DEVELOPMENT FOR RESULTS-BASED MONITORING, EVALUATION AND AUDITING PROJECT

MAPPING RURAL ICT ADOPTION, KNOWLEDGE MANAGEMENT, ECOSYSTEMS AND LIVELIHOODS IN THE CONTEXT OF MDG ACCELERATION FRAMEWORK (MAF) PILOT PROJECTS

BUKOBA RURAL DISTRICT

DRAFT CONSOLIDATED REPORT

(*Summary of the 4 Reports*)[1]

Submitted by

Economic and Social Research Foundation
51 Uporoto Street (Off, Ali Hassan Mwinyi Rd.) Ursino Estate
P.O. Box 31226 Dar-es-Salaam
Tel +255 22 2760260, Fax +255 22 2760062
Web: www.esrftz.org

September 2013

---

[1]*Details of the findings and the Proposed Strategic Interventions of the 4 studies can be obtained from the respective Volumes*

TABLE OF CONTENTS

LIST OF FIGURES AND BOXES

1.0 INTRODUCTION

1.1 Background Information

Tanzania is one of the 189 nations, which endorsed the Millennium Development Goals (MDGs) in September 2000 as part of the internationally agreed upon development goals at the General Assembly of the United Nations (URT 2011). Since the endorsement of the MDGs, Tanzania integrated the MDGs into its short and medium-term development programmes, including the National Strategy for Growth and Reduction of Poverty (NSGRP) I and II, the Poverty Monitory Master Plan, the Poverty Reduction Plan and the Zanzibar Growth and Reduction of Poverty I and II, and the National Five Years Development Plan (NFYDP). These medium term policies are also aligned with the long-term policy frameworks such as the National Long Term Development Plan, and Development Vision 2025 for the Mainland as well as Vision 2020 for Zanzibar.

By 2008 the MDGs performance were unsatisfactory particularly because with exception of MDG 2 (Primary School Net Enrolment rate) and MDG 6 (HIV prevalence), the country was not doing well in the remaining six MDGs (URT 2008). This is what impelled and compelled Tanzania to advocate for sound policies and institutions at national, local and community level to ensure sustainable progress and building capacity at local level in identifying and understanding specific characteristics of poverty groups and establish mechanisms that respond to demand (URT 2008). This initiative was implemented under MDGs Localization[2]. Another assessment of 2010 indicated that Tanzania is on track to achieve its MDGs related to primary education enrolment (MDG2), gender equality (MDG3), some targets related to combating the spread of HIV/AIDS (MDG6) and some indicators (i.e. proportion of urban population using an improved drinking water source.) under MDG7 namely, the environmental sustainability goal (URT 2010). However it found that unless there was strengthened, concerted effort and commitment to accelerate delivery, most other targets are unlikely to be achieved, notably those critical ones directed towards relieving extreme poverty and hunger (MDG1), improving maternal health (MDG5), two components of MDG 7 (environmental sustainability) namely, proportion of rural population using an improved drinking water source, and proportion of people (both rural and urban) with access to improved sanitation, some components of MDG 3 (To promote gender equality and empower women) namely, ratio of females to males in tertiary education, and proportion of women among members of Parliament, and MDG 8 (Develop a global partnership for development). MDG 1 in particular is off track and expected not to be achievable by 2015.

To speed up achievement of the MDGs the UNDP and other development partners developed initiatives including Access to Information (ATI), MDG Acceleration Framework (MAF), and continuation of the MGD localization project. The aim was to shorten the time required to achieve the MDGs targets and improve the well-being of the majority of the population.

---

[2]This is also known as MDG adaptation of global targets at local level or national context (Local Actions for Global goals)

The localization project, piloted in four districts of the country, focused on five key sectors: Water, Education, Health, Infrastructure (Roads) and Agriculture. The underlying assumption of the initiative was that enhancing demand for and supplying information at the local level will improve the quality of local governance, the use of relevant local government information by the public and basic services delivery; this in turn will eventually reduce poverty and accelerate the pace of achieving the MDGs. Thus the project explored the contents of the Management Information Systems (MIS) of Ministries, Departments and Agencies (MDAs) and how information flows to the Regional Secretariat (RS) and on to the councils and from them to the wards and villages. In addition, efforts were made to identify information needs at the LGAs and sub-district levels and to recommend possible interventions to address gaps that were identified. Note that, MDG localization was complemented by ATI and implementation of other Government programmes for socio-economic development such as the Tanzania Social Action Fund (TASAF), and Participatory Forest Management (PFM). As noted earlier, ATI pilot initiative aimed at improving the quality of local governance and access to basic services by increasing access to and use of relevant local government information by the public including the local communities (the demand side of information) and support the local government in their relatively new role of supplier of information. Thus, the ATI activities include, strengthening the capacity of local government authorities (LGAs) and civil society organizations (CSOs) to analyze data and supply relevant information to citizens, and strengthening the capacity of CSOs in monitoring and evidence-based advocacy. Subsequently, the lessons are shared with policy makers with the ultimate goal of improving national processes[3].

