Assessment Report for a Project "Access to Safe Water and Sanitation" in Kabale District in Uganda

Climate and Disaster Risks Project Analysis

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BREAD FOR ALL

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Text

Marion Künzler, climate change expert, *Bread for all*

Picture

Marion Künzler, climate change expert, *Bread for all*

Front page: Landslide blocking the road during the rainy season in Kabale District in Uganda.

Bread for All is the development organization of the Swiss Protestant Community of Churches. The organization supports 400 development projects and programs in 57 countries in Africa, Asia, and Latin America. In addition, its development policy has the goal of creating fairer international socioeconomic structures, maintaining creation, and bringing peace.

Tearfund Switzerland is a Christian relief and development organization. Together with Christian partner organizations in countries of the south, Tearfund promotes and strengthens disadvantaged people through education, basic health and income generation.

Executive Summary

Climate change and disasters affects poor people in particular, because of their weak adaptive capacities. Development projects of all kinds can strengthen or weaken those capacities. At the same time, they can influence greenhouse gas emissions, the main cause of climate change, positively or negatively. Therefore it is important to evaluate the impacts of development projects on adaptive capacities and climate change mitigation, in order to find measures to improve projects in the face of climate change.

This Assessment Report presents the results and the lessons learned from the climate and disaster risk analysis of a project on access to Safe Water and Sanitation in Kabale District in Uganda implemented. The analysis was conducted with the "Participatory Assessment of Climate and Disaster Risks (PACDR)" from Bread for All, Bread for the World and HEKS/EPER. The analyzed project is run by Kigezi Diocese Water Sanitation Program (KDWSP) of the Church of Uganda, and financed by different stakeholders as Tearfund Switzerland.

The analysis showed that the farmers are highly vulnerable to landslides, human diseases /HIV, hailstone and soil exhaustion. The increased frequency and intensity of landslides might be a consequence of climate change and high population pressure. Also, the increase of hailstone events could be due to climate change. Human diseases might be related to climate change, especially malaria and water-borne diseases. In contrast HIV has nothing to do with climate change.

Future global warming will even increase these risks further, and add hazards that have been less important in the past, such as the increased occurrence of malaria, hailstones or lightening. The local population has a broad variety effective and sustainable coping strategies. But now there is big difference between the two communities as in Rubaya an IWRM approach is in place and in Rutare not. Also for hailstones no strategies at all were identified. Several strategies are not sustainable and cannot reduce their vulnerability sufficiently, particularly with a view to ongoing climate change.

The project activities have a positive impact and have reduced several hazards in both communities. Yet more actions need to be taken to strengthen the livelihood resources and adaptive capacities of the population. Farmers identified four areas of action (1) soil conservation, (2) organic farming, (3) natural resource management (4) health and hygiene.

The contribution of the activities of Kigezi Diocese to reduce or increase greenhouse gases in the atmosphere was not evaluated due to running out of time.

The analysis of hazards, vulnerability and capacities in the Kabale District in Uganda shows that climate and disaster risks must be confronted. Climate Change will increase risks. Locally adapted measures can lessen the impacts and render the population more resilient.

Further lessons were learned during this application of PACDR. The suitability of the guide in different environments was confirmed. It paid off to investigate in participative stakeholder consultations. The introduced exercises for these consultations allowed participants to engage in a learning process themselves. Also the concept of learning by doing for project staff was successful. Project staff as well as the farmers of the screened project said they had learned a lot, too.

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1 Introduction

Climate change and development are highly intertwined: the risks of global warming could jeopardize decades of development efforts, particularly in the poorest regions of our planet. It is therefore vital to ensure that development projects strengthen their beneficiaries' capacities to confront climate change. It is also important to make sure that the same projects do not lead to excessive emissions of greenhouse gases.

Tearfund Switzerland supports projects to strengthen disadvantaged people through education, basic health and income generation. Many of their beneficiaries are heavily threatened by climatic and disaster risks, mainly because of their high economic, social and environmental vulnerabilities. Even though Tearfund Switzerland does not engage in specific climate change projects, it has grasped the need to consider those threats and the related vulnerabilities.

Marion Künzler, a climate change expert of *Bread for All*, carried out the this climate and disaster analysis in a local project supported by Tearfund Switzerland in October 2014 in Uganda.

The analysis was executed with the *Bread for All*, HEKS/EPER and Bread for the World "Participatory Assessment of Climate and Disaster Risks (PACDR)", which is based on CRiSTAL[1].

This report is organized as follow and follows the structure of PACDR. First, the project and its context are briefly described. Then, the participatory analysis on climate change and hazard, on vulnerability and capacity, the identification of adaptation strategies, the projects mitigation capacities and ideas for a project revision are presented. The last section discusses some lessons learned from the application PACDR.

1 CRiSTAL is a tool jointly developed by the International Institute for Sustainable Development (IISD), Intercooperation, the International Union for the Conservation of Nature (IUCN), and the Stockholm Environment Institute (SEI).

2 Results of Project Analysis in Kabale District in Uganda

2.1 Project and its Context (Module 1 (M1) of PACDR)

The organization Kigezi Diocese Water Sanitation Program (KDWSP) of Church of Uganda works since 1986 in the Kabale District in South-West of Uganda. KDWSP is part of Church of Uganda and belongs to Kigezi Diocese. The program is committed to improve water supply and sanitation. It operates in at least 15 local churches (4 government parishes selected from 4 government sub-counties) per year.

Figure 1: Kabale District is located in South-West of Uganda. Source: http://en.wikipedia.org/wiki/Kabale_District

Uganda is ranked 161st out of 187 in terms of its Human Development Index with a GNI per capita of $1,124, an average life expectancy of 54.1 years and an average literacy rate of 85.5%. The HIVAIDS prevalence rate is at 6.5%. The population below income poverty line is 28.7% (UNDP 2011 Report).

2.1.1 Project area

Kabale District is a highland district with around 600'000 inhabitants. The district covers 1,827 square kilometers. The topography is mainly green, interlocking and heavily cultivated hills with spectacular valleys. It consist mainly of agricultural land and small secondary forests which depend on two water catchment areas. The altitude of the district ranges between 1,219 meters and 2,347 meters above sea level. This altitude makes it colder than the rest of the country. Kabale District is constituted of three counties of Rubanda, Rukiga and Ndorwa together with Kabale Municipality (Tearfund Switzerland 2014).

The inhabitants are predominantly from Bakiga tribe and express religious affiliation, the proportion being approximately 46% Anglican, 49% Catholic, with less than 5% shared by other religious sects. The average family size is 6 with all households being male headed unless male not present. The big part of the population which is youth and men has a negative attitude towards work. Population growth is 3% per annum (Tearfund Switzerland 2014).

The population lives mainly from agriculture as Irish and sweet potatoes, maize, peas, beans, sorghum, wheat, cooking bananas, vegetables, fruits, small scale farming for milk, yogurt, cheese, livestock. Income is generated by selling Irish potatoes and vegetables, fish, tea, some coffee, wine and distillation of gin. Also the brick industry or the mining provide labor work.

65% of Uganda's population has access to a safe, water supply. In Kabale District, the coverage level is at 82% with 73% functionality and there is a danger of decreasing; as a result of high population growth at 3% adding 18,000 people to the population each year (Tearfund Switzerland 2014).

The area is densely populated with most people settling on the hill tops and reserving lower fertile soils in the lower parts of the hills for agriculture. Most water sources are found in the valleys and this causes people to haul water over long distances and on steep slopes. In Kabale district water hauling is mainly the work of women and children in addition to doing other domestic chores. This has caused problems like backaches, miscarriages to women and poor school performance of children as they at times miss early and late lessons alternating it with water hauling (Tearfund Switzerland 2014).

Prevalence of diseases especially malaria which is ranked highest in the country is due to global warming, following swamp reclamation that has favored breeding of mosquitoes. Also HIV/AIDS - estimated by the national UNAIDS with 6.7% - is rampant amongst the highest risk rural communities of Kabale: for example in Rubanda where the adult male population seasonally travel for logging work, the local AIDS testing clinic estimates that 40% of all adults are infected. Sanitary related diseases are also common in the area and these are due to lack of or poor knowledge between water, sanitation and disease, contamination of water sources by human and animal excreta. Due to population pressure on land, there is over cultivation of the small and fragmented pieces of land using traditional methods of farming which have accelerated soil erosion, leaving land barren. The terrain cannot promote mechanized agriculture due to land fragmentation and steep slopes of the area. This has led to low productivity hence poor feeding and poor nutrition causing poor growth and development of children (Tearfund Switzerland 2014).
The water, sanitation, hygiene and HIV/AIDS situation is exacerbated by a lack of capacity of communities, artisans, entrepreneurs and implementing agencies to address the problem in a systemic manner. There are a number of additional factors that contribute to poverty in the immediate area:

- Imbalance and neglect of gender roles and responsibilities by most men has adversely affected household incomes.
- Peasantry coupled with lack of water for production has affected agricultural yields in times of prolonged droughts.
- High and increasing population density, leading to land fragmentation and increased pressure on land. Combined with traditional farming methods (e.g. a lack of manure use, eco-san toilets and mulching) and increasingly unpredictable rains, the result is low agricultural productivity.
- Environmental degradation: soil erosion and decreasing soil fertility causing reduced agricultural outputs.
- High unemployment, in part due to masculine aversion to work, leading to low levels of savings and investment.
- Low levels of literacy, especially amongst females.
- High levels of disease that reduce productive activities and consume income.

(Tearfund Switzerland 2014)

2.1.2 Project activities

The project aims to improved and sustainable water and sanitation services in targeted communities in Kabale District by 2015. The current phase of the project is three years from April 2012 to March 2015. The project is financed by Tearfund UK, Tearfund Switzerland, Tear Netherlands, USAID, Lotteriefonds Zurich, Edrisia Foundation and Community contributions. The overall budget is CHF 2,151 million for a period of 3 years (April 2012- March 2015) (Tearfund Switzerland 2014).

The direct beneficiaries are the rural poor from communities, schools, health centers, religious institutions, community based organizations and community leaders. These are around 23,302 (broken down 8,266 males and 15,066 females). They will act as multipliers to enhance knowledge and skills' base and subsequently increase sustainable WATSAN facilities in the respective communities (Tearfund Switzerland 2014).

The **overall goal** of the program is to reach improved and sustainable water and sanitation (WatSan) services in targeted communities in Kabale District by 2015.
KDWSP is implementing the following activities at various stages in Kabale District:

- Equipping the local churches, NGOs, CBOs, other Dioceses, community members and interested individuals with evidence based skills and best practices in WatSan (Skills in Rain Water harvesting (RWH) facility design and construction, entrepreneurship training to market these skills, mobilizing skills and WatSan implementation approaches, process alignment and operation and maintenance or Sustainability of WatSan projects/interventions).
- Promoting and providing improved and sustainable water and sanitation services (gravity flow schemes, tanks, rain harvesting and spring protection) trough the Establishment of water sanitation committees and 10 demonstration homes in each community, Education training's on WatSan best practices (health promotion e.g. hand washing, safe extracta exposure, safe water handling) in communities at household level and schools, Training on gravity flow schemes and its construction in communities (water tanks, rain water tanks, spring protection, water flow schemes)
- Influencing and advocating for change in policies and by-laws related to WATSAN projects at sub-county and District levels through communication and outreach, stakeholder engagement, public relations and, information sharing.
- Mainstreaming cross-cutting issues of HIV/AIDS, environmental sustainability, Family Planning, Food security trough training of communities in HIV/AIDS and family planning, training of communities in food security, environmental sustainable practices (trenching, contour farming, hedge rows, trees planted, production of organic manure) and nursery bed attendants for each community.

Results of project so fare (see also section about Rubaya and Rutare):

- The program has since focused on rural communities and has to date facilitated access to clean water by constructing 50 gravity flow schemes, protecting over 952 springs, providing 187 community tanks (up to 50m3), 1,834 ferrocement tanks (4,000l each) over 11,076 household jars (420l each) and 403 household jars (1500l each) in rural communities of Kabale District (Diocese Kigezi 2014).
- The achievements to date have been spearheaded by a KDWSP Unit at the Diocese and trained women groups and artisans. Over-all 46 women groups have been trained in *ferrocement* tank construction and 281 artisans from the 8 Districts of South Western Uganda, Soroti, Fort Portal, Burera (Rwanda) in rain water harvesting tech-

nologies. In addition, the program has trained two other organizations in rain water harvesting namely, Two Wings Agro forestry Network (TWAN) in *ferrocement* tank construction and CARITAS of Kabale Diocese (Roman Catholic) in rainwater harvesting (jars) construction (Diocese Kigezi 2014).

