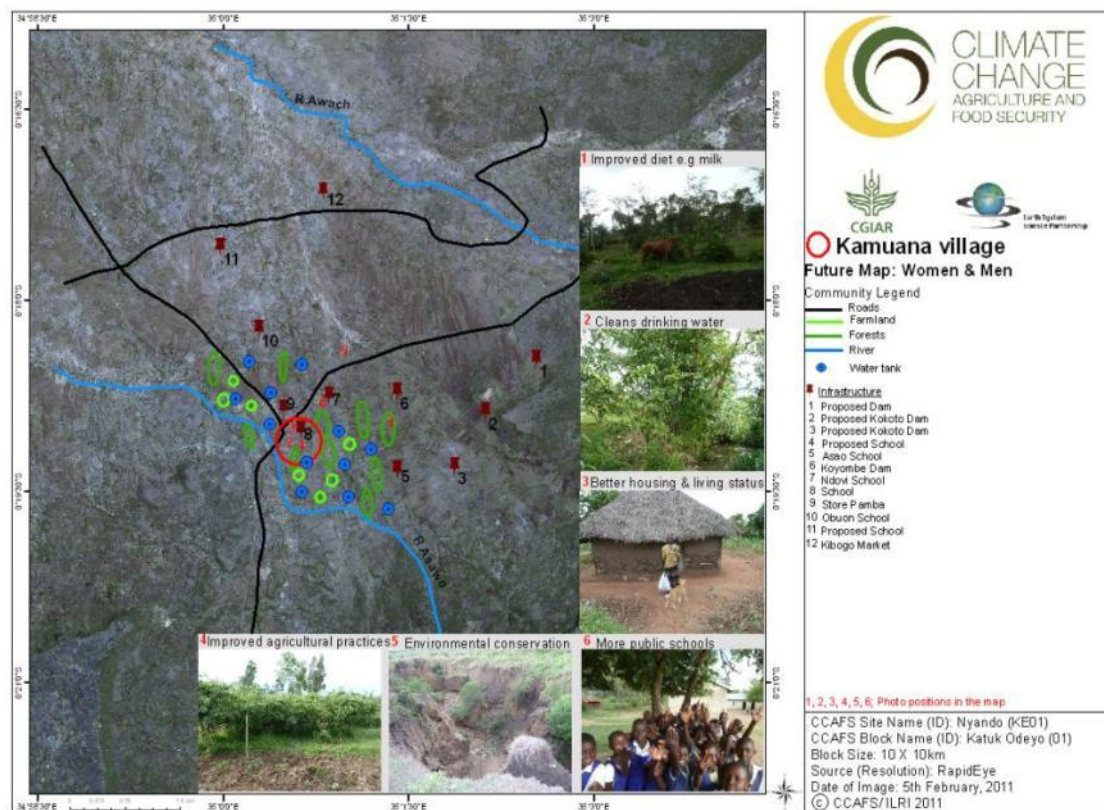


Table 3. Vision of the future

Items from the 2 map legends	Preferred condition for 2030	Opportunities	Constraints	Organisations to involve
<b>Forest</b>	There is a forest in their village, and they no longer depend on firewood from neighbouring community. Trees have been planted in homestead and along the river.	-Environmental conservation, -Timber -Firewood	-Low rainfall -Weak soils -Small farm sizes	KARI, ICRAF, Government ministries such as agriculture, NEMA, local CBOs
<b>Farmlands</b>	They produce high yields from their farms, and do farming as a business. They use new technologies (certified seeds, irrigation, crop rotation).	-Increased food production. -Soil conservation. -More food variety. -Food security.	-Extreme weather conditions. -High prices of fuel. -Poverty. -HIV/AIDS prevalence in the area.	Ministry of agriculture, KARI, ICRAF, local CBOs
<b>River</b>	Have trees along the riverbanks.	-Control of soil erosion	-River banks are on private land so they must work with the land owner	NEMA, KARI, ICRAF, FOKO, local CBOs
<b>Gully</b>	The community has controlled the gully.	-Lessons on environmental management. Others can learn from what has gone on the gully	-Tree planting does not appear to be a solution since they have done it in past and gully is still expanding. They need other options.	Government and its agencies, research & development organisations.
<b>Road</b>	Road to Kapsorok has been repaired, and other roads have been improved. Presently Kapsorok road is not passable “even to chicken and dogs.”	-Road will open up development in the village. -Fast transfer of information.	Gully erosion.	Ministry of road, CDF, NGOs, development partners.
<b>Schools</b>	They have a public primary school at Store Pamba. Ndori secondary school has been upgraded to boarding school. Another secondary school established at Onyuongo.	-Access to education by their children. -Supplementary activities shall come up in the village. -Job opportunities.	-Poverty. -Funds.	Ministry of education, CDF, NGOs, development partners
<b>Market</b>	Store Pamba has an open market with a designated market day. A public toilet and a resource centre serve this market.	-Development of the area. -Better services. -Job opportunities.		Local government, business partners, trade unions, community.
<b>Hospital</b>	There is a health centre at Store Pamba.	-Reduced distance to health services. -Job opportunities.		Ministry of health, CDF, NGOs.
<b>Water</b>	Source of clean water in the village. Water points distributed across several areas serve the community.	-Availability of clean water. -Women will not spend much time to look for water. -Save money.	There are not many organisations working on water development in the village	Development partners



We present below a discussion of the major constraints and opportunities for the vision of the future that has been presented in Table 3.

**Forests.** Constraints - Low rainfall constrains the growth of trees/forests. Small farm sizes restrict the area that can be under tree cover. There is no public land on which to plant public forests within the community. Opportunities - Forests within the community will contribute to environmental conservation. Trees incorporated on the farm in agro forestry systems and woodlots will reduce dependency on the neighbouring community as the only source of timber and wood fuel.