The MAF was launched in Bunda and Bukoba in 2011 to address deficiencies such as lack of strategies to link the findings of agriculture research institutions to farmers' use, a low budget allocation to agriculture and agriculture research and development, a low level of ICT implementation, particularly in rural areas, and inadequate capacity for cooperative, SACCOS and farmers groups to mobilize financial services. Proposed solutions to these shortcomings included: regular knowledge-sharing, demonstration and capacity development for farmers or farmers groups about new agriculture technologies, improved practices by extension workers and cooperative/agriculture service centres, and credit mobilization through SACCOS and the private sector.

One solution to address the gap in information-sharing at all levels was to set up Citizen Information Centres equipped with computer technology and a TV with a DVD player. Emphasis was placed on sensitizing farmers to use the centres and on scaling-up and sustaining women's involvement. Because the flow of Information between agricultural extension officers and farmers was seen to be a major weakness, emphasis was placed on making clear and well known the terms of services for extension officers as well as farmers' responsibilities on how to consult and work with them.

---

[3] See Millanzi and Mwisomba (2008)

1.2   Problem Statement and Project Justification

With respect to the MAF projects, the purpose for establishing and equipping the information centres was to engage village people and facilitate the transfer of knowledge that they can use to make difference in their lives and the environment surrounding them. As pointed out in section 1.1, MAF was also meant to address deficiencies such as

- Lack of strategies to link the findings of agriculture research institutions to farmers' use
- A low budget allocation to agriculture and agriculture research and development
- A low level of ICT implementation, particularly in rural areas, and
- Inadequate capacity for cooperative, SACCOS and farmers groups to mobilize financial services.

1.3   Objectives and Justification of the Study

The purpose of the 2013 assessment was to determine the effectiveness of the MAF initiatives in Bukoba rural by exploring the following:

(a)   Conduct a baseline study and benchmark the practice of implementation and execution modality of MDGs localization, ATI and MAF projects in Bukoba Rural Districts; and look at the role of ICT in accelerating and addressing performance gaps of the current localized programmes, ATI and MAF projects.

(b)   Understand and design a local ecosystem based set of interventions to address the widespread and persistent ecosystem related challenges in rural Bukoba

(c)   Explore the current practices of knowledge management at the information centres, identifying what may be hindering the success of the initiative

Finally this survey is intended to recommend what actions that might be taken to make improve the performance and impacts of the projects in terms of improved economic productivity, improved quality and quantity of the ecosystems, and more effective information centres and the entire knowledge management initiative.

In other words, the ultimate goal is to identify areas that need improvement or scaling-up for better achievements of the set goals and targets. The developed interventions and/or solutions will subsequently be used for capacity development in the respective communities where localization of MDGs, ATI and MAF projects are implemented.

The proposed measures are expected to improve performance of the projects thus, creating more capacity for increasing productivity, address the challenges of ecosystem and improve resource utilization and productivity in rural Bukoba thus addressing poverty and attaining improved livelihoods of the people. It should be noted that this report focuses only on Bukoba Rural District.

2.0   SITUATION ANALYSIS

The situation analysis and/or status in the study area is mainly based on impacts and results brought about by implementation of the three projects of MDG Localization, Access to Information (ATI) as well as the MDG Acceleration Framework (MAF) in Bukoba rural. This section has nevertheless been presented in three sections focussing on livelihoods, ecosystems and ICT and Knowledge Audit.

2.1   Project Implementation and Livelihoods

The MAF project was implemented in stages. In the first stage the project was introduced at the local government authority namely, Bukoba Rural District Council whom in collaboration with KANGONET (a local Bukoba based CSO) implemented the project. During the discussion with the district council heads of departments, it was reported that Bukoba district council is aware and have adopted the project and implemented it in collaboration with the Bukoba based CSOs. The project area was selected based on the agro-ecological zones, strategic crops and livestock location and distribution.