- Besides this, the attitude of people changed on WatSan issues e.g. hygiene. This results in a reduction of water induced diseases and deaths by contaminated water.

2.1.3 Analyzed communities

The analysis was done with the beneficiaries of two communities in Kabale District: Rubaya and Rutare. Both communities are in near distances to Ruandan boarder and in the highlands. The two Communities are separated by various valleys and a 45 minutes drive over a bumpy road. Both communities are settled in a valley and on the steep slopes of the hills around. The water sources are found in the valley bottoms while people reside on hill tops reserving low fertile soils for agriculture the people still drop in altitude of more than 200 meters on steep slopes in water hauling. The land fragmentation is very high e.g. in Rubaya an average family owns one acre which is scattered in the area and separated on five pieces of land. The forest is mainly secondary dominated by eucalyptus. The populations lives mainly from their agriculture products as Irish potatoes, sweet potatoes, peas, tree planting for selling, bee keeping and trading with sorghum.

Rutare community consists of 3 villages and around 300 households. KDWSP has implemented a classic WatSan project in Rutare. They have improved the water supply and sanitation by

- a gravity flow schemes with the catchment of spring water, construction of pipes and a water reservoir as well as 29 tab stands. Thereof 26 are functioning.
- The construction of latrines for all houses (except 3 houses).

Figure 2: Rutare community lying in a valley and on steeply hills.

Figure 3: The valley is often flooded after heavy rains and destroys homes and fields

- The establishment and training of a WatSan committee to oversee the whole gravity flow scheme, assure its operation and maintenance and to mobilize the committee and community to address problems. The committee serves also as multipliers to train the community on hygiene. All users of tab stands pay a fee for the use and maintenance. The farmers maintain and repair their system on their own.

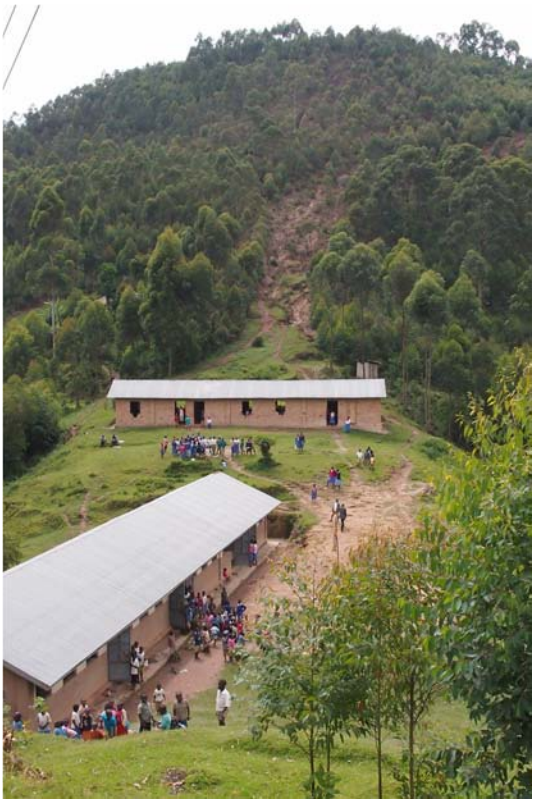


Figure 4: School settled in landslide prone area

Rutare population mentioned as impacts an improved access to clean water within short distances (saving of time for water catchment) and improved personal hygiene, use of water for livestock and crop irrigation, elimination of water-borne illnesses and no more contaminated water after heavy rains.

The population is confronted by hazards as broken roasty pipes, flooded sources, land erosion and landslides after heavy rainfalls, high production costs for beans and decreasing productivity, high land fragmentation, low income, unpredictable weather and low soil fertility.

Figure 5: Rubaya community lying in a valley and on steeply hills.

Rubaya community is one of the pilot projects of KDWSP. They have since March 2013 an Integrated Water Resource Management (IWRM) in two villages. This promotes the coordinated development and management of water, land and related resources in a way to maximize the resultant economic and social welfare in an equitable manner without compromising the sustainability of vital ecosystems (Diocese of Kigezi 2014).

As also met in Rutare, Rubaya has since 13 years an 18 km long gravity flow scheme with 50 tab stands, household latrines, a WatSan committee and promoted hygiene standards.

In addition to Rutare the following activities were implemented:

- Mapping and training of stakeholders in IWRM and climate change adaptation activities and on how to mainstream and adapt to the impacts of climate change through a catchment based water resources management framework. As part of this work baseline surveys were undertaken in the catchment to establish the levels of degradation and identify suitable intervention areas. Development of a sub`catchment management plan as well as constituting the Catchment Management Committee will follow this process (Diocese of Kigezi 2014).
- Ten energy saving stoves were constructed to cut energy consumption by over 75% hence lessening on destruction of the environment Diocese of Kigezi 2014).

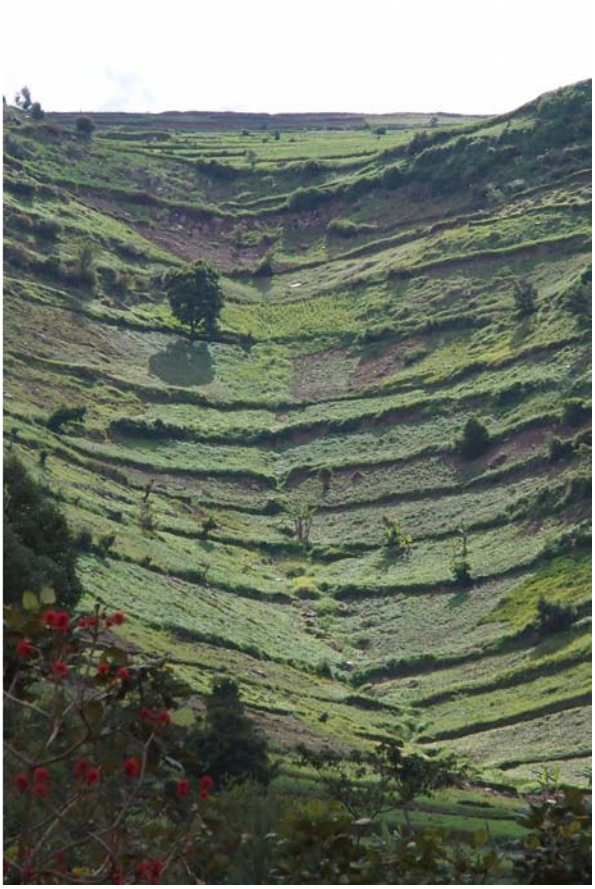


Figure 6: a gully is collecting the running water and increasing the speed of run off

Figure 7: a check dam slowing down the run off water

- 15 conservation channels for irrigation, 35 check dams to slow down the speed of running water and minimize/avoid erosion and landslides were constructed
- Trainings on gullies' treatment technologies, river bank protection and promotion of planting trees with multiple uses have taken place (Diocese of Kigezi 2014).
- Implementing soil and water conservation measures through terracing of Steep Mountain slopes (GoU 2014).
- Establishing and training of community based management structures (Diocese of Kigezi 2014).
- Health improvements through sanitation and hygiene and environmental health training's were conducted with focus on safe wastes disposal without polluting water systems. These wastes are re-used for organic manure as its nutrients boost growth of Irish potatoes and vegetables for nutrition and food security. Chemical pollutants (these do not dissolve immediately) from spraying crops also percolate through the soils to ground water and communities are discouraged to use such (Diocese of Kigezi 2014).

Community based catchment management structures were established, trained and supported to implement IWRM interventions and best practices. The results were very positive as e.g. an improved standard of living due to 10 improved energy saving stoves, diversification of income with fruit trees, green pepper, eucalyptus and sugar cane, grazing management for animals and therefore also planting of feed for animals, use of animal (goat and cows) excrementa as manure to increase productivity or the reduction of water-borne illnesses. Some neighboring communities have learnt from the positive impacts and are implementing some of the interventions as well (Diocese of Kigezi 2014).

2.1.4 Project context

A. Local and external groups/institutions/organizations

Besides KDWSP also the Ministry of water resource management, National level climate change directory and Kabale District are working on WatSan. DANIDA is funding a project in the area Lake Victoria and Albert management zone. Generally the working atmosphere is good with other institutions and organizations.

KDWSP is one of the founder members of Uganda Rain Water Association (URWA) and Uganda Water and Sanitation NGO Network (UWASNET) and continues to serve on governing bodies of the two networks in various capacities. Currently KDWSP is serving as chair of URWA for the second term (Diocese of Kigezi 2014)

In the agricultural sector also the government, FAO on sustainable land management, International Fertilizer Center on landscaping and promotion of Irish potatoes as well as the IUCN are implementing projects.

Besides this, there are other organizations working in Kabale district but mainly on other issues. Most of them are not applying a holistic approach but rather addressing it selectively as e.g World Vision and Caritas.

B. Climatic conditions

The climate of Kabale can be classified as cool and humid which is primarily due to the altitude.

Rainfall in Kabale district is bi-modal. The long and heavy rains are from March to May. It is in this season that virtually all crop varieties are grown. The shore rains are experienced from around October to November. They are usually moderate and therefore mainly short term corps are grown. June, July and August are generally the driest months of the year. The mean annuals vary from 800mm – 1000mm[2].

Temperatures average about 18°C during the day and fall to about 10°C at night. The relative humidity is between 90% and 100% in the morning and decreases to between 42% and 75% in the afternoon, all the year around.[3]

The area's geology of light volcanic soils means most of the water on the hillsides exists as sub-surface flow, only breaking the surface as springs at, or near the valley bottoms.

C. Current hazards

The main meteorological hazards to Kabale Districts population are due to the characteristic topography which is very hilly with steep slopes.

While heavy rainfalls cause landslides, soil erosion and depletion and floods, unpredictable seasons and longer dry spells cause a drop in water tables and result into food shortage and diseases (e.g. malaria, diarrhea).

Climate Change and deforestation has increased the frequency of thunderstorms and the along going lightening causing death of humans and livestock. Also plant diseases and pests attack crops (e.g. potatoes, beans and bananas) and seem to be more frequents then in the past. The appearance of new diseases has been observed.

2 http://www.tist.org/tist/docs/PDD-Documents/TIST%20UG%20PD-VCS-Ex%2020%20Dist%20Enviro%20Profile%20Kabale.pdf
3 Source: http://en.wikipedia.org/wiki/Kabale_District

Due to high population growth and therefore a high population pressure (250 persons per km^2 in 1991) on land, there is over cultivation of the small and fragmented pieces of land using traditional methods of farming as burning bushes, reclaiming swamps and deforestation which have accelerated soil erosion, leaving land barren. The terrain cannot promote mechanised agriculture due to land fragmentation and steep slopes of the area. This has led to low productivity hence poor feeding and poor nutrition causing poor growth and development of children.

The deforestation and scare reforestation with eucalypthus causes various problems: high consumption of water, low humus production due to slowly rotting oil emulsive leaves, uncovered and unprotected soils around the trees increasing soil erosion and depletion etc.

Malnutrition amongst children is increasingly common due to low quantities and lack of nutritious foodstuffs as a result of environmental degradation. Increasing numbers of children drop out from school as they are unable to provide packed lunches.

Prevalence of diseases especially malaria which is ranked highest in the country is due to global warming, following swamp reclamation that has favored breeding of mosquitoes.

Although accurate figures for HIV/AIDS do not exist (the national UNAIDS estimate is 6.7%), it is rampant amongst the highest risk rural communities of Kabale: for example in Rubanda where the adult male population seasonally travel for logging work, the local AIDS testing clinic estimates that 40% of all adults are infected. Moral decay in the society and high stigma levels of PLWHA has accelerated the spread of HIV. Limited access to services and its impact of many orphans, many child headed families, burdened grandparents has increased poverty levels.