**Farmland.** Constraints - Extreme weather conditions increase vulnerability to crop failure. High prices of fuel increase the cost of production. High levels of Poverty and HIV/AIDS prevalence in the area compromise the community's ability to participate in agriculture. Opportunities - The use of modern technology and certified seeds will provide them with an opportunity to increased food production and expand food variety. The practice of crop rotation will improve soil conservation.

**Rivers.** Constraints -The riverbanks are private land so the community must seek permission from the landowners to plant trees in the riparian land. Opportunities - Planting trees on the riverbank will provide an opportunity to control soil erosion.

**The gully.** Constraints -Tree planting has not succeeded in halting the advance of the gully. Many organisations have done this over the years and the gully is still expanding. The community feels they need to try other approaches and options such as construction of more water pans ("dams") and diversion of water upstream before it gets to the gully area. They are interested in cementing the gully to stop further extension. Some want the gully to be filled and a bridge constructed. Opportunities - The work that has been done in the gully can serve as lesson on environmental management to others.

**Roads.** Constraints -Gully erosion is characteristic of the area. Gullies form easily and pose a threat to all roads in the area. Opportunities - Road repairs will open up development in the village. Roads will contribute to the quick transfer of information, etc..

**Schools.** Constraints - The area has high poverty levels and the people have limited resources with which to put up a school. Opportunities –More schools will improve access to education for their children. An increase in the number of schools will attract extra activities in the village and create new job opportunities.

**Markets.** Opportunities - Improving the level of services provided by the market centres will create new jobs and improve service delivery.

**Hospitals.** Opportunities –The proposed health centre will reduce the distance to health services and create new job opportunities.

**Water.** Constraints -There are not many organisations working on water development in the village. Opportunities –The proposed distribution points will improve the availability of clean water within the community and by extension reduce the possibilities of water borne diseases. Women will spend less time looking for water.

The community identified rivers, water pans ("dams") and wetlands water as important resources. The rivers and water pans do not have any form of management and access to them is open, posing a challenge to conservation. River resources have deteriorated over time, whereas the water pans have management committees who provide a continuous maintenance of the resources. There are no forests in the area, and the community relies entirely on the neighbouring community for their supply of tree products for wood-fuel and construction. In the past the community did not have to pay for forest resources but today they must negotiate a price as commercialisation has set in. Efforts should be made to increase the tree population on the landscape also to promote alternative sources of energy and energy saving technologies.

Farmland and human settlement are not separate. All households own land and are engaged in cultivation. However agricultural yields are very low as a result of low soil fertility. There have been efforts by the Ministry of Agriculture and other development agencies to work with the community towards improving agricultural production but the community still speak of declining yields. Perhaps

cultivation is not the best land use for the region. There is need to explore alternative livelihood options other than cultivation.

Infrastructure in the community is inadequately developed. There is one tarmac road and the schools have only the basic facilities. The closest health facility offers only outpatient services. There is piped water in the community but very few households are connected to it and the supply is unreliable due to constant breakages and power cuts. There is need to invest in improving the level of infrastructural development. The area is prone to gully erosion because of its sodic soils. It has a very big gully called Katuk Odeyo gully that has defied the efforts of many organisation that have tried to halt its progress. Today the gully poses a risk to both man and livestock. Gully erosion in the area is a challenge to the construction and maintenance of a road network.

The main drivers of change in the community are population pressure, unreliable rainfall, unrestricted exploitation of natural resources, land fragmentation and commercialization. In their vision of the future the community want to reduce their reliance on the neighbouring community for trees resources. They also want to improve agricultural production and further develop infrastructure.

Future CCAFS work will need to address sustainable NRM, improvement of agricultural output, improved infrastructure, alternative non-land based livelihoods and the Katuk Odeyo Gully.

## Topic 2: Organisational landscapes

This topic aims to show evidence of organisational capacities that help address food security and manage resources. This will inform CCAFS about how prepared the village is to respond to the challenges envisaged as a consequence of climate change or other future challenges and to engage with CCAFS partners at a collective level.

Specifically, this section presents the different formal and informal organisations involved in the community in general terms, as well as with respect to food security in different situations (i.e. average and crisis conditions), and natural resources management (NRM). It also elaborates on what types of activities the organisations are engaged in, who their members are, whether the organisations are useful, etc.

### A. Basic spheres of operation

Participants were asked to draw three large concentric circles on the ground. The inner circle would represent the community, the middle circle the locality and the outer circle beyond the locality. Participants were then asked to name organisations working in the area, whose names were written on cards, and place the cards in the appropriate circle. Thus, the group placed in the inner circle the cards of organisations that worked in the community, in the middle circle the cards of organisations operating in the locality, and in the outer circle those that operated beyond the locality. See Photo 2 for an example of the activity as carried out with the study participants. The results are shown in the diagrams that follow. Based on this structure, the men identified 13 organisations in the village while the women identified 16.

In Tables 4 and 5, more detailed information is provided on the five most important organisations as they were ranked by the men's and women's groups.