A baseline survey was conducted in early October 2012 in the project area to map-up public access to information, assess needs and formulated project indicators and targets. The baseline information was then compiled and analyzed to form the basis for measuring results and projects. Together with this exercise the project was introduced to the study areas (Wards and Villages). This survey forms the integral part of this second baseline survey which is meant to understand the current status of the MAF initiatives in terms of social economic conditions and livelihoods in Bukoba rural district and carry out the baseline survey on the practice of implementation and execution modality of MDGs localization, ATI and MAF projects, which will help to benchmark and set standards (best practices) in Bukoba Rural Districts for scaling up the MAF to include other wards and districts[4]. The implementing partners namely the LGA (Bukoba Rural District Council) and private sector represented by KANGONET used the results and suggestions made by the baseline survey to implement the project. The project was implemented in four wards namely, Kyamulaile (Omukisi and Mashule), Katerelo (Kyema), Kemondo and Butelankuzi (Mishenye) [5]. The analysis of the implementation against baseline will follow below. The intervened crops included upland rice, cassava and sunflower while livestock included local chicken and fish farming.

The farmers (and farmers' groups) selection criteria varied based on selected crops and/or livestock. For upland rice, cassava and sunflower, whoever had prepared the farm was provided with all the necessary inputs which included improved seeds and fertilizers (both basal dressing and top dressing). Famers were not very responsive since the project started a little bit late in that it was difficult to cope with the ending season. For the chicken, the response was relatively high so that the selection of farmers had to be competitive.

---

[4] Note that MAF has phased out already
[5] Village names in the parentheses

The qualification was based on the criteria set by the experts particularly the construction of chicken huts as guided by extension officers. The selection of fish farmers and groups favored those who had already started this kind of farming and had at least one fish pond, the already existed ward information resource center and those established under the ATI project[6].

2.2   The Ecosystems

Kagera region is divided into three agro-ecological zones namely, the lake shore and islands, Plateau area, and the lowland. Bukoba rural district is covered by two out of three regional agro-ecological zones. The district is therefore divided into two agro-ecological zones. First is the lake shore and islands. This zone enjoys the highest rainfall in the area with annual precipitation ranging from 1400mms to 2000mms. The zone is characterized by undulating rolling plains having soils rich in yellow –red sandy clay, with low available nutrients. The area has an altitude of 1300ms to 1400ms above sea level. Crops grown are mainly bananas, cassava, beans, coffee and tea. Average household farm size ranges between 1 to 2 acres.

Figure 2.2:   Plantain mixed with Vegetables in Bukoba Rural
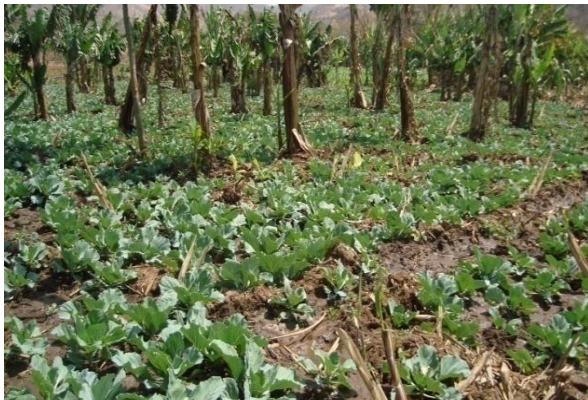
Secondly, is the lowland zone which includes lowlands at 1,100ms to 1200ms above sea level. These are flat plains with occasional ridges. Annual rainfall averages 500mms to 1000mms which come in a single season. The soils are of complex patterns. Black-grey clays dominate with low natural fertility. Principal food crops grown in the zone include cassava, rice, sorghum, millet and maize. Coffee is the main traditional cash crop. Average farm size per peasant household ranges from 3-5 acres. The ecosystems challenges facing Bukoba rural includes increasing pressures on resources as a result of rapid population growth, agriculture and livestock intensification characterized by progressive reduction in farm sizes, and unsustainable land use and management practices. Land and freshwater resource base, associated biodiversity and population livelihoods and food security are threatened by land degradation, declining productivity capacity of croplands and rangelands, deforestation and encroachment of agriculture into wetlands. Climate change and variability aggravates even further this threat. Examples of inappropriate farming practices in the agricultural sector