Sanitary related diseases are also common in the area and these are due to lack of of poor knowledge between water, sanitation and disease, contamination of water sources by human and animal excreta.

Besides this other observed hazards by KDWSP staff are accidents with motorcycles, the rural- urban migration, land conflicts and land grabbing.

D. Prevention and preparedness systems

The known prevention or preparedness systems in Kabale District are the following:

- several policies exist but are not implemented
- construction of terraces, dams against floods, no cultivation along rivers on the first 5 meters but not everywhere implemented
- immunization program e.g. vaccination, health education and awareness creation
- afforestation by government, charge (cut one and plant three), agroforestry
- promotion of family planning

2.2 Participatory Climate Change and Hazard Analysis

Chapter 2.2 to 2.5 present the results of the stakeholder consultations for the analysis on climate change conducted in October 2014.

The information on climate and disaster risks, their impacts and the current coping strategies was collected during two one-day gender specific workshops with the local population. As the poor farmer families are the main project beneficiaries of Kabale District, one workshop took place with women (w) and another with men (m) in October 2014. On the third day the results were presented to all participants (men and women) and ideas for adaptive capacities collected.

In a first step the scientific information on the national level for Uganda has been researched (see Uganda's Climate Change and Hazards in Literature). Information on a more local level is unfortunately not available. Therefore, the results of consultations with project representatives and beneficiaries help to identify the consequences of climate change and disasters on a local scale.

Women and men groups completed two exercises for this module:

- Hazard map for Rubaya and Rutare: participants identified the main livelihood resources and the main hazards that affect their daily life (only men). Due to time problems women made instead the alternative exercise to identify the hazards in Rubaya and Rutare
- Seasonal calendar: all activities during the year were collected and marked in the month they are implemented (women and men).

2.1.1 Uganda's Climate Change and Hazards in Literature

Past Trends of Climate Change and Disaster Risks

Past and present changes help to indicate possible future developments so it makes sense to have a look at climate changes during the last decades.

A. Temperature

Analyzing data produced by 16 representative weather stations over the last 60 years (1951-1980 and 1981-2010) a recent study (Tetra Tech ARD 2013) found a significant overall increase of average annual temperatures in Uganda. Whereas the minimum temperature rose by 0.5-1.2 °C, maximum temperatures increased by 0.6-0.9 °C. Other studies recorded even higher overall increases by about 1.3 °C since 1960, an average rate of 0.28 °C per decade. Daily temperature observations showed significantly increasing trends in the frequency of hot[4] days and nights (McSweeney et al. N/A).

B. Rainfall

In contrast to the raising temperatures, different studies aren't consistent regarding the development of precipitation levels over the last decades. Overall trends seem to point to a small increase in annual precipitation in Uganda. These long-term changes aren't always certain (depending on the source) and they are relatively modest compared to the high inter-annual variations of rainfall (Kyoheirwe et al. 2012, Tetra Tech ARD 2013).

The finding of no strong long-term changes in precipitations in Uganda doesn't exclude shorter-term changes in rainfall and its variability. For instance, researchers recently identified a decline in rainfall during the March to May season at a regional scale, persisting since 1999. There is also evidence for a shift in timing of peak seasons and in the magnitude and intensity of precipitation (Kyoheirwe et al. 2012). The inter-annual variability regarding the onset, cessation, and the length of the rainy seasons is significant but, here again, no overall (long-term) trend, or spatial pattern, has been detected (Tetra Tech ARD 2013).

C. Extreme events

In Uganda, rainfall is the most sensitive climate variable that affects social and economic activities. Although there's been no significant overall trend in precipitation levels over the last decades, the population has been increasingly affected by extreme events induced by cli-

4'Hot' day or 'hot' night is defined by the temperature exceeded on 10% of days or nights in current climate of that region and season.

mate change. In many regions other than the central region (Kampala and Entebbe) there is evidence of an increased frequency of droughts in recent years. In general, the incidences were more pronounced in western and north eastern parts of Uganda (Government of Uganda 2002). The northeastern Karamoja region has been most affected by this phenomenon, experiencing not less than six severe droughts since the late 1980s, according to the International Disaster Database (EM-DAT)[5]. Floods have even been far more frequent, occurring almost every year in the last decades, but generally affecting significantly less people than droughts. Landslides are of raising concern as well, like the 2010 incident resulting in at least 388 deaths, according to EM-DAT.

D. Other risks

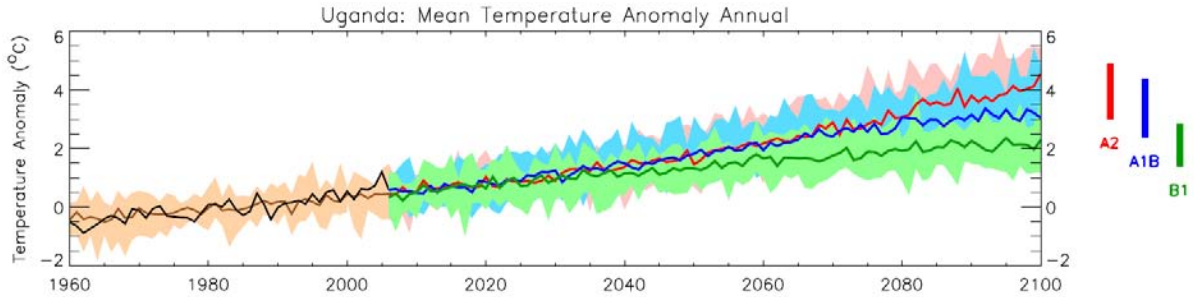
By far the most frequent disaster in Uganda are epidemics. Bacterial and viral infectious diseases occur regularly, leading to dozens to hundreds of deaths every year. Modern epidemics include avian influenza (bird flu), Ebola hemorrhagic fever and malaria. There have also been earthquakes in 1988 and 1994. Indeed, available seismic information indicate that parts of Western and Central Uganda are prone to seismic activity. Other disasters include pests infestations and crop and animal diseases resulting in yield losses and food insecurity (Government of Uganda 2011).

Projected Trends of Climate Change and Disaster Risks in Uganda

The International Panel on Climate Change (IPCC) consists of a large number of climate scientists from around the world and its task is to model future climate change and its impacts. With the help of very complex computer models which have been “filled” with huge amounts of data from the present and the past, those scientists try to forecast climate change for the next decades. Of course, the future is always uncertain. However, by using different scenarios and by cross-checking the models with the past, fairly good projections for the future can be made.

A. Temperature

Figure 8 : Annual mean temperature anomaly 1960-2100

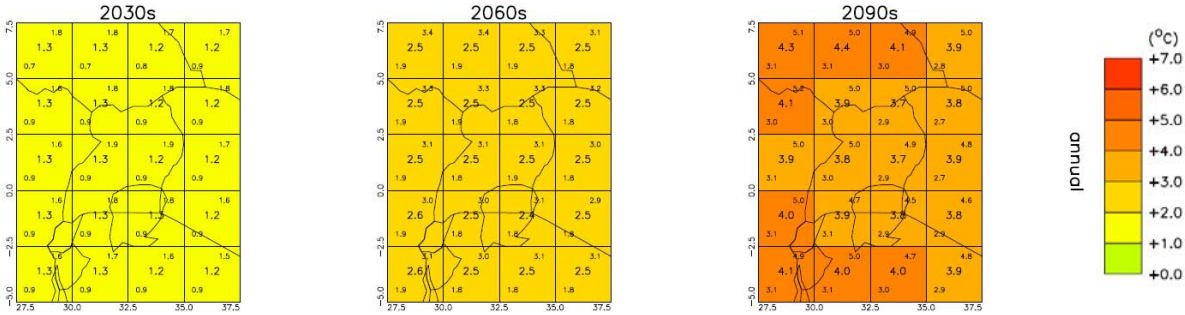


Trends in annual and seasonal mean temperature for the recent past and projected future. All values shown are anomalies, relative to the 1970-1999 mean climate. Black curves show the mean of observed data from 1960 to 2006, Brown curves show the median (solid line) and range (shading) of model simulations ofrecent climate across an ensemble of 15 models. Coloured lines from 2006 onwards show the median (solid line) and range (shading) of the ensemble projections of climate under three emissions scenarios. Coloured bars on the right-hand side of the projections summarise the range of mean 2090-2100 climates simulated by the 15 models for each emissions scenario. Source: McSweeney et al. N/A.

Different models and scenarios from several studies agree on the continuation of the already observed increasing trend in temperatures. Annual average temperatures in Uganda are predicted to increase on the order of 0.8-1.4 °C until 2030 (Tetra Tech ARD 2013), 1.0-3.1 °C until 2060 and, 1.4-4.9 °C for a 2090 horizon (McSweeney et al. N/A) (see Figure 8).

5http://emdat.be/disaster_list/index.html

Figure 9: Spatial patterns of projected change in mean annual temperatures until 2090s



Spatial patterns of projected change in mean annual and seasonal temperature for 10-year periods in the future under the SRES A2 scenario. All values are anomalies relative to the mean climate of 1970-1999. In each grid box, the central value gives the ensemble median and the values in the upper and lower corners give the ensemble maximum and minimum. Source: McSweeney et al. N/A.

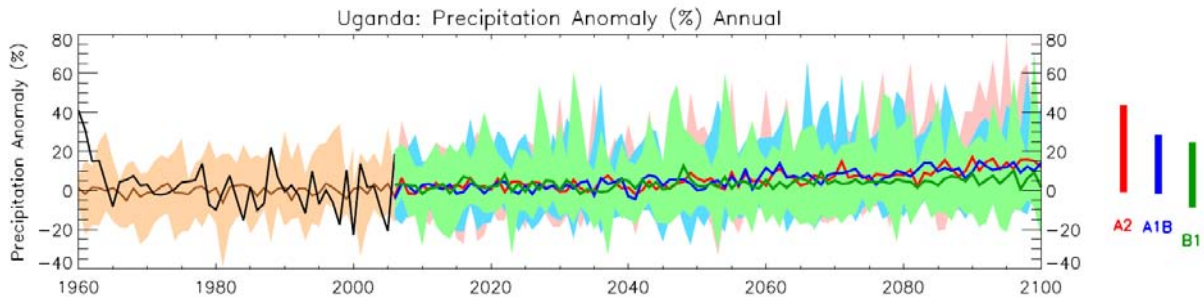
Temperatures are going to increase evenly over whole Uganda. There is no clear spatial pattern (see Figure 9). Furthermore, no season stands out as warming significantly faster than others, although some models predict higher warming rates in the coldest season from July to September, by 1.5-5.4 °C.

Projections indicate significant increases in the frequency of days and nights considered 'hot' in current climate. By the 2060s, 16-43% of days will be 'hot', and 18-73% of days by 2090. 'Hot' nights are projected to increase even faster, occurring on 31-84% of nights by the 2060s and 35-97% of nights by the 2090s. The occurrence of days and nights considered 'cold' in current climate is expected to become exceedingly rare. For a 2090 horizon and under the highest emissions scenarios, they don't occur at all.

B. Precipitation

Developments of future precipitation levels are less certain than the increasing temperatures. Some studies point to a small, but not significant, increase in annual rainfall totals by the 2030s (Tetra Tech ARD 2013). Others (McSweeney et al. N/A) indicate a significant increase in annual rainfall, with ensemble median changes of +7% to +11% for a 2090 horizon (see Figure 10).

Figure 10 : Annual precipitation anomaly until 1960-2100

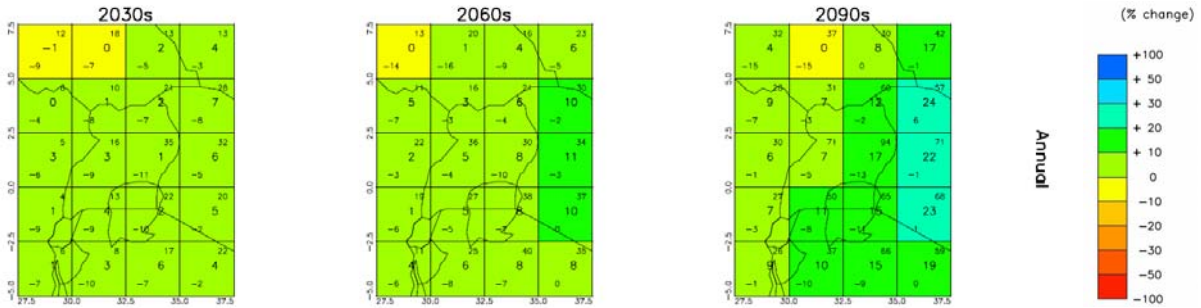


Trends in monthly precipitation for the recent past and projected future. All values shown are percentage anomalies, relative to the 1970-1999 mean climate. Source: McSweeney et al. N/A.