Photo 2. The organisational landscape activity in progress

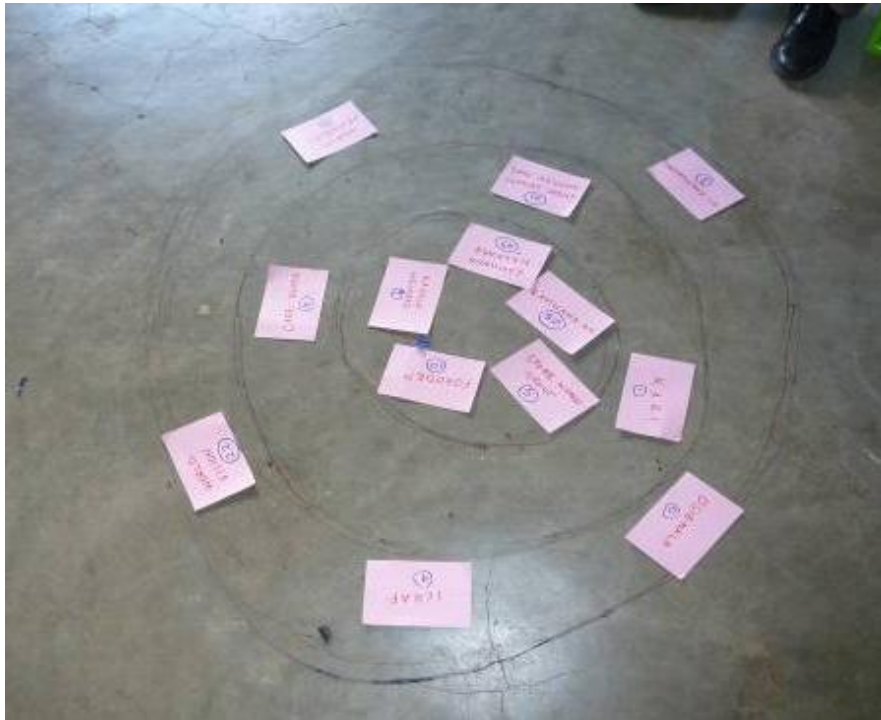
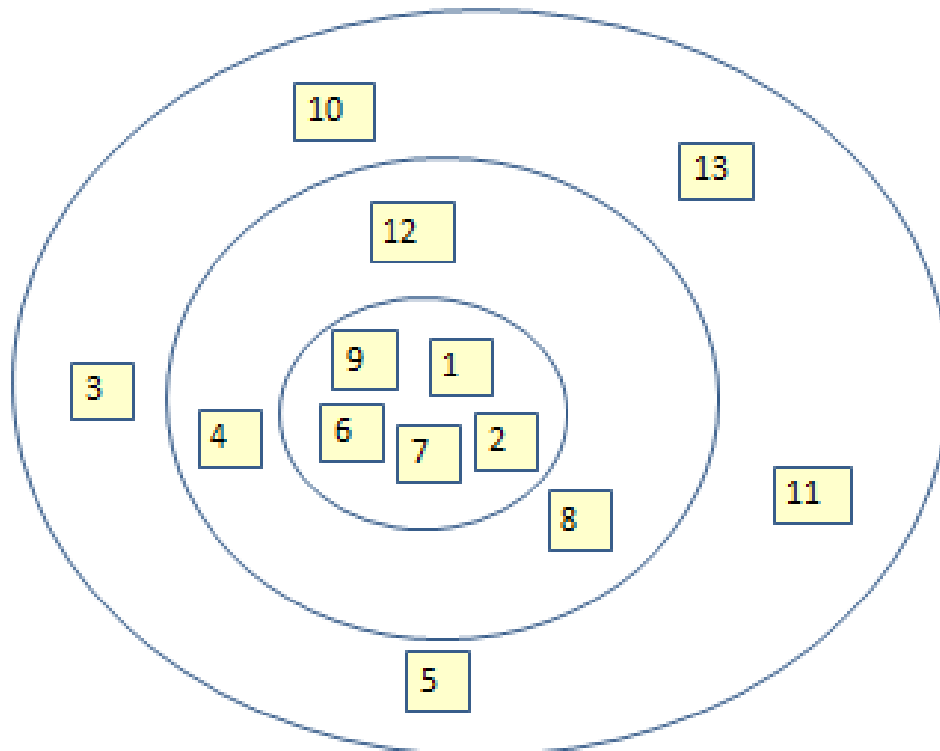


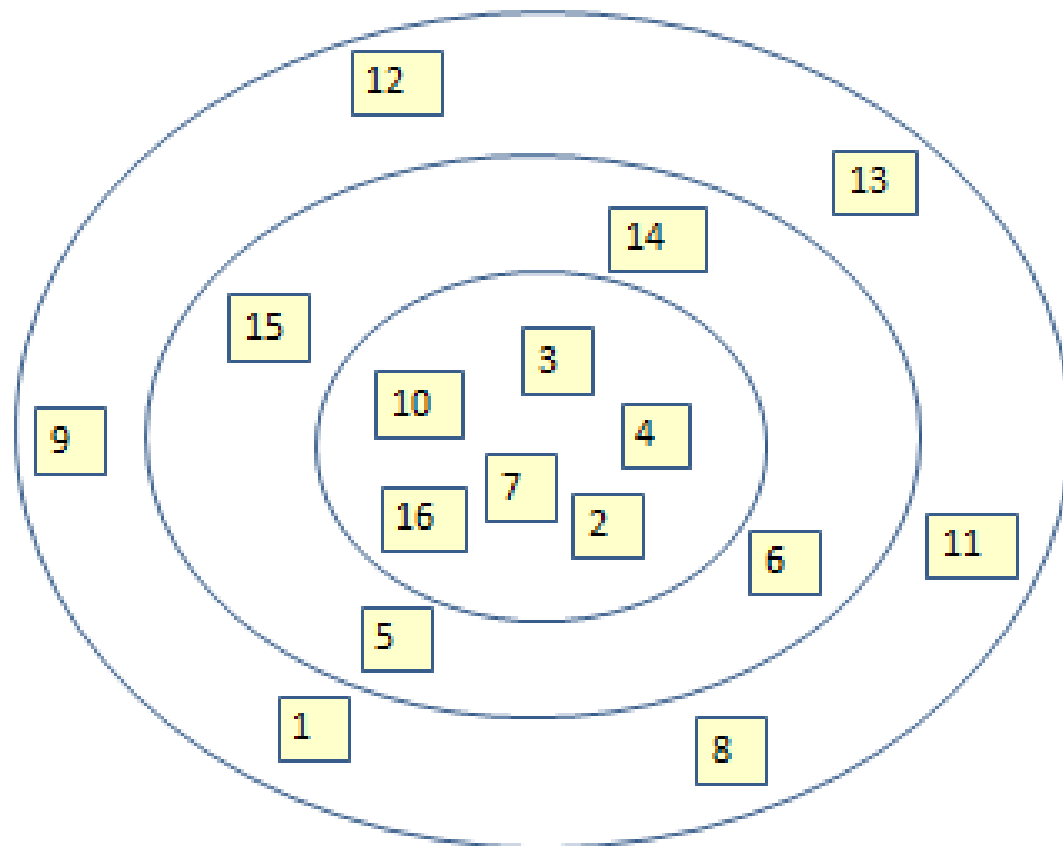
Figure 1. Organisational landscape of the men's group