---

[6] For details See Chapter 4 Section 4.1

include mismanagement or abuse of the farm inputs (which has led to destruction of living organisms and the ecosystems); frequent and uncontrolled burning of vegetation including natural forests; encroachment of marginal areas of cropland such as in steep slopes and fragile soils; reduction in the use of crop rotations and fallows. These practices contribute to the loss of productive vegetation cover and biodiversity. Subsequently, this process also leads to significant water losses through evaporation from hot, bare soils and substantial water runoff which causes accelerated soil erosion. Sedimentation in water bodies such as lakes and wetlands is therefore evident resulting into reduction in important functions of the affected resources.

As pointed out earlier, the impacts of these practices include the loss of productive land and a significant reduction in productivity; negative effects on the quality of water and the hydrological regime thus increasing food insecurity and vulnerability especially during the period of drought and floods. Loss of livelihoods and out migration is among the consequences in Bukoba rural.

These threats on the ecosystems have impacted negatively on the performance of the activities under MDG localization, ATI as well as MAF programmes. For example, promotion of fish farming lacks the requisite guidance and monitoring. Farmers have subsequently tended to construct fish ponds closer to the water sources and wetlands thus disrupting the ecosystem such as the underground water drainage. Some of the agricultural chemicals and veterinary drugs are said to be poisonous thus, wiping out some species of birds that used to eat or remove bugs from livestock

Figure 2.3:   Tea Plantation in Bukoba Rural

Figure 2.4: **Dry Forests due to Haphazard Tree Harvesting (Panel I) and a Fish Pond Constructed closer to Water Sources (Panel II)**

Panel I   *Panel II*

To address environmental stress outlined in chapter three above, various initiatives have been initiated in Bukoba rural. Among them are the conventional approaches towards environmental protection. Others are manly project based or project led initiatives.

2.2.1 Conventional Approaches

(a) Perennial banana-coffee based home gardens (Kibanja)
Kibanja is a small piece of agricultural land where mixed farming is practiced. It is a traditional farming system characterized by its perennial nature of crops and multi-layers of soil nutrients, its important number of crops and crop varieties. This system is mainly practiced in Kagera region.

It allows recycling of nutrients from the soil and organic residues. Bananas of various types are the dominant crop, with two dispersed coffee trees. During the two wet seasons the kibanja (piece of land) is planted with annual crops such as beans and maize. Households in Bukoba District have one kibanja field averaging about 0.6 ha.

(b) Small Scale Annual Crop Production (Kikamba)
KIbamba comprises small fields of annual crops often located near the kibanja field. In many cases the kikamba field is a deteriorating kibanja field. Common kikamba crops include maize, beans, cassava, sweet potato, sorghum and millet, occupying separate parts of the field and grown with different practices. Soil fertility is much lower than in the kibanja system because few inputs are applied.

(c) Extensive annual crop production with fallow (rweya-omusiri)
This is an important land use system composed of patches of woodlot production and very extensive crop production. Crop production is limited to cultivation of Bambara groundnuts in rotation with long fallow periods (e.g. 10 years), during which cattle are allowed to graze

communally and grass cut for mulching the kibanjas. Soils on *rweya* land are generally infertile, occurring on land that is too steep, has too shallow or too sandy and droughty soils.

(d)   The Bylaws
The farming communities in Bukoba also use cultural values and norms (by laws) to improve resource management system and protect the ecosystems. For example, a bylaw which prevents members of the local communalities to collect firewood from the forest belt along the lakeshore which was habitat to different species of monkeys has been used for many years in forest management. This system used to be extremely effective in the past than today.

2.3   ICTs and Knowledge Management

Generally the current ICT related situation from MAF project point of view shows that progress has been made in its implementation e.g. supportive training conducted on usage of mobile phones for farmers and extension workers and interactive knowledge brokering. Also computer hardware and software were procured and to some extent installed to improve capacity of extension workers and farmers on ICT usage intended to stimulate agricultural productivity. The current situation at each information or community resource centre is summarized in the succeeding sections.

(a)   Butelankuzi
The centre is established and housed in Butelankuzi Ward government building. It makes use of solar energy due to unavailability of grid power.