Increases in rainfall are predicted to be highest from December to February, which is historically the driest season. This development could lead to a change of seasonality of rainfall in the future, with the March to May rainy season shifting forwards in time or the September to November rains extending into, what's today, the dry season. Spatial patterns (see Figure 11) suggest stronger increases of annual rainfall in the eastern part of Uganda. Although long

term projections point in an upward direction, precipitation could decrease for a 2030 horizon, depending on the season and the geographical region.

Figure 11: Spatial patterns of projected change in monthly precipitation until 2090s



Spatial patterns of projected change in monthly precipitation for 10-year periods in the future under the SRES A2 scenario. All values are percentage anomalies relative to the mean climate of 1970-1999. Source: McSweeney et al. N/A.

C. Extreme events

Projections indicate an increase of the proportion of rain falling in heavy events with the largest increases being seen in the rainy seasons. Rainfall maxima could increase by 27mm in 1-day events and up to 37mm in 5-day events (McSweeney et al. N/A). Extremely wet and extremely dry years will become more frequent, as suggested by some models (Hepworth 2010). In other words, climate variability will increase further and will result in more frequent and intense extreme weather and climate events such as droughts, floods, landslides and heat waves.

Impacts of Climate Change and Disaster Risks in Uganda

Ongoing changes of Uganda's climate have had severe adverse impacts on different environmental and social resources and sectors, as they increased extreme weather and climate events. Floods like those which occurred in 1997/98 or 2007 resulted into enormous losses of agricultural land, crops and livestock and lead to infrastructure damage and displacement. In a period of 10 years (from 1991-2000) Uganda experienced seven droughts which caused severe water shortage, leading to loss of animals, low production of milk, food insecurity, increased food prices and generally negative effects on the economy. The highlands, which were previously malaria-free, are now invaded by the disease, because of the temperatures rising over the last decades. These impacts will increase in the future, as climate change worsens.

Some sectors are particularly vulnerable to these adverse effects of climate change: Health, agriculture, pastoralism, biodiversity and eco systems, and water resources.

A. Health

Increased temperatures and heavy rainfall can result in shifts in the spread of diseases like malaria or sleeping sickness. In originally malaria-free belts, particularly in the highland ecosystems the populations have no protective immunity which exposes them to high infection rates, morbidity and mortality. Indeed, malaria has been identified as the most serious killer disease. According to the Malaria Control Programme (2002) malaria causes more illness and death in Uganda than any other single disease accounting for about 15-40% of outpatients attendances at health care facilities and about 9-14% of deaths of in-patients. (Government of Uganda 2007)

Floods pose serious pollution problems to sources of drinking water, with the potential danger of outbreaks of cholera and other waterborne diseases such as diarrhea, typhoid and dysentery. Longer dry seasons could increase the incidence and severity of respiratory diseases. Increased workloads in coping with climate change impacts could cause stress and ill health. Furthermore, extreme weather and climate events can weaken the infrastructure of health services and lead to a decrease in quality of medical care (Government of Uganda 2007, McSweeney et al. N/A).

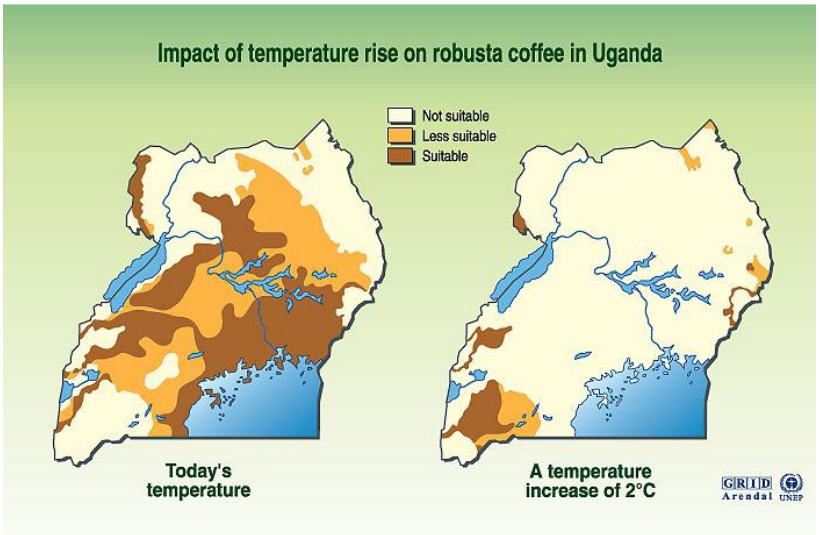
B. Agriculture and food security

Agriculture is the backbone of the Ugandan economy. It employs over 80% of the workforce and accounts for over 20% of GDP. The main export crops, coffee, tobacco and fish, account for 43% of export earnings. Most of Uganda's agriculture is rain-fed and grows food crops for subsistence and the local market.

Climate change affects agricultural production in a diverse and complex manner. While temperature increases lead to extension of growing period for crops in high-latitudes and an increase in yield at higher than normal CO2 level in colder conditions, it is also associated with increased prevalence and emergency of pests and vectors resulting into escalation of diseases. Changing rainfall patterns and intensities affect soil moisture, crop growth at different stages, post-harvest storage conditions, and especially increases in "dry season" rainfall.

While crops such as cassava, which thus far did not do well in the cold zones of the mountains, are now grown in higher altitudes, others such as coffee are endangered by the rising temperatures induced by climate change. According to UNEP's analysis, in a conservative scenario with a 2 °C rise in temperature, conditions for Robusta coffee will become unsuitable across most Uganda's coffee growing area (see Figure 12). As the nation's leading export commodity, the loss of coffee within 30 to 70 years could lead to the loss of US $266 million in exports, 40% of export revenue and 3% of GDP (Hepworth 2010). Further, this could have implications for other commercial crops that are grown, such as paddy rice and cotton.

Figure 12: Impact of temperature rise on robusta coffee in Uganda



Source: Otto Simonett, Potential impacts of global warming, GRID-Geneva, case studies on climatic change. Geneva, 1989.

Table 1: Comparison of the extent of climate related vulnerability by crop

Vulnerability	Coffee*	Matooke	Maize	Beans	Rice	Sorghum	Sweet Potatoes	Cassava
Rising temperature threatens suitability for production	+++	++	++	+	+	+	+	0
Falling soil fertility reduces yields and makes crop more vulnerable to climatic stresses	+++	+++	+++	++	++	++	+	+
Poor moisture retention capacity of soils increases vulnerability to precipitation variability	+++	+++	++	++	++	+	+	+
Pests and diseases increasing with rising temperatures	+++	+++	+	++	++	+	+	-
International prices increasingly volatile as a result of climate change impacts on supply	++	0	++	0	0	0	0	0
High temperatures and unseasonable rain promote rapid spoilage and threaten quality	+++	+++	++	+	0	0	+	+
Rising international concern over carbon footprint may threaten demand for exports	+++	++	0	0	0	0	0	0
Shortages of disease-free planting materials, exacerbated by unreliable precipitation	+++	+++	0	0	0	0	+++	+++
Crop is perishable. Extreme precipitation and flooding make transport more costly & difficult	++	++	+	+	+	+	++	++
Increasing variability of precipitation and extreme events threatens suitability for production	++	++	+++	+++	+++	+	+	+

Key: Relative impact of climate change on various aspects of vulnerability by crop:

+++ Highly Vulnerable
++ Moderately Vulnerable
+ Limited Vulnerability
0 Not Affected

Note: Threat of rising temperatures is much more acute for Arabica coffee than for Robusta

Source: Tetra Tech ARD 2013

But it's not only cash crops that are affected by rising temperatures, increasing rainfall and more frequent extreme events. Food crops like matooke, maize, beans or rice which are essential for Uganda's food security are also vulnerable to adverse effects of climate change, even if not to the same extent. Table 1 summarizes the vulnerability to adverse effects of climate change of the most frequently grown crops in Uganda. Coffee is to be seen as the most important cash crop while maize is the most important subsistence crop.

Furthermore, heavy rains can lead to landslides, land degradation and soil erosion. The latter accounts for over 80% of the annual cost of environmental degradation representing 4-10% of GNP and estimated at about US $625 million per annum (Government of Uganda 2007). The problem is exacerbated by deforestation through increased demand for firewood, charcoal and arable land.

Another key sector in the Ugandan economy and an important source for food is fishery. It is estimated that over 200,000 Ugandans are directly involved in the fishing industry and fish are the second largest export earner, bringing revenue of US$125 million in 2007 (Hepworth 2010, Government of Uganda 2007). Prolonged droughts result in lower water levels in Uganda's lakes which can lead to lower fish yields and, together with poor agricultural production, to severe food shortages.

C. Biodiversity and eco systems

Forest products (timber, poles, rattan, bamboo, food, fodder, medicine, and firewood etc.) and services (biodiversity habitat, moderating of micro climate, shade and wind breaks for enhancing agricultural productivity) play a very important role in the social and economic development of Uganda. Forests are especially pivotal to the rural communities' livelihoods. For example, over 99% of Uganda's rural people use wood or charcoal as fuel. Forests play also

an important role in moderating climate, particularly microclimate (Government of Uganda 2007).

Today, deforestation is the main environmental issue confronting Uganda's forests, Savannah woodlands and bush land. Deforestation is caused by a number of factors, including population increase and poor agricultural practices. But climate change is also an issue because the distribution of plants and animals is determined by temperature and moisture patterns. According to Hopkins bioclimatic law, for every three degrees Celsius rise in temperature, there is a northward shift in vegetation of 250km. The disappearance of medicinal plant species has already been reported. This is serious because a large proportion of the rural population depends on direct herbal medicine to treat a wide range of ailments. Also, dry conditions and prolonged droughts frequently lead to outbreaks of fire that degrade forests resulting in serious environmental consequences (Government of Uganda 2007).

Uganda, with a convergence of seven major biogeographic regions, is extremely rich in biodiversity, having over 1,000 bird species (over 11% of the world total). There are at least 345 known mammal species, 165 reptile species, 43 amphibian species, 49 fish species and 4900 known species of higher plants. Climate change induced changes are likely to affect wildlife in various ways. The impacts manifest through a number of extrinsic and intrinsic reactions. In wildlife, extrinsic behavior involves movement to hostile environment in search of food and water. Intrinsic manifestations involve imbalance in physiology leading to phenomena, such as reduced immunity and also hormonal imbalance giving rise to disruption in reproduction. Also, the drought-induced movement contributes to increased tendency of wild animals to hide, thus making the affected protected areas less attractive to tourists (Government of Uganda 2007). According to the National Biodiversity Data Bank (NBDB), Uganda's biodiversity index shows an alarmingly and steadily decreasing trend, reaching roughly 70% of the 1960-level in 2010[6].