**Legend**

- |   |                           |    |                                       |
|---|---------------------------|----|---------------------------------------|
| 1 | Kamuana 4K                | 8  | CARE Kenya                            |
| 2 | Kamuana Welfare           | 9  | Store Nyalo                           |
| 3 | World Vision              | 10 | ICRAF                                 |
| 4 | Jimo Nguono support group | 11 | VI Agroforestry                       |
| 5 | World Neighbors           | 12 | Kenya Agricultural Research Institute |
| 6 | Fokodep                   | 13 | Osienala                              |
| 7 | Kajulu Welfare            |    |                                       |

Figure 2. Organisational landscape of the women's group



**Legend**

- 1 Kenya Women Finance Trust
- 2 Kamuana Welfare
- 3 Store Nyalo
- 4 Jimo Nguono support group
- 5 Pambazuko
- 6 Upendo Women group
- 7 Unregistered Welfare Group
- 8 World Neighbors
- 9 World Vision
- 10 Kamuana 4K
- 11 Kenya Agricultural Research Institute
- 12 ICRAF
- 13 CARE Kenya
- 14 Ministry of Health
- 15 Fokodep
- 16 Nyamrerwa

Table 4. Information on the first five organisations ranked by the men

Organisation name	Main activities	Number of members (estimate)	Access (open or restricted to...)	Origin (indigenous, state, NGO, project)	Sphere of operation: community, local, beyond local	For community groups		
						Sources of funding (members, external, both)	Existed how long (less than 1 yr, 1-5, longer)	Formal or informal
1 Kamuana 4 K	Horticulture and income shared among members. Keep local livestock. Plant sorghum. Support each other during emergencies	Total 90 Active 60	Restricted to those who are ready to abide by-laws	Indigenous	Community	Members	Longer (7 years)	Formal
2 Kamuana Welfare	Horticulture. Monthly contribution of money. Run a tool bank. Support each other during funerals	100	Restricted	Indigenous	Community	Members	Longer (13 years)	Formal
3 World Vision	Support child education. Build houses for widows. Fund and build capacity of registered groups. Support school projects.		Restricted	Beyond local	Beyond local	External	Longer	Formal
4 Jimo Ng'uono Support Group	Advocates against stigma to the HIV+. Promotion of kitchen gardens. Capacity building of community.	34	Restricted	Indigenous	Local	Both	1-5 yrs.	Formal
5 World Neighbours	Supports CBOs. Provides clean tap water. Promotes dairy goat farming.	Between 12-15 groups	Restricted for groups	Beyond local	Beyond local	External		Formal

Table 5. Information on the first five organisations ranked by the women

Organisation name	Main activities	Number of members (estimate)	Access (open or restricted to...)	Origin (indigenous, state, NGO, project)	Sphere of operation: community, local, beyond local	Sources of funding (members, external, both)	Existed how long (less than 1 yr, 1-5, longer)	Formal or informal
1 Kamuana welfare	Farming activity including growing watermelons for sale. They meet after every 2 weeks. Registration is 18 years and above.	All the villagers (men and women)	Open to everyone in village including children.	Indigenous	Community	They contribute Ksh.100 for welfare, Ksh.20 registration.	Has been there for long	Formal
2 Kamuana 4k	They grow maize, tomatoes and kales for sale. They count profits at the end of the year and distribute to members.		Open to both women and men.	Indigenous	Community	Members' support, sale of products.		Formal
3 Nguono support group	Save money and lends to members. Loans from the group should be repaid monthly. It is an organisation that supports during funeral ceremonies and take care of widows and orphans.		Women and men.	Indigenous	Community	Members contribute		Informal
4 Nyamrerwa	Local medical practitioners offer med. Services during childbirth, but not beyond basic treatment. Trained to identify children diseases. In case of complications, refer patient to health centres		Women and men.	Indigenous	Community	Members contribute		Informal
5 World Vision	<ul style="list-style-type: none"> <li>- Support orphans and vulnerable children</li> <li>- Funds their education</li> <li>- Gives family a cow, which cannot be sold because it has to provide milk</li> <li>- Supports individuals and groups.</li> <li>- Builds house for family with vulnerable child</li> <li>- Supports school by building classroom</li> <li>- Promotes farmers by providing farm equipment and water pumps.</li> <li>- Distribute relief food</li> <li>- Support environmental groups in tree planting</li> </ul>		Open to orphans and vulnerable children.	NGO	Beyond local	External		Formal

## B. Organisational landscape of food security

The goal of this exercise was to get an improved understanding of how the organisational landscape contributes to the food security of the group. Food security is mostly measured at the household level. Nonetheless, community-level organisations and interactions influence the food security of different groups within the community differently. Male and female participants were asked to discuss the concepts of food availability, access and utilization, and then review each organisation they had previously identified by asking which of them had activities that fell under these categories.

Close to 90% of the organisations identified by both men and women in the discussion groups are engaged in some aspect of food security (Figures 3 and 4). The female participants identified 15 organisations that address food security issues in the community, one way or another. Seven of those organisations addressed food availability, 6 focused on food utilization and 6 concentrated on food access. The male participants, on the other hand, identified 10 the organisations that addressed food security issues. All of those organisations addressed food availability, 6 of them addressed food utilization but only 3 focused on food access.

Participants were asked to define organisations involved in providing assistance in food crisis situations. The purpose of this exercise was to understand how organisations help people to cope under those conditions. Participants indicated that there was no difference in the organisational landscape for food security during the time of crisis. The number of organisation remained the same and their roles did not change.