Figure 2.5:   One of the Focus Group Meeting at Kyamulaile

Figure 2.6:   Some equipments of the community resource center at Butelankuzi

Also important to mention is the fact that, the centre is housing a library with resources provided by previous projects mainly on agricultural development. The centre is also used as a place to charge mobile phones and conference or meeting room and indeed it is the one we also used in our FDG meeting (Figure 2.4). The centre is managed by ward agricultural extension officers whom their offices are also situated in the same building.

All equipments planned for this community resource centre like a computer and a set of TV are in place and installed. However the most operational one is the TV set. The computer is also installed and accessible but it seems nobody is trained yet to operate the equipments, and therefore the computer is not yet made available for use by the public.

(b) Katerelo (Kyema)

The centre is established at Kyema village and it is supposed to use grid power – electricity. All equipments planned for this community resource centre like a computer and a set of TV are in place. However to date they haven't been used pending to the finalization of meter installation/reinstallation by TANESCO. Meanwhile the centre is used for other purpose including capacity building training for farmers in nine surrounding villages.

(c) Kyamulaile

The case of the community resource centre at Kyamulaile is different as it has its own building which was completed last year 2012 and recently furnished with tables, chairs and as other centres with a set of computer and a TV. Also different to other centres here both a computer set and a TV set are operational though with unpredictable time due to other obligations in the ward of an extension officer who is in charge. This village was not covered by a rural electrification project under REA. Thus, the center runs under solar power as there is no grid power (electricity). The advantage here is that the centre is just adjacent to the ward office thus managed easily by agricultural extension officers in this ward.

Rural Knowledge Assets refer to actual subjects that were transferred in the rural communities that hosted MAF projects. Most respondents in the three communities of the Pilot Project District agreed that the most knowledge transferred was in the subject areas of agriculture, livestock and marketing for crops-which corresponded with the most-listened-to radio programmes by respondents.

Some respondents also indicated that they also learned from radio programmes on health, social issues, education, gender, forestry, and political issues; however respondents when asked what knowledge they frequently received during the MAF pilot initiative did not note these information categories.

Agricultural experts at Maruku Agriculture Research and Development Institute (MARDI), extension officers at both district and village levels and village leaders who participated in group discussions were asked why agriculture and livestock rated as the most important information for most of people living in Bukoba rural areas. They replied that most communities in rural Bukoba are seeking new ways to increase food security and incomes because the traditional crops of bananas for food and coffee for cash no longer provide a dependable livelihood. Banana plantations are being infected by "Mnyauko" (banana bacterial wilt) and other traditional crops such as cassava and potato are decliningwhile the prices farmers are receiving for coffee are too low. One agricultural and land management expert, who works in the Trans-boundary Agro-Ecosystem Management Programme for the Kagera River Basin, said:

> *People in Bukoba Rural District are worried about the shortage of water because most of the water catchments and rivers are either dried up or do not provide enough water for the community. Also, soil has lost its nutrients or is being deprived because of improper agricultural methods; the situation is worsened because of the wilt disease. This leads people in rural areas to face a serious shortage of food including banana, cassava, and potatoes. Cash is now becoming very important for the daily livelihoods of people living in rural Bukoba and unfortunately coffee cannot adequately provide it. Because they now have to walk a long distance to get water and collect firewood, they have to buy these items for their daily use – things they used to get for free in the past. So people are realizing that there is no way they can maintain the status quo and so they are ready to look for and adopt alternatives.*

The implication of this is that although it was critical for the District through MAF programme to provide the knowledge on agriculture and livestock in response to the current situation, rural people alsorequire broader socioeconomic knowledge related to issues such national politics and policies, ways to reduce poverty, education for their children, gender issues and the environment. Provision of knowledge on existing and traditional resources and technologies alone may no longer be sufficient; that determining what knowledge is to be provided must be forward-looking and seek new solutions to their clients changing needs.

3.0   METHODOLOGY

3.1   The Field Survey

The four field surveys (studies) namely a baseline and benchmarking study, the ecosystems, ICT and a knowledge audit were undertaken in the rural communities in Bukoba Rural District where MAF and Localization projects have been implemented.