D. Water resources

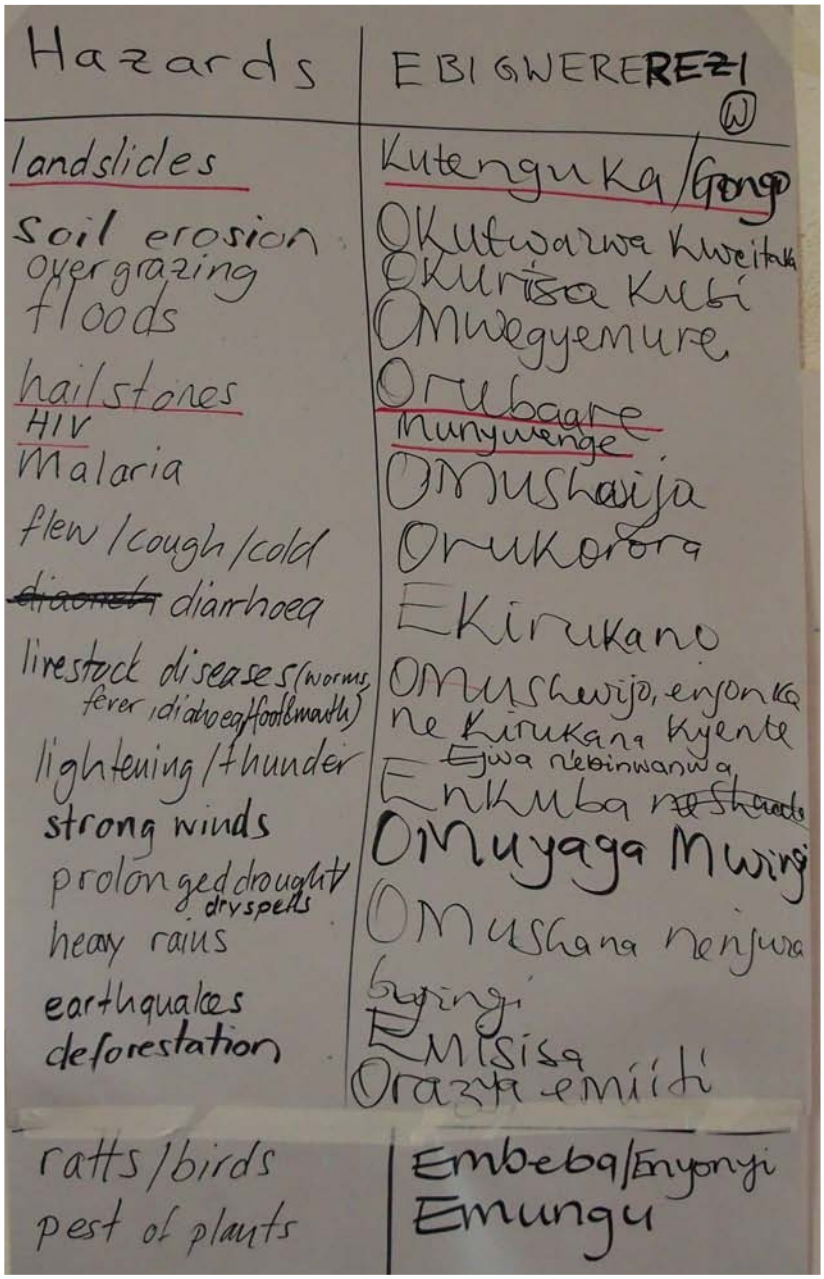
Uganda has abundant water resources although its distribution is not even, particularly in the semi-arid areas of the country. The rainfall in good years offsets the water distribution prob

lems particularly during the rainy season. Streams, which a large proportion of the population depends upon, tend to dry up during droughts causing serious stress for a large proportion of the rural communities. The scarcity of water in such areas has resulted in movements into neighboring districts in search for pasture and water. These movements have frequently led to ethnic conflicts and disruption of production, affecting the development of these communities. The water scarcity in the dry land areas is likely to worsen with climate change (Government of Uganda 2007).

Although precipitation is projected to increase, additional recharge and run-off may be offset by the grater evaporative losses brought by higher temperatures. In addition, heavy rainfall, leading to floods and landslides, complicates water management and is likely to affect both the availability and the quality of water, which in turn impacts on livelihoods (Hepworth 2010, McSweeney et al. N/A). Prolonged and severe droughts can lead to low water levels in lakes, rivers, underground aquifers and reservoirs, impacting on the hydrology, water supply and the potential for hydropower generation (Government of Uganda 2007).

6 National Biodiversity Data Bank (NBDB): http://nbdb.mak.ac.ug/index.php/ugandas-biodiversity

2.1.2 Hazard Map or alternative exercise



Hazards	EBIGWERE REZI (W)
landslides	Kutenguka/Gongo
soil erosion	Okutwarwa kweitaka
overgrazing	Okurisa kubi
floods	Omuegyemure
hailstones	Orubaare
HIV	Munywenge
Malaria	Omushaija
flew/cough/cold	Orukorora
~~diaoneh~~ diarrhoea	Ekirukano
livestock diseases (worms, fever, diarrhoea, footmouth)	Omushwija, enyonka ne kirukana kyente
lightening/thunder	Ejwa nebinwanywa
strong winds	Enkuba ~~ne shuts~~
prolonged drought/dryspells	Omuyaga Mwingi
heavy rains	Omushana nenjura
earthquakes	bayingi
deforestation	Emisisa
	Orazya emiiti
ratts/birds	Embeba/Enyonyi
pest of plants	Emungu