Figure 3. Organisational lanscape of food security – men

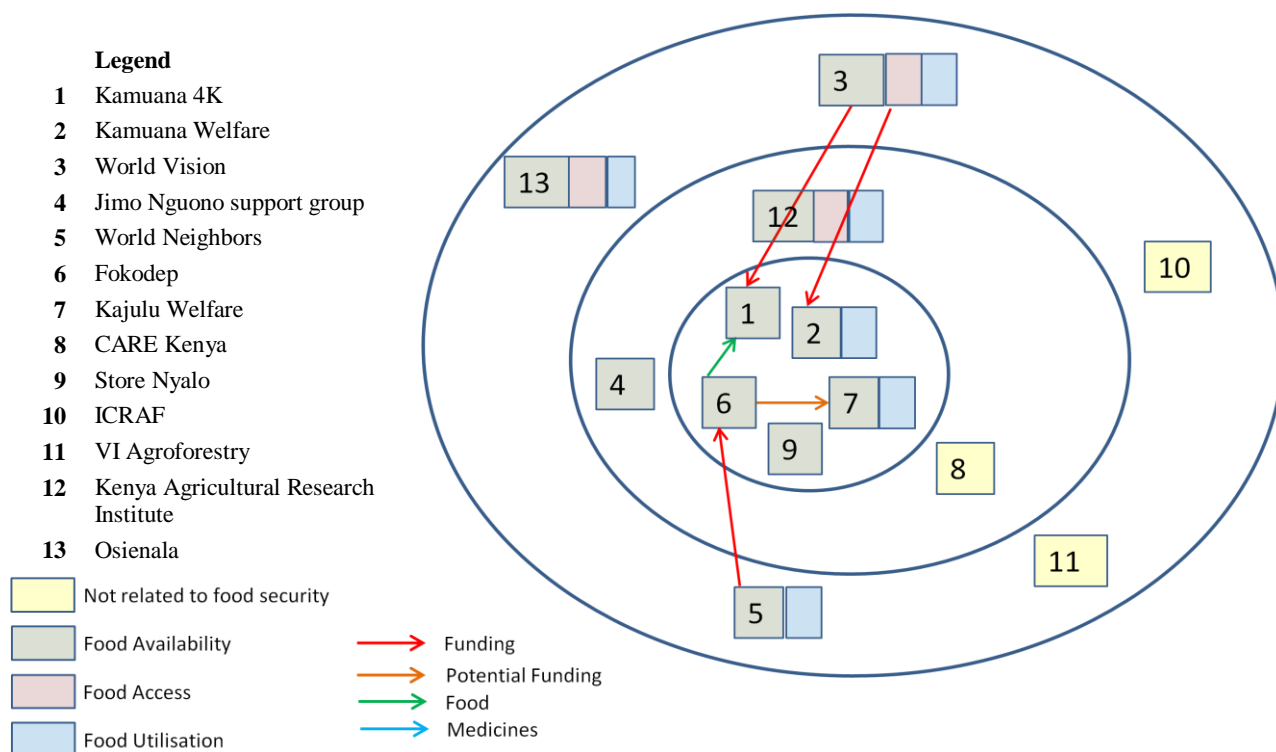
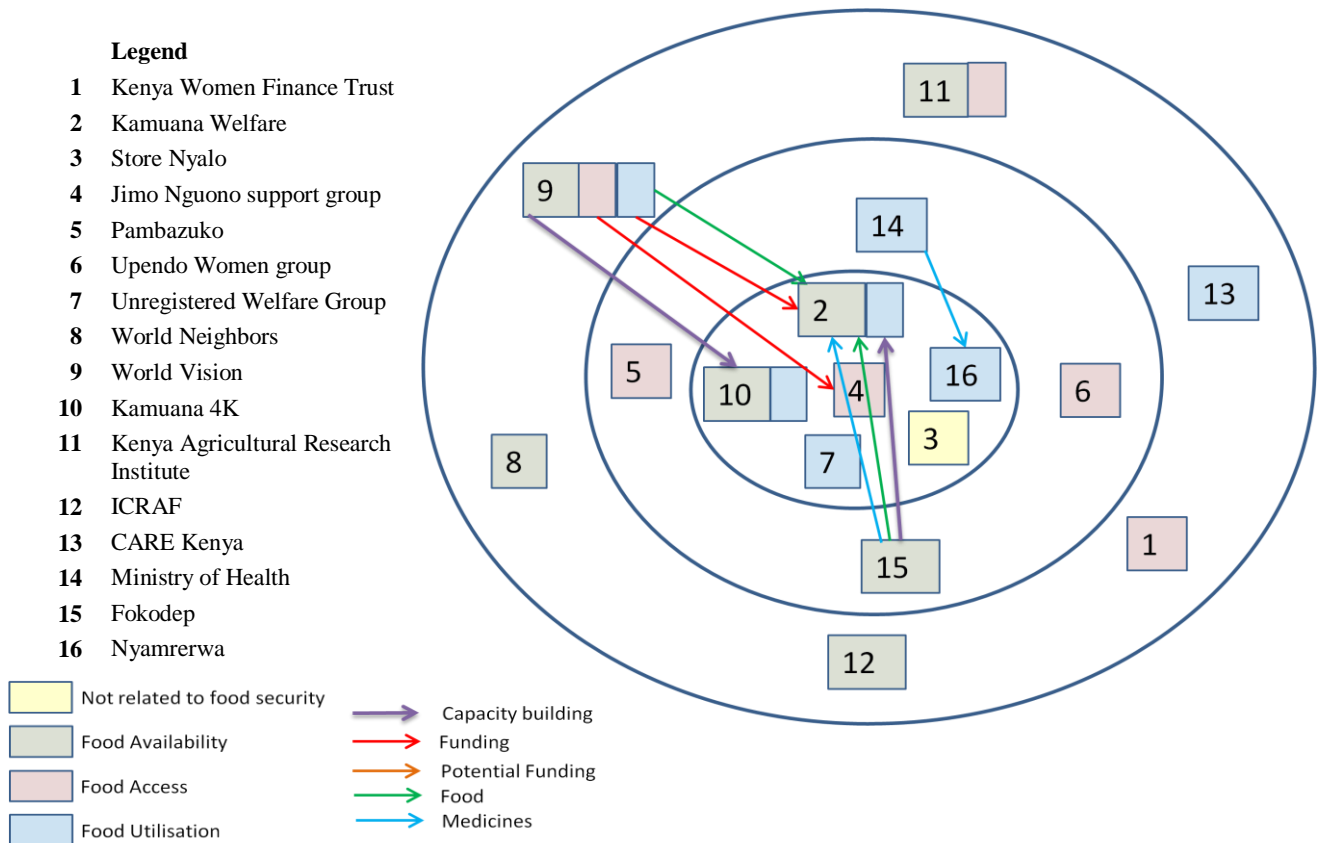