The studies used both qualitative and quantitative analysis. For the qualitative approach, the consultants used *Focused Group Discussion* (FGD) to collect data and *purposive sampling* to identify the participants. A total of 130 individuals participated in these studies including beneficiaries (women, youth, and most vulnerable groups), representatives of Civil Societies Organizations, District Officers, traders and processors, councillors, project coordinators, agriculture extension officers, village leaders, radio station managers and researchers who in one way or another were linked with MAF and MDG localization projects. It was important to approach interviews using non-threatening techniques such as asking them to narrate "most significant change" stories, or encouraging them to tell the stories that they felt conveyed a picture of what has changed, why it has changed, how learning can be applied in the future, and what solutions they can see to fill gaps and meet challenges so that the interventions such as poultry farming, Agricultural Information Resource Centres (AIRCs), Knowledge Management (KM) and conservation of the ecosystems can more effectively facilitate development in rural areas. The consultants further avoided biased and leading questions shun from unrealistic responses.

In addition, questionnaires were administered to 46 people with multiple choice questions based on a Likert-type scale (ranging from 1 (most preferred/very effective) to 4 (no preferred effect), and guided questions that required respondents to provide a specific examples, comments or answers. Secondary data analysis was used to understand project background and operationalization of the concepts.

3.2   Analytical Framework

Statistical Package for Social Sciences (SPSS) and Micro Soft Excel (MS-Excel) computer software were employed to analyse quantitative data in terms of cross tabulation, frequencies and calculations of averages which were used for comparisons and trend analysis.

Qualitative data gathered from farmers and key informant interviews were carefully transcribed. These transcriptions were then read and re-read to interpret and get the key

messages. From these transcriptions key themes or patterns of ideas, concepts, behaviour, interactions, incidents, terminologies, or phrases were then identified. Furthermore, as the way to gain more insights abbreviated codes such as few letters, words, or symbols were assigned to key themes and placed near them. This was meant to help researchers organise data into common themes emerging from the responses. Afterwards, these themes were organised into coherent categories which were summarized to study and extract key messages to answer research questions.

4.0 FINDINGS FROM THE MAPPING STUDY - 2013

4.1 Summary of the Major Findings

4.1.1 Practice of implementation, execution modality and Livelihoods

In term of change in social-economic condition and livelihood of the people and the extent at which lives of the people have changed as a result of the implemented projects socially and economically, the following results are evident:

(a) Upland Rice – Katerelo and Butelakuzi Wards

Production of upland rice was high and potentially higher if it is grown during the first rain season. This was testified by Mzee Saidi Sudi who is one of the MAF beneficiaries from Kyema village, Katerelo Ward. The harvest was 15 bags per two acres. At Butelankuzi two farmers prepared farms for MAF pilot, one from Ilango village (1/2 acre) and the other one from Nyakanga village (1/4 acre). Their harvests were 3 and 2 120 kgs bags respectively. Unlike last crop season, the upland rice farmers are said to be food secure this year. This crop has shown all indication that in the future it can substitute banana which is a permanent food crop in Bukoba and which is now prone to BMX disease.

Many farmers including others from the neighboring villages are now lined up and have applied for upland rice inputs next seasons. About 15 famers have already submitted their request and have already prepared 10 acres for upland rice in the coming season at Katerelo and 33 farmers at Butelankuzi. Farmers outside[7] the project area who visited the site to learn about upland rice farming were from Kansenene, Kanazi and Ruagati. The implication here is that the demand for and willingness to adopt upland rice high. Through training and sensitization programmes farmers are now equipped with knowledge of upland rice production as an alternative and a quick win crop.

(b) Cassava

Kyamulaile ward was selected as a pilot ward for cassava production. Since cassava stems (used as seedling or seed) came a little bit late only 5 farmers were ready for this pilot. With exception of one Mzee Iddi Nkubuye, they have not yet harvested but potentially this is the best alternative crop and a quick win.

---

[7] The visitors learned about newly introduced upland rice and fish farming technique.

Figure 4.1:   One of the Successful Cassava Farmers (Mzee Iddi Nkubuye) and his House in Kyamlaile Ward

Last year Mzee Iddi Nkubuye (See Figure 4.1) planted cassava in two plots i.e ½ acres (long maturing specie was planted in November 2012) and ¾ acres (short maturing specie was planted in April 2013). While he cultivated and planted cassava in a plane land in the first plot, the second plot was cultivated and planted cassava on ridges[8]. This farmer planted *mkombozi* type of cassava (stems) in the first plot and and *suma-meremeta mm 29* type of cassava (stems) in the second plot. *Suma-meremeta mm 29* is resistant to a disease known as *batobato* and some of the threats of climate change. This type of cassava is produced by Maruku Research Institute in Bukoba rural.