Figure 13: Alternative exercise to identify hazards of women group

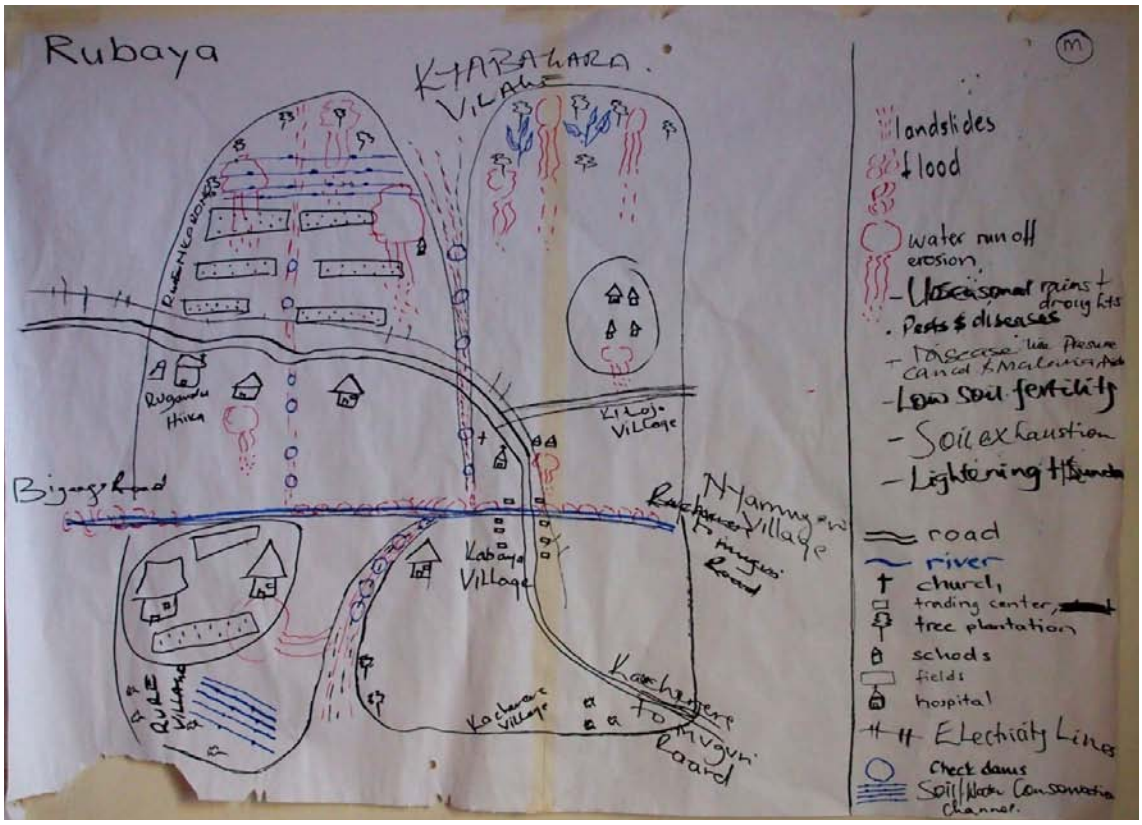


Figure 14: Hazard map of men group for Rubaya

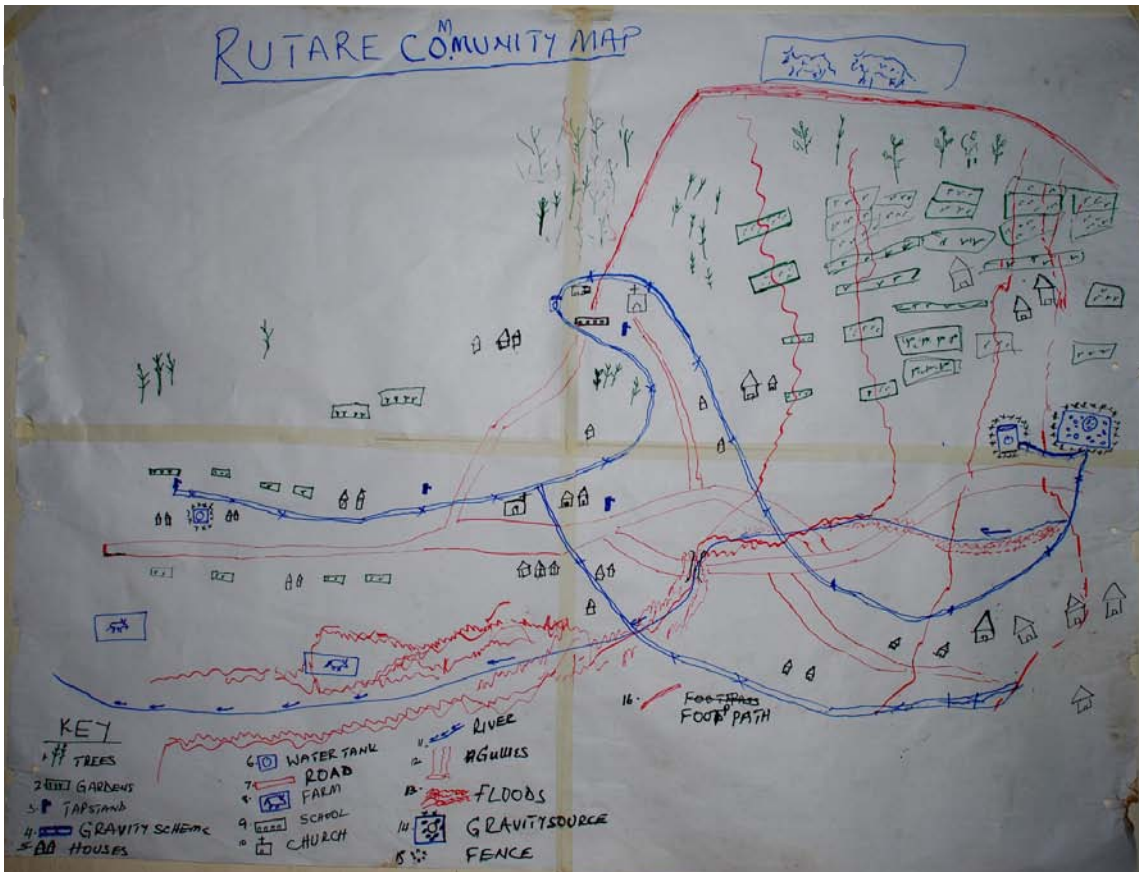
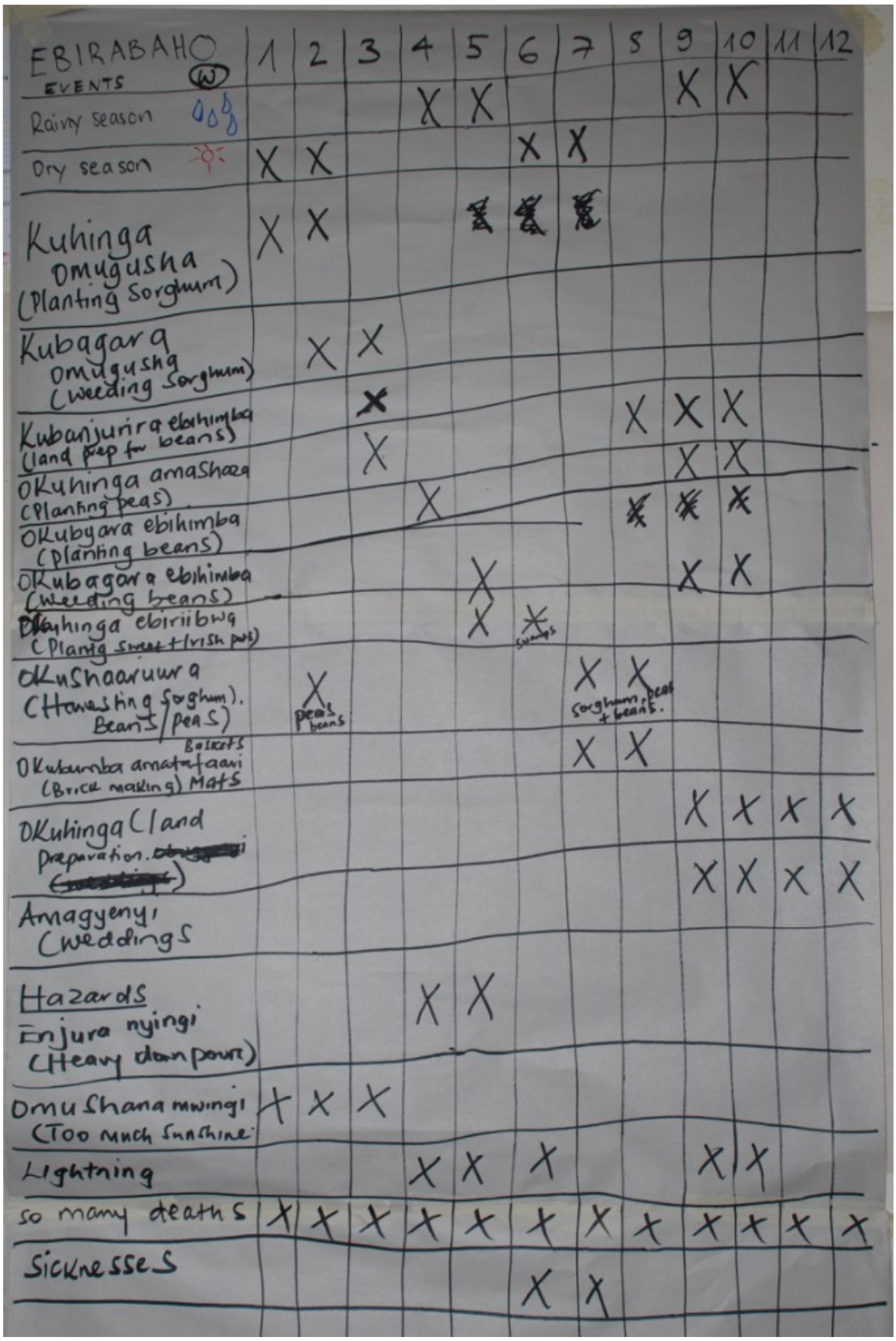
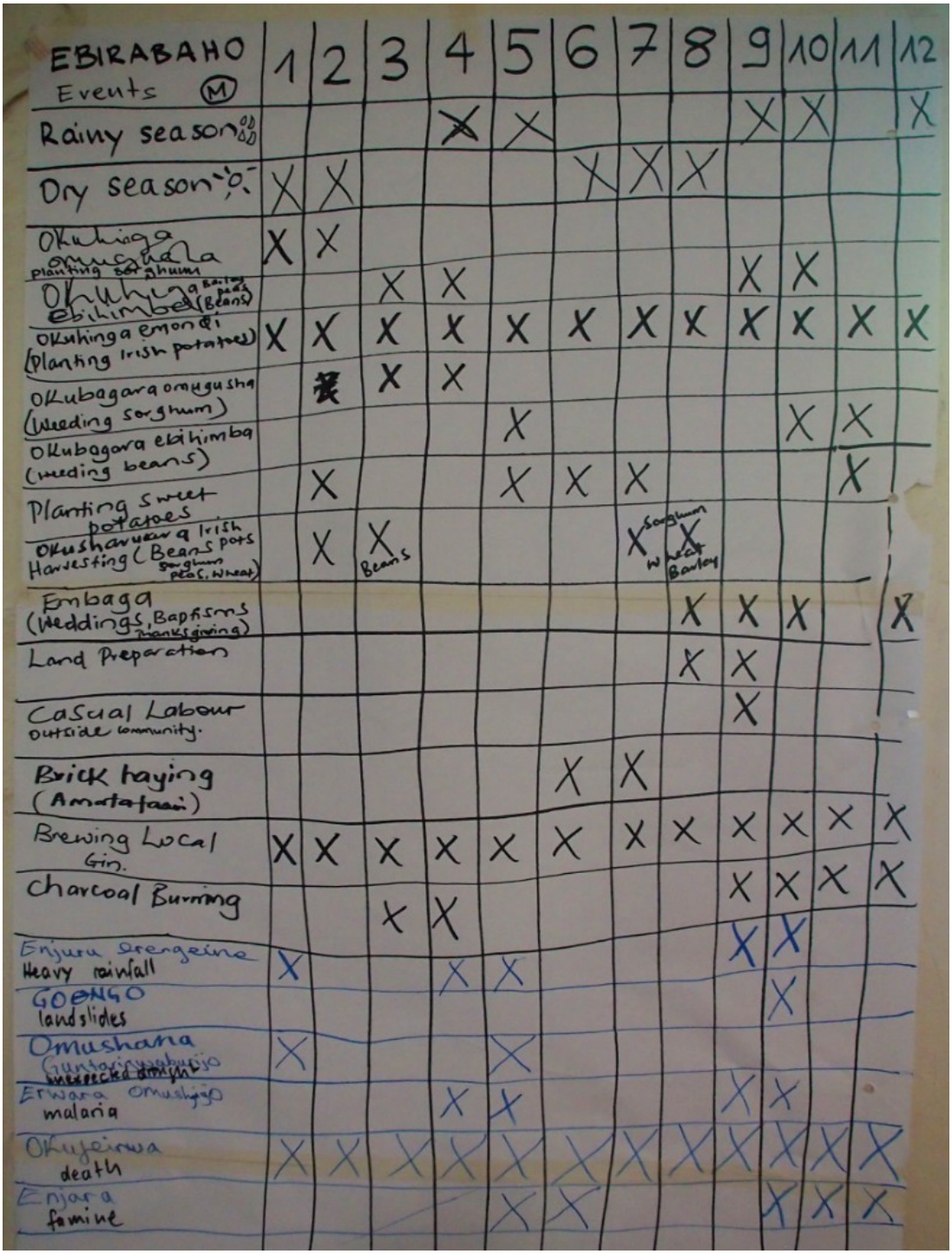


Figure 15: Hazard map of men group for Rutare



EBIRABAHO EVENTS (W)	1	2	3	4	5	6	7	8	9	10	11	12
Rainy season				X	X				X	X		
Dry season	X	X				X	X					
Kuhinga omugusha (Planting Sorghum)	X	X			X	X	X					
Kubagara omugusha (weeding Sorghum)		X	X									
Kubanjurira ebihimba (land prep for beans)			X					X	X	X		
OKuhinga amashaza (Planting peas)			X						X	X		
OKubyara ebihimba (planting beans)				X				X	X	X		
OKubagara ebihimba (weeding beans)					X				X	X		
OKuhinga ebiriibwa (Planting sweet/Irish pots)					X	X sweetpots						
OKushaaruura (Harvesting Sorghum). Beans/peas)		X peas beans					X	X Sorghum, peas + beans.				
OKukumba amatafaari (Brick making) Mats Baskets							X	X				
OKuhinga (land preparation. [redacted])									X	X	X	X
Amagyenyi (weddings									X	X	X	X
Hazards Enjura nyingi (Heavy down pour)				X	X							
Omushana mwingi (Too much sunshine	X	X	X									
Lightning				X	X	X			X	X		
so many deaths	X	X	X	X	X	X	X	X	X	X	X	X
Sicknesses						X	X					

Figure 16: Seasonal calendar of women group in Kabale District



EBIRABAHO Events (M)	1	2	3	4	5	6	7	8	9	10	11	12
Rainy season				X	X				X	X		X
Dry season	X	X				X	X	X				
Okuhinga omugusha (planting sorghum)	X	X										
Okuhinga ebihimbe (planting peas, Beans)			X	X					X	X		
Okuhinga emondi (planting Irish potatoes)	X	X	X	X	X	X	X	X	X	X	X	X
Okubagara omugusha (Weeding sorghum)		X	X	X								
Okubagara ebihimba (weeding beans)					X					X	X	
Planting sweet potatoes		X			X	X	X				X	
Okusharuura Irish Harvesting (Beans pots sorghum peas, Wheat)		X	X Beans				X Sorghum Wheat	X Barley				
Embaga (Weddings, Baptisms Thanksgiving)								X	X	X		X
Land Preparation								X	X			
Casual Labour outside community.									X			
Brick laying (Amatafari)						X	X					
Brewing Local Gin.	X	X	X	X	X	X	X	X	X	X	X	X
Charcoal Burning			X	X					X	X	X	X
Enjura Irengeine Heavy rainfall	X			X	X				X	X		
GOENGO landslides										X		
Omushana Guntorinyuburio	X				X							
Erwara omushaga malaria				X	X				X	X		
Okufeirwa death	X	X	X	X	X	X	X	X	X	X	X	X
Enjara famine					X	X				X	X	X

Figure 17: Seasonal calendar of men group in Kabale District[7]

7 Notes: (1) Potatoes are planted the whole year around. IN the rainy season on the hills, during the dry season in the swamps in the valley. (2) Charcoal burning is mainly done in the wet season because the market prices are them best. (3) January is supposed to be a month with rain and dry spells. Now they have only unexpected long dry spells. (4) Famine is normally in May/June and from October to December a problem. This seems to be strange directly after harvest season. The men explained that the harvest is either sold and used to pay school fees or kept as seeds but not really used as food.

Hazards mentioned by participants for Kabale District:

- (w, m) landslides
- (w) soil erosion
- (w) overgrazing
- (w, m) floods
- (w) hailstones
- (w, m) Human diseases; HIV, malaria, flew/cough/cold, diarrhea, high pressure, cancer
- (w) Livestock diseases:worms, fever, diarrhea, foot and mouth
- (w, m) lightening /thunder
- (w) strong winds
- (w) prolonged drought /dry spells
- (w, m) heavy rains
- (m) unseasonal rains and drought
- (w) earthquakes
- (w) deforestation
- (w) rats/ birds
- (w, m) pest and diseases of plants
- (m) overuse, high population growth
- (m) accidents

Observed changes by men (m) and women (w) over the last 15 years:

Shift of seasons

- (w, m) planting of sorghum and beans earlier, already in April/ May instead of May/ June and September / October instead of October/ November
- (w) planting climbing beans and maize earlier due to improved seeds
- (w, m) planting Irish potatoes all year around- in the past it was twice per year

Unpredictability

- (w) dry season starts earlier and takes longer
- (m) dry season got irregular
- (w) unseasonal rainfall
- (m) unpredictable rainfall all year around
- (m) concerning the rainy season men were not sure. Some said it is more or less stable and that in October the rainfall got stronger then in April. Others said that the rainy season got unpredictable.

Change of frequency and intensity of hazards:

- (w, m) landslides in Rutare increased
- (m) landslides in Rubaya decreased
- (w, m) floods in Rutare increased, in Rubaya decreased due to IWRM interventions
- (w, m) lightening thunderstorms increased
- (w) hailstones increased and destroy the fields and reduce job offers, thus also the income is affected
- (w) strong winds increased
- (w) malaria decreased due to nets, despite breeding increased
- (m) malaria increased
- (w) diarrhea decreased
- (w) frequency and intensity of heavy rainfalls in April, May and October, November increased
- (m) heavy rainfall increased
- (w) exotic livestock diseases increased
- (m) crop and pest diseases increased
- (w) HIV as new hazard
- (m) HIV, cancer and high blood pressure increased
- (w) number of deaths increased due to malaria, lightening, accidents, HIV
- (m) accidents increased
- (w) deforestation increased
- (w) number of rats increased
- (m) overuse, high population growth increased

Comments on results

The main natural hazards identified in the workshops were landslides (men = m, women = w), hailstones (w), HIV (w), human diseases (w) and soil exhaustion (m). Generally women and men mentioned more or less the same major hazards occurring in Kabale District. Additionally men mentioned hazards like overuse/ high population growth and accidents, whereas women mentioned livestock diseases, earthquakes, hailstones and deforestation.