Figure 4. Organisational landscape of food security - women



### C. Organisational landscape of natural resource management

In this section, the organisational landscape in relation to natural resource management (NRM) is discussed. Specifically, what organisations were actively working to protect the environment, manage natural resources, etc.? The process entailed asking the group to highlight what organisations are involved in the management of natural resources in the community; developing a list of natural resources important to the livelihoods of the community; and asking the group to decide on a symbol for each type of natural resource listed.

The men identified 9 organisations engaged in natural resource management while the women identified 7. Out of this total 33% of the organisations identified by the men operate beyond the locality, 22% operate within the locality and 45 % operate within the village. These ratios changed for the women’s discussion where 57% operated beyond the locality, 14% within the locality and 29% within the village. An ideal situation is when there are more actors within the community because it is an indication of the level of community participation in natural resource management.



Figure 5. Organisational landscape of natural resource management – men

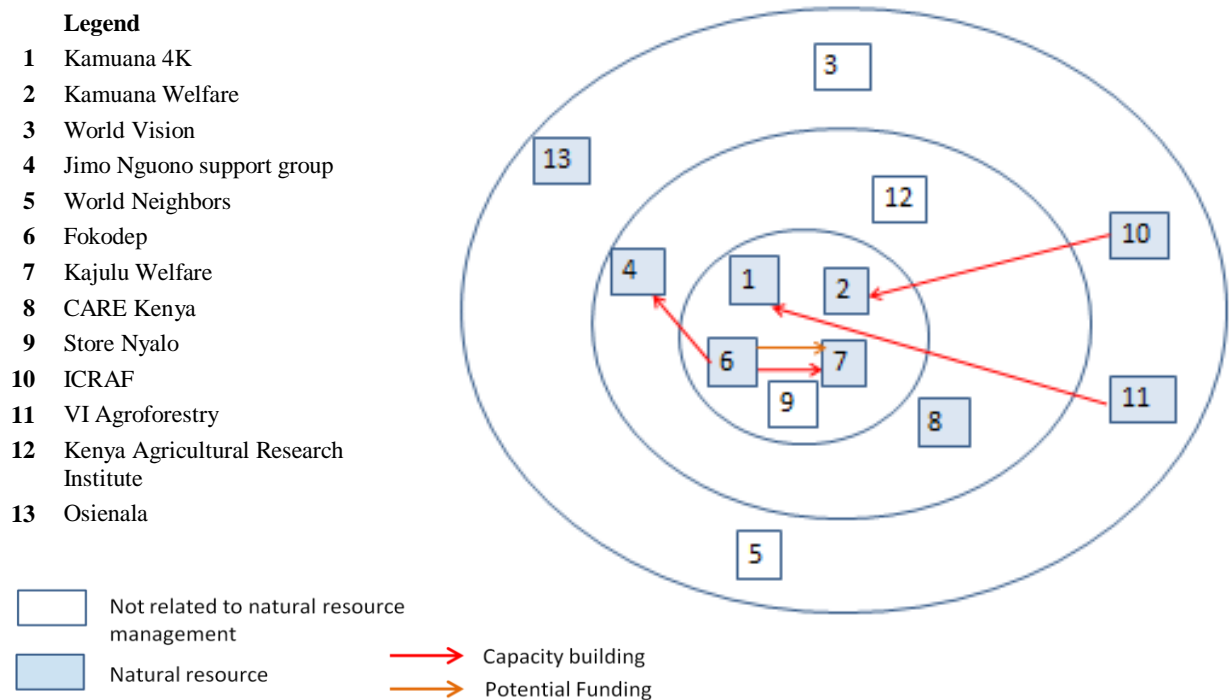


Figure 6. Organisational landscape of natural resource management – women

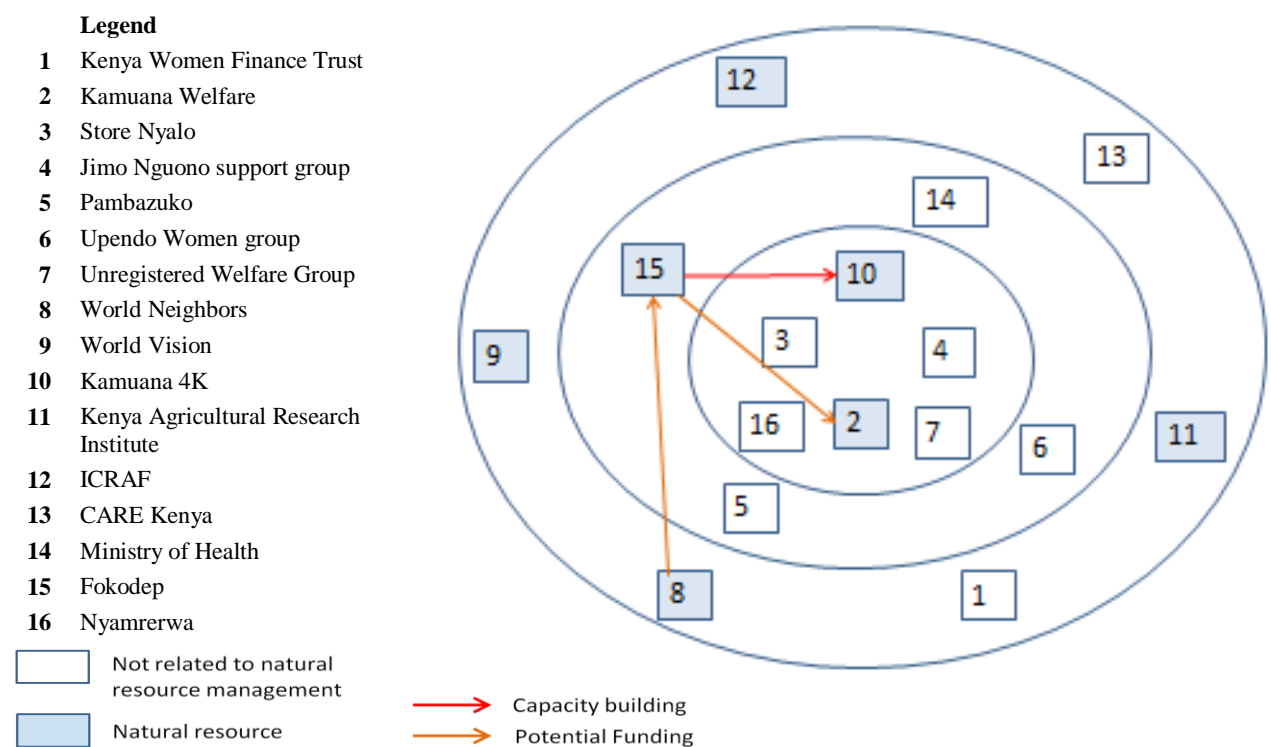


Table 6 below summarizes information on all the organisations identified separately by male and female participants. The organisations are classified according to their role in supporting food availability, access and/or utilization, as well as the provision of relief in times of food crisis, and the management of natural resources.

Table 6. Information on highlighted organisations of men and women (unless otherwise noted, 1=yes, 0=no)

Organisational Landscape	Men					Women				
	Name of organisation	Org. ID by men	Sphere. 1=village 2=locality 3=Beyond locality	Food secur-ity	Food crisis	NRM	Org. ID by women	Sphere. 1=village 2=locality 3=Beyond locality	Food secur-ity	Food crisis
1. Kamuana 4K	1	1	1	0	1	1	1	1	0	1
2. Kamuana Welfare	1	1	1	0	1	1	1	1	0	1
3. World Vision	1	3	1	0	0	1	3	1	0	1
4. Jimo Nguono support group	1	2	1	0	1	1	2	1	0	0
5. World Neighbours	1	3	1	0	0	1	3	1	0	1
6. Fokodep	1	1	1	0	1	1	2	1	0	1
7. Kajulu Welfare	1	1	1	0	1	0	0	0	0	0
8. CARE Kenya	1	2	0	0	1	1	3	1	0	0
9. Store Nyalo	1	1	1	0	1	1	1	0	0	0
10. ICRAF	1	3	0	0	0	1	3	1	0	1
11. VI Agroforestry	1	3	0	0	1	0	0	0	0	0
12. KARI	1	2	1	0	0	1	3	1	0	1
13. Osiendela	1	3	1	0	1	0	0	0	0	0
14. Kenya Women Finance Trust	0	0	0	0	1	1	3	1	0	0
15. Pambazuko	0	0	0	0	0	1	2	1	0	0
16. Upendo Women group	0	0	0	0	0	1	2	1	0	0
17. Unregistered Welfare Group	0	0	0	0	0	1	1	1	0	0
18. Ministry of Health	0	0	0	0	0	1	2	1	0	0