After harvesting last season Mzee Iddi Nkubuye sold 45,000 pieces of cassava stem (seeds) earning TZS 900,000. In addition, he also sold 1 ton and 800 kgs of cassava and earned a total of TZS 300,000. He used this income to build a new house in the picture which is far much better than the one he used to leave. This project has changed his life as he prepares to construct another big house and buy animals.

(c)   Sunflower
Sunflower was MAF intervention crop targeted for Kyamulaile ward. The choice follows the conducive weather in that part of Bukoba rural favoring sunflower. For the same reason of delay in the project take-off the response from farmers was low. Only one farmer accepted to grow sunflower and he is yet to harvest.

---

[8] According to Mzee ddi, this is what he learned in one of the training in Kemondo, that, he should cultivate ridges particularly when a farm is in wetland

(d)   Fish
Katerelo, Butelankuzi and Kemondo were the pilot wards for fish farming. Findings from the interview with farmers (through their groups) show that this is the promising kind of intervention. It was difficult to tell how the project changed their life from the time of its inception since they have not yet harvested. The demand and willingness to participate in the fish farming project is still high showing how people still have hope for this kind of intervention to change their lives. At Mishenye for example 13 farmers have already prepared their fishing ponds waiting for fish fingers.

(e)   Chicken
This is probably the leading promising kind of intervention in the study area. It was piloted at Kyamulaile using the same criteria of favorable weather condition. A total of 160 chicken were provided to 8 farmers from different farmers' groups (20 chickens each) who fulfilled the criteria provided and the distribution was gender balanced. Two villages involved were Kyamulaile and Omukisi.

Table 4.1:   Summary of the Project Results

Sn	MAF Intervention	Baseline Information	Current Situation	Implementation Challenges	Current Proposed Solutions	Expected Results
1	Upland Rice	Know to very few farmers. Only one farmer tried it at Kyema	Grown at Kyema and Butelankuzi; 2 and ¾ acres respectively.	• Late planting • Market competition • No Processing Machine	• Ensure early farm and inputs preparation and planting. • Processing machine will be needed.	• Higher productivity • Food security • High Income
2	Sunflower	• It was a newly introduced crop • It was proposed as a new quick win crop and included in District value chain priority crops **Technology Used** Small manual (hand) machine were once introduced at Kyamulaile **Training** • No intensive training done in sunflower production	• Only one Farmer grew sunflower ate Kyamulaile. • Farmers were trained on sunflower growing	• Late planting • Market competition • No Processing Machine	• Ensure early farm and inputs preparation and palnting. • Processing machine will be needed. • Emphasis still needed for farmer to accept it as quick win solution	• Higher productivity • High Income
3	Cassava	**Production** • A common crop in Bukoba Rural	• Farmers responded positively	• Late planting	• Earlier growing is highly	• Higher productivity

15

S n	MAF Intervention	Baseline Information	Current Situation	Implementation Challenges	Current Proposed Solutions	Expected Results
		• Almost produced by every household on an average of less than ¼ an acre **Technology Used** No cassava grater **Training** • No intensive training done on cassava production	• Training was conducted and better species resistant to diseases introduced • Cassava grater purchased		emphasized • There still need more training on farm preparation (e.g. how to make terraces)	• Food security • High Income
4	Chicken	• Chicken were kept locally by almost every household • Hatching Incubator technology was in use • Market for local chicken was very high	• Response is very high to chicken • 8 farmers provided with chicken and got training • Production is very high (in terms of numbers and eggs)	•	• Incubators needed	
5	Fish Farming	• Few fishing ponds have been constructed. At Kemondo, two farmers group Msifuni and Mapinduzi existed. • At Mishenye, Amkeni Group had one pond already and the other one was still under construction.	• Three farmers group got training and provided with Vifaranga (1 at Kemondo, 1 at Katrelo and the other one at Butelankuzi	•	• More training on fish farming still needed • Fish feeding making machine needed.	

4.1.2 The Ecosystems

In response to the challenges of ecosystems in Bukoba rural, a number of project based interventions have also been initiated by different local as well as international institutions such as Tanzania Social Action Fund (TASAF), Trans-boundary Agro-Ecosystem Management Project for the Kagera Basin, United Nations Development Programme (UNDP) through MDG Localization, ATI and MAF.