Generally most of the observed climate changes by the farmers are consistent with scientific assessments on the impacts of climate change in Uganda:

- Shift of seasons and unpredictability: the observations of farmers are also more or less consistent with scientific observations as rainfall got irregular from year to year and during the year and is therefore more unpredictable. As contrary as the observations of farmers are as unsure are also the predictions of scientist. Certain is only that unpredictability and inter-annual variability are changing

- Frequency and intensity of hazards: also the observed increasing frequency and intensity of landslides, floods, lightening thunder and hailstorms is consistent with scientific observations. Whereas landslide frequency increased in Rutare, it decreased in Rubaya mainly due to the IWRM interventions. Even that malaria is a relatively new in the highland area, the prevention with mosquito nets seems to stabilize (some locals mentioned increasing others decreasing number of cases) malaria cases.
- various: The observed reduction of water borne diseases like diarrhea is certainly a positive impact of KDWSP's work on hygiene promotion. It is also very obvious that in Rubaya the measures against soil erosion, landslides etc. are very effective as the population mentioned decreasing frequency of floods and landslides.

Finally it should be mentioned that not all mentioned hazards are related to climate change. Some of them are due to human degradation or pollution (e.g. overuse, high population growth, deforestation).

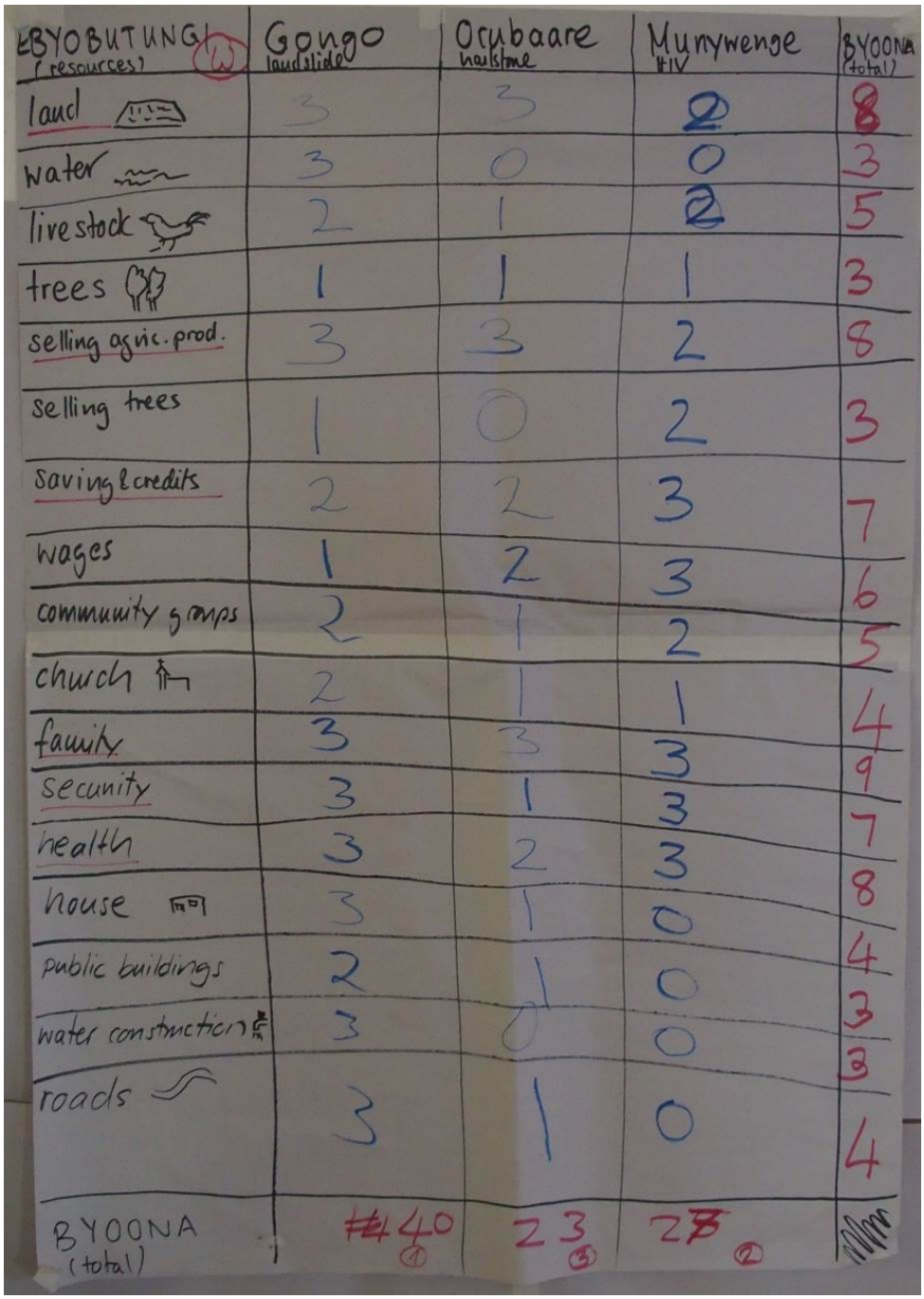
In the seasonal calendar some slight differences can be observed in identifying activities between men and women. Men mentioned additionally typical male activities as casual labor, gin brewing, charcoal burning or brick tying. Women whereas mentioned additionally typical female activities as mats and basket making.

Thus, it is worth to consider the projections of climatic and disaster risks in future project work to strengthen the population's adaptive capacities and to reduce their vulnerability to climatic and disaster risks.

2.3 Participatory Vulnerability and Capacity Analysis (M3/E1 and E2)

With the exercise "vulnerability matrix" the farmers identified the most important livelihood resources in their daily life in Kabale district. In a second step, the impact for the most important climatic and disaster risks on the livelihood resources is rated. Finally the row and columns are summarized and the hazard ranked and the most vulnerable livelihoods identified.

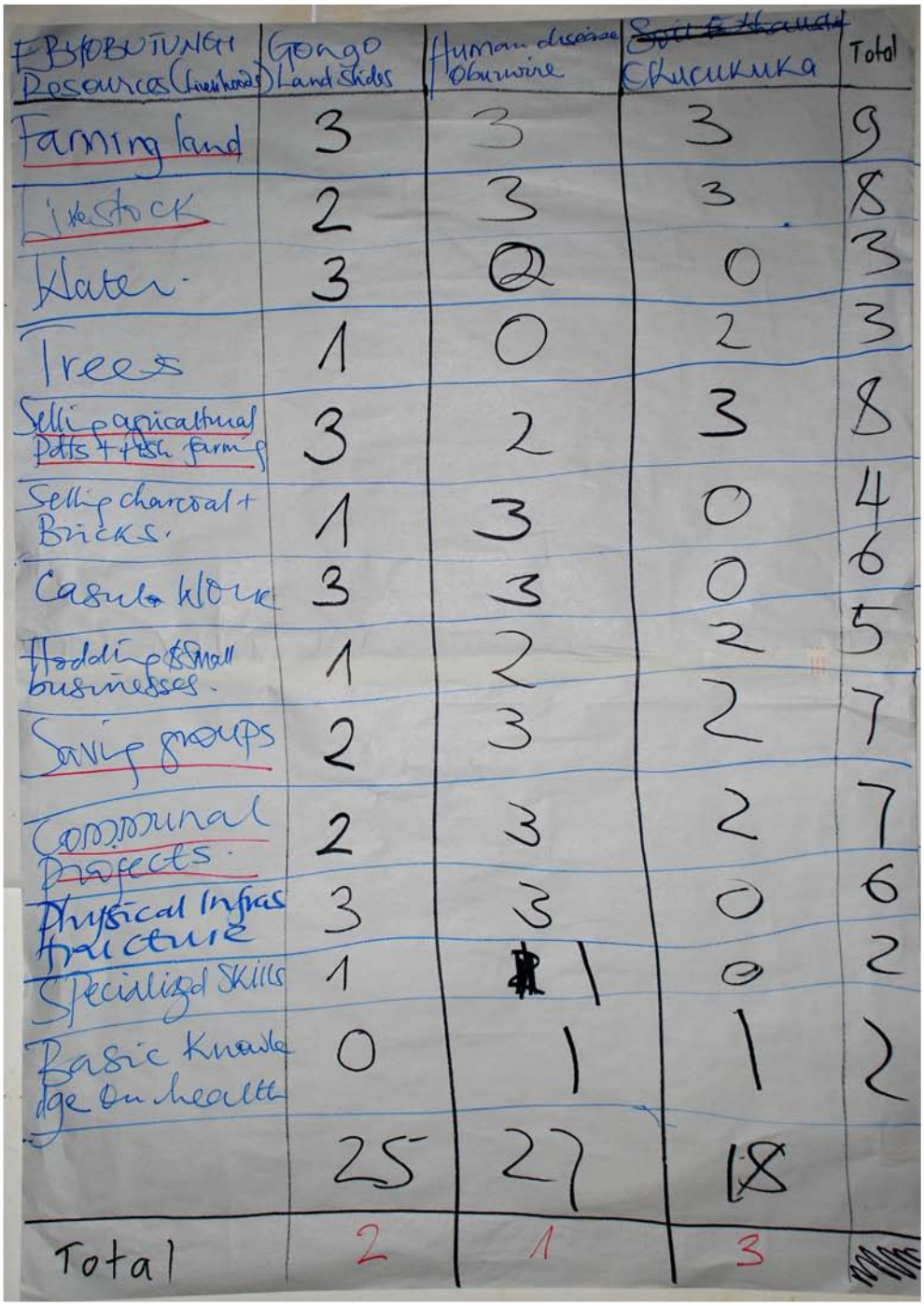
Figure 18: vulnerability matrix of women group in Kabale District[8].



EBYOBUTUNGI (resources)	Gongo landslide	Ocubaare hailstone	Munywenge HIV	BYOONA (total)
land	3	3	2	8
water	3	0	0	3
livestock	2	1	2	5
trees	1	1	1	3
selling agric. prod.	3	3	2	8
selling trees	1	0	2	3
saving & credits	2	2	3	7
wages	1	2	3	6
community groups	2	1	2	5
church	2	1	1	4
family	3	3	3	9
security	3	1	3	7
health	3	2	3	8
house	3	1	0	4
public buildings	2	1	0	3
water construction	3	0	0	3
roads	3	1	0	4
BYOONA (total)	~~44~~ 40 (1)	23 (3)	28 (2)	

8 Notes during evaluation: (1) hailstones impact on wages: hailstones destroy fields and yields. Therefore less jobs are offered. (2) HIV's impact on livestock: livestock is affected by HIV because sick person can not take care

Figure 19: vulnerability matrix of Kabale district by men[9]



EBIBOBUTUNGI Resources (Livelihoods)	Gongo Land Slides	Human disease Obuzwire	~~Soil & Health~~ Ekuruuka	Total
Farming land	3	3	3	9
Livestock	2	3	3	8
Water	3	0	0	3
Trees	1	0	2	3
Selling agricultural Potts + fish farming	3	2	3	8
Selling charcoal + Bricks.	1	3	0	4
Casual work	3	3	0	6
Trading small businesses.	1	2	2	5
Saving groups	2	3	2	7
Communal Projects.	2	3	2	7
Physical Infrastructure	3	3	0	6
Specialized Skills	1	1	0	2
Basic Knowledge on health	0	1	1	2
	25	27	18	
Total	2	1	3	

9 Notes during evaluation: (1) impact of landslides on specialised skills: men rated 1 because they can not access the necessary resources. It was a long discussion around that knowledge is rated and not the equipment. Nevertheless men sticked to their rating.

Comments on results

Men and women mentioned mainly the same natural and physical resources, and partly the same financial resources whereas social and human resources were completely different. Nevertheless they were strongly gender related due to their daily work and duties. Women and men mentioned different financial, human and social resources. Both mentioned as financial resource saving and credits and selling of agricultural and fish products, additionally women mentioned selling trees, wages, whereas men mentioned selling charcoal and bricks, casual work, small business. Concerning human resources, men mention specialized skills and basic knowledge on health, whereas women emphasized security and health. For the social resources the women pointed out church community and family, while men choose communal projects.