19. Nyamrerwa	0	0	0	0	0	1	1	1	0	0
<b>TOTALS</b>	<b>13</b>	<b>Village=5 Locality=3 Beyond loc. =5</b>	<b>10</b>	<b>0</b>	<b>10</b>	<b>16</b>	<b>Village =6 Locality =4 Beyond loc. =6</b>	<b>16</b>	<b>0</b>	<b>7</b>

### Topic 3: Information networks

The aim of this exercise was to understand the diversity of options people use for accessing information on agriculture and weather; how people take advantage of sources of information available, and if some sources are not used and why. We want to describe networks of how people access and share information within the community.

The radio is the most used and trusted media to obtain information in the village, and every household has easy access to a radio. Meanwhile, family and friends are the most important individuals from whom information is obtained. There seems to be very little sharing of information about weather conditions. The community relies on observations of the environment most of the time to get

information from which to make decisions. They include observations of temperature, sunshine, wind, rains, drought and clouds. The community tends to doubt many outside channels of information.

Farmers seek information that they can use to make decisions on agriculture. For men, such information is particularly important regarding the start of season/rains, planting time, type of input to be used (e.g. manure, fertilizers), and information on the type of soil. For women the critical information includes marketing, types of seeds to plant, management of crops and animals, and chemicals to apply on crops. A summary of the results from the exercise are presented in Table 7 below.

Table 7. Networks of information

Source	Topic (men)						Topic (women)			Total
	Type of seed	Rainfall	Planting time	Fertiliser and crops varieties info	Soil type info	Marketing	Type of seed	Chemical info	Crop/ animal mgmt	
<i>Individuals</i>										
<b>Family</b>	1	1	1	1	1	0	0	0	0	5
<b>Friends</b>	0	0	0	0	0	1	1	1	1	4
<b>Neighbour</b>	1	0	0	0	0	0	0	0	0	1
<b>Old women</b>	0	0	0	0	0	0	0	0	0	0
<b>Organisations</b>	1	0	0	0	0	1	1	0	1	4
<i>Media</i>										
<b>Radio</b>	1	1	0	0	0	1	1	1	1	6
<b>TV</b>	0	0	0	0	0	0	1	1	0	2
<b>Newspaper</b>	0	1	0	0	0	0	0	1	0	2
<i>Other</i>										
<b>Observation</b>	1	1	0	0	0	0	0	1	0	3
<b>Functions/ meetings</b>	1	0	0	0	0	0	0	0	1	2

## Conclusion and recommendations

In the past there were bigger forests that had wildlife. The rivers had cleaner water and less sediment. There was a lush riparian vegetation and thriving pottery industry. No water pans (“dams”) had been constructed in the community. There was less land under cultivation and the yields were higher. There were no cash crops and cultivation was characterised by traditional methods. There were fewer roads and social amenities such as schools. All of those conditions have changed.

Population pressure has created increased demand for and even over-exploitation of natural resources. Today there are no forests within the village and no wildlife left. The households go to a neighbouring community to collect wood fuel, or purchase wood fuel in the market, which are indicators of the environmental stress. The rivers are contaminated and unprotected. Land fragmentation has reduced the actual area of land under cultivation. Seeking to increase production, farmers have engaged in over-cultivation that has contributed to soil exhaustion and erosion. Unpredictable rainfall patterns have further reduced agricultural production. The results of the household survey show that most households are subsistence farmers producing crops and /or keeping livestock. The majority of households have less than 7 months on-farm food sources all year.

The progressive decline in agricultural production needs to be addressed since the majority of the people are peasant farmers and rely heavily on their farm outputs for subsistence. Improved farm

production can contribute to improving their food security in terms of food availability. More than 90% of the organisations engage in food security issues therefore enhancing their capacity has potential to make an impact on the food security situation.

Crop production needs to be improved to ensure food security and a decent income. Yet cultivation is no longer capable of supporting the population in the region. There is need to explore alternative livelihood options other than cultivation. Currently other livelihood activities of the community include basketry, business (firewood, fish, food products) and pottery.

Efforts need to be made in improving the tree population in the area, providing alternative sources of energy or introducing energy saving technologies. Implementing agroforestry systems will increase trees in the community for wood fuel and improve soil fertility at the same time reducing reliance on the shared forests and providing environmental services. Protecting the riparian areas will make the rivers and their water healthy. The community believes that the forests attract rainfall.

There is need to invest in improving the level of infrastructural development. There is piped water in the community but very few households are connected to it and the supply is unreliable due to constant breakages and power cuts.

There are many organisations in the community engaged in mobilisation of resources but they lack capacity and do not perform at optimum level. There is a dearth of effective collective action to solve problems in the village. There are no obvious efforts to clean, manage or conserve the river or riparian zone. A big gully remains unchecked, growing and presenting threats to life and property. Yields are not sufficient. The community groups have potential to implement many interventions but they are resource poor. Most community organisations are operating below capacity. Much more can be achieved if they are empowered. This can be further improved by creating horizontal linkages between the organisations at a local level, but such links are currently very few.

The radio is the most popular form of media from which the community obtain information to help them make decisions related to agriculture. The community listens to Radio Ramogi and Radio Lake Victoria, both of which use the local language. From the broadcasts they learn about seed types, their advantages and disadvantages; use of fertilizers; and cash crop prices at different markets. All of this helps the producers to make decisions on what to plant, what seed type to be planted each season and where to sell/buy produce. Meteorological information is also relayed through the radio. This guides the producers' agricultural calendar.

## Implications for CCAFS

Future CCAFS work will need to address sustainable NRM, improvement of agricultural output, improved infrastructure, alternative non-land based livelihoods and the Katuk Odeyo Gully.

It is important to strengthen the capacity of the organisations and the links among each other to create synergy. It will be important to build capacity on the basis of whatever knowledge, resources and creativity that already exists in the community. For that goal to be realized, the strengths and shortcomings of male and female community members must be taken into account. For instance, the women in the analysis understand the resources that they interact with but they do not know about resources that are far way and that hence do not interact with. Men, on the other hand, understand the resources that are both near and far but do not have details. Water and forest are resources that are very important to women. The women knew of more local groups than the men.

Attention should be paid to not only undermining but also strengthening the established roles and initiatives of both individuals and organisations. For example, observation is the most used source of information on weather, and individuals form an important part of the information networks, including those pertaining to weather conditions. Hence, the consolidation of Information networks for agricultural and weather information in the community should support individuals and organisations in the community as much as media outlets for information diffusion.

There is potential for establishing an extensive network of linkages in the area but there has been no initiative towards this end. Most organisations have in the past come and addressed only issues that were in line with their project objectives without making any attempt to find out which other

organisations have been in the area and the gains that can be made by linking initiatives.

Table 8. Potential CCAFS partners

ORGANISATION	SPHERE OF OPERATION	ACTIVITIES	STRENGTH
ICRAF	International	NRM	NRM Research
VI-Agro forestry	International	NRM	NRM Interventions
Jimo Ng'uono Support Group	Locality	NRM	NRM interventions
Kamuana 4K	Community	NRM	Community mobilisation
World Vision	International	Food security	Resource mobilisation
KARI	Beyond locality	Food security	Research/continuity
Fokodep	Locality	Food security	Community mobilisation
Kamuana welfare	Community	Food security	Community mobilisation

Building local capacity should take into account improving the capacity of small community organisations that are already existing so that on every landscape there is a set of local community organisations that can move the process of creating local linkages. Priority should be given to local community groups with potential to be around for a long time.

## Recommendations for major opportunities

Table 9. Recommendations for major opportunities

Gaps in knowledge/ current constraints that could provide opportunities/niches for CCAFS and partners	Opportunities for research (CCAFS)	Opportunities for Action Research (CCAFS partners)	Development Interventions (Partners)
1. Persistent low agricultural yields. What is the cause/explanation for this?	X	X	
2. Little practice of good land husbandry		X	X
3. Inadequate interaction between the farmers and the Ministry of Agriculture		X	X
4. Gully is still expanding. What can be done?	X	X	X
5. Poor infrastructure (road network, etc.)			X
6. Lack of capacity amongst local groups/organisations	X	X	X
7. Few horizontal linkages among organisations		X	X
8. The absence of conservation initiatives for water resources and the water catchment/springs/river beds		X	X
9. The absence of a forest and the reality of a low tree population on the landscape		X	X
10. Poor information network for weather related information	X	X	X