Landslides (w) and human diseases (m) are the hazards with the highest impact on farmer's livelihoods affecting nearly all resources. The following resources are affected (at least 7 points in a sum for all three risks) by landslides (w, m), human diseases (m). HIV (w), hailstones (w) or soil exhaustion (m):

- Natural resources: livestock (m), farming land (m, w)
- Financial resources: selling agricultural and fish products (m, w), saving and credits (m, w)
- Social resources: communal projects (m), security (w), family (w)
- Human resources: health (w)

The most vulnerable resources are natural, financial, social and human resources. Men and women rated some similar livelihood resources vulnerable for the different risks and others completely different. Physical resources have a very low vulnerability as the hazards are not affecting them. Most of the financial resources depend on natural resources. Therefor it might be that during some crisis natural resources are sufficient to ensure food security, but there is nothing left to sell and to get financial resources for other needs. In the worst case, the natural resources are even not sufficient for food security. And latter might worsen with the projected climatic changes. Therefore adaptation will become ever more important.

2.4 Hazard-Impact-Coping Strategies

In an exercise the female and male farmers of Kabale District identified the main impacts of drought (m= men and w= women), deforestation (men) and human diseases (women) and their coping strategies.

Risk	Impact	Coping strategies	Effectiveness	Sustainability
landslides	• (m) soil washed away • (m, w) destruction of infrastructure (houses, bridge, roads) • (m, w) loss of livestock • (m, w) crop washed away • (w) famine • (w) displacement of famines • (m) soil exhaustion • (w) diseases • (m) springs submerged • (m, w) human deaths • (m) displacement of people • (w) affects household income	• (m, w) construction of water conservation channels • (m, w) terracing steep slopes • (m) shifting to safer places • (m) use of compost manure to increase crop yields/ food production • (w) seeking medical care • (w) community sensitization and awareness raising on the stare of affairs • (m) community service/ maintenance of infrastructure • (m) repair/ routing maintenance • desilting of conservation channels • (w) seek government assistance	• (m) Soil conservation • (m) increased crop yields • (m) increased incomes • (m) increased fodder grass • (use of organic manure) • (w) reduction of run off and crop destruction • (w) check soil erosion and run off • (w) increased yields hence food security • (w) increased communities resilience	• (m) Land owners and government to keep enforcing • making by-laws and enforcing them • (w) sustainable because the knowledge and skills remain with the community members • (w) cheap and easy to maintain (use of locally available resources)
Human diseases (m), HIV	• (m, w) Orphan children • (w) increase in number of widows and widowers • (m, w) increased mortality • (m, w) poverty increase due to lack of working and over expenditure on treatment • (m, w) loss of hope, desperation • (m) famine, hunger	• (m) training by village health committees that people should go to hospitals and protect themselves • (w) community sensitization and awareness raising on danger of HIV/aids • (w) encouraging HIV testing and counseling • (m) counseling	• (m) No time • (w) reduced stigmatization • (w) positive living • (w) behavioral change • (w) reduced HIV infections	• (m) No time • (w) skills and knowledge and attitude change will remain in community

Risk	Impact	Coping strategies	Effectiveness	Sustainability
(w)	• (m) loss of time for production • (w) loss of production manpower • (m) more elderly people looking after orphan • (m) poor stewardship of resources • (w) increasing school drop outs • (w) increased domestic violence	• (use of organic manure) • (m) teaching people in crime prevention • (w) zero grazing • (w) abstinence		
Soil exhaustion (m)	• (m) famine • (m) poverty line level • (m) displacements • (m) lack of school fees • (m) theft of food and money • (m) robbery • (m) destruction of natural resources • (m) increase in defacement cases • (m) increase of street children	• (m) organic manure • (m) hedge rows • (m) conservation channels • (m) making saving and credit groups • (m) family planning • (m) crime prevention • (m) teaching young girls to wait until the right time to marriage	• (m) No time	• (m) No time
Hailstones (w)	• (w) loss of crops • (w) famine • (w) loss of lives and livestock • (w) affects household income • (w) destruction of roofing material • (w) increased diseases	• (w) none	• (w) no time	• (w) no time

In a very shortened discussion about the efficiency and sustainability of the coping strategies the farmers mentioned:

- (m, w) that a lot of the strategies for landslides especially in Rubaya are very effective and also sustainable. Most of them are new strategies coming along with the IWRM approach. In contrary in Rutare some of this strategies are not applied and the population would like to learn from Rubaya to implement them as well.

- (w) Women could not identify any coping strategies against hailstones were therefore a bit disappointed not to know how to confront this risk.

Comments on results for impact and coping strategies

Generally, men and women mentioned quiet similar impacts on all their resources as well as a big range of coping strategies to tackle the impacts of all risks (except for hailstone).

Efficiency and sustainability of coping strategies

A discussion in the workshop with men and women highlighted: Both communities apply a broad range of mostly effective and sustainable coping strategies. Most strategies are due to the interventions of the project work e.g. construction of water conservation channels. Therefore also not all coping strategies are applied in both communities. Rubaya has a broader range of effective and sustainable coping strategies as they are already applying the IWRM approach in their area. It is a mix of preventive and reactive strategies. Contrary Rutare population was very impressed by their strategies and asked to learn from Rubaya community.

Nevertheless, the population lacks sufficient preventive and reactive strategies, for especially hailstones. Women did not know how to tackle this risk and seemed to be a bit helpless.

2.5 Participatory Identification of Adaptation Strategies (M4/E1)

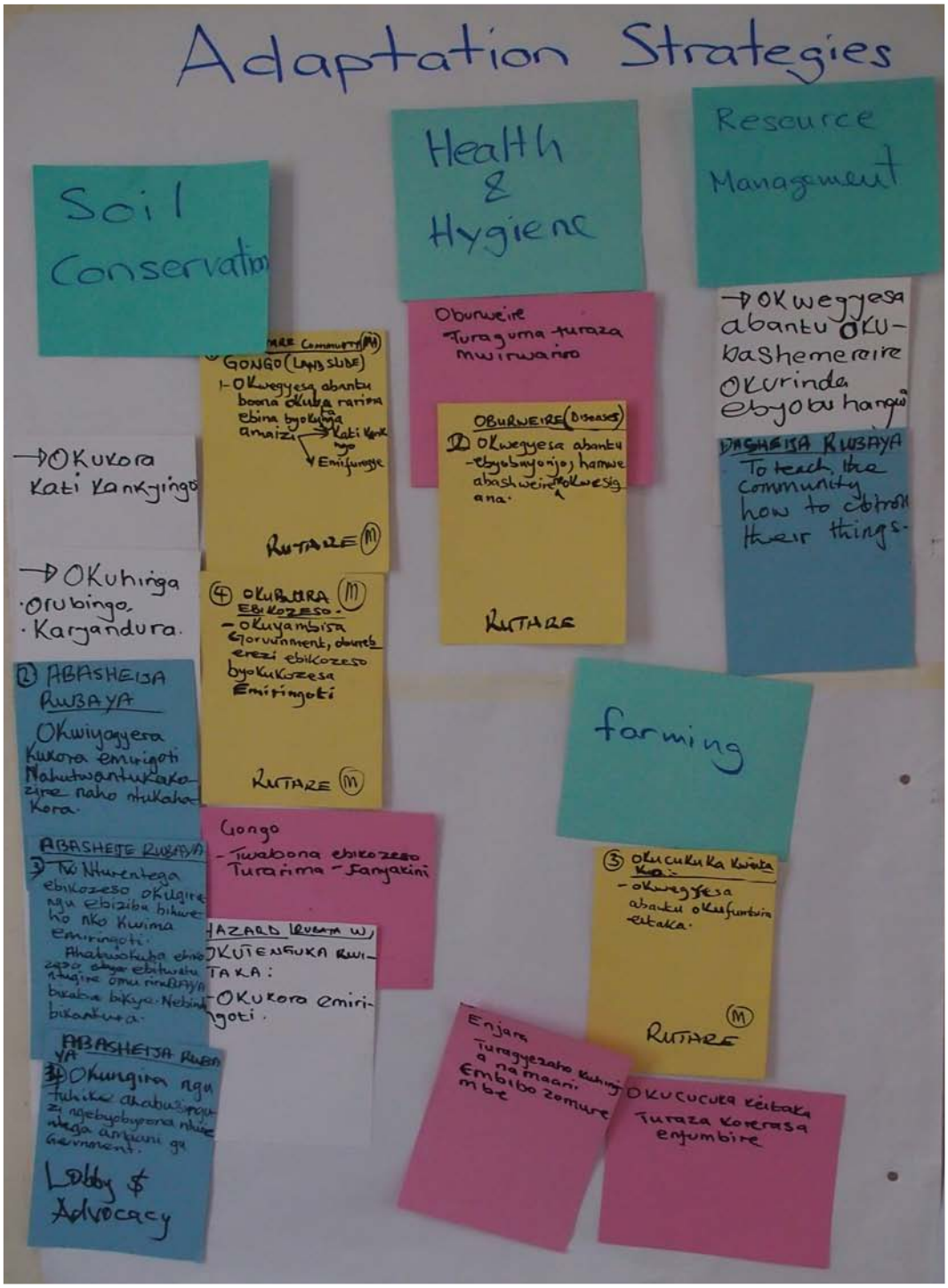


Figure 20: identified adaptations strategies from men and women in Rubaya and Rutare

During a meeting with the women and men group, the participants prioritized adaptation strategies for their two communities in Kabale District. The exercise was done in separated women and men groups accordingly to their communities.

Mainly four areas of action were identified:

(1) Soil conservation strategies: check dams, water channels etc.
(2) Health and hygiene strategies:
(3) Resource management:
(4) Organic farming strategies: organic fertilizers and pesticides, tillage technics

2.6 Project's Mitigation Capacities (M5/E1)

This section deals with the project's impact on greenhouse gas emissions, and essentially consists of looking at some potential sources or sinks for greenhouse gases (GHG), and analyyzing what the project's impact on those sources is. The evaluation is purely qualitative, as no emissions or sink measurements have been conducted. Due to time problems the exercise was skipped.

2.7 Project Revision (M6/E1)

Based on the results of all exercises, this section seeks to identify project revisions or the design of new activities. As time was insufficient, we could only discuss shortly on the way ahead. The following aspects were pointed out:

- All identified strategies are part of Diocese Kigezi's project work which was not always the case in past project analysis.
- The identified strategies foster the pilot project in Rubaya. The project analysis pointed clearly out the positive impact of the IWRM in Rubaya. It will be considered for the next program phase starting in April 2015
- The identified activities will be considered and integrated as much as possible into the next project phase

3 Lessons Learned from the Application of the Tool

The climate change analysis presented in this report is the twentieth conducted with the HEKS and Bread for All "Participatory Assessment of Climate and Disaster Risks (PACDR)". Besides evaluating a specific project, the application of the tool also aimed at testing and improving it. The following lessons were drawn:

- The experience in the seventeen countries worldwide and in the tenth on the African continent confirms the suitability of the tool in very different environments.
- The concept of using one day for project visit, two days for gender separated workshops with farmers, and a last day to present all workshop results to women and men as well as to discuss adaptation strategies was appropriate.
- Also the concept that project staff participated as trainees and instructed exercises themselves was appreciated. It allowed project staff to apply the gained knowledge (during the CC and DRR training in Kampala) in practice. The Bread for all expert supported the project staff whenever needed.
- The introduction of the issue climate change was a challenge: how is climate change caused? What are the impacts? Who is responsible for climate change? Etc. It is essential for the participants to understand it. But it is very hard to break it down to a simple and understandable issue without loosing the correctness.
- The consultations with each group of beneficiaries, namely men and women were quiet long and overloaded. This was due to a long journey of 2 hours one way which also shortened the available time on place. Therefor only the introduction was done in the plenum. All exercises were done in separated groups with half women of Rubaya and half women of Rutare. This means that in most exercises only 6 women participated which is a bit a low number to be still representative. Also, the amount of exercises with farmers was at the limit as sometimes the discussion was difficult.
- The workshop participants were very interested in learning and understanding climate change. The challenge is to collect information of farmers and at the same time giving a feedback. Therefor the concept of trainees facilitated the interpretation and translation.
- Coordinators were very happy with the process, too, and looked at it as capacity building for themselves. They thought it will help them to stimulate the next program phase which they are currently working on.

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