(a) Trans-boundary Agro-Ecosystem Management Project for the Kagera River Basin
Trans-boundary Agro-Ecosystem Management Project is intended to adopt an integrated ecosystems approach for the management of land resources in the Kagera basin that will

generate local, national and global benefits including: restoration of degraded lands, carbon sequestration and climate change adaptation and mitigation, protection of international waters, agro-biodiversity conservation and sustainable use and improved agricultural production, leading to increased food security and improved rural livelihoods (www.fao.org/nr/kagera).

The project has four components focusing on the sustainable Trans-boundary Land and agro-ecosystems management of the Kagera basin (SLaM). These are enhanced regional collaboration, information sharing and monitoring; enabling policy, planning and legislative conditions; increased stakeholder capacity and knowledge at all levels for promoting integrated agro-ecosystems management. Others are adoption of improved land use systems; and management practices generating improved livelihoods and ecosystem services.

Figure 4.2:   Gully erosion near plantain farm in   Bukoba Rural
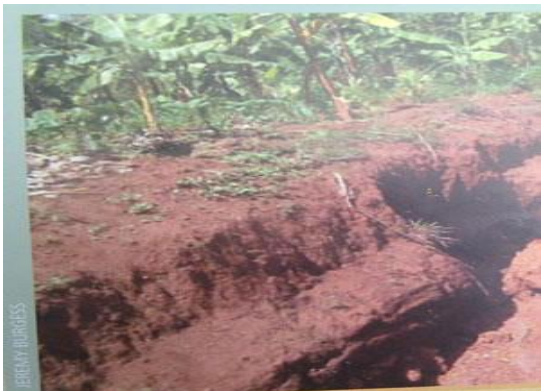
A fifth component concerns project management, structures operational and effectiveness. The activities take into account gender issues, access to resources and conflict resolution.

Figure 4.3:   Part of Kagera River Basin in Bukoba Rural

(b)   Tanzania Social Action Fund (TASAF)
The first phase of TASAF implementation started in 2000 and concluded in 2005 when the second phase was initiated which was implemented for eight years up to June 2013. The third phase is expected to commence this year also will last for 10 years. There are four types of

projects under TASAF namely, The Service Poor Projects (SP), Vulnerable Groups Projects (VG), Participatory Forest Management (PFM), and Food Insecurity Projects (FI).

PFM is the only project under TASAF which focuses on ecosystems and is therefore relevant to this study. TASAF implements two types of project components under PFM. The first component is meant to protect traditional or natural forest by discouraging environmentally unfriendly traditional practices such as praising publicly persons who set fire and burn a larger area covered by vegetation. The second component is basically facilitating afforestation. This approach entails the identification of these forests, analyze the extent of deforestation and set boundaries (demarcation).

Under this component community leaders are also educated and sensitized on sustainable forest management. TASAF has also been supporting the local initiatives to preserve the forests by facilitating the process to formulate by laws and finance locally initiated strategies towards forest management.

(c)   Radio Programmes

Through MDG Facilitation Framework (MAF) for example, the radio programmes by Vision Radio have been used to educate and sensitize members of the communities in Bukoba rural on management of natural resources including water, land and forestry. These programmes have been conducted by inviting specialists in ecosystems to the studio of Radio Vision to deliver environmental education topics to the public, and allow radio listeners to ask questions by calling or sending short messages (sms).

4.1.3   Information and Communication Technology (ICT)

(a)   Access and Usage of ICTs

(i)   Ownership and Use of ICTs

The respondents indicated to mostly own and use mobile phones as well as radios suggesting that if one has to communicate cost-effectively with the surveyed communities should consider using these channels. Also, there was an indication of a number of ownership and use of TVs while computers and landline phones were marginally owned and used (Figure 3.4). The difference among the ownership and usage of TV were noted and mostly contributed by TVs which are owned by information centres and used by any interested individual.

The frequencies of use of these ICTs were also studied and found that mobile phones and radio were the ones with higher frequency of use on daily basis. This also applies to the studied ICTs that are owned by other members of their family which was also found to be more than 73% of the total number of respondents for mobile phones, and to some extent the frequency for radios was also high. The reasons for the ICTs that were not used frequently on daily basis were also found out and the statistics show the major reasons to be led by the fact that they are too expensive to access or own. Also the availability of infrastructure necessary for using these ICTs like electricity was another contributing obstacle. Several other reasons

were also indicated to affect the said daily usage frequency including limited visits and use of the information resources centers in the communities and some respondents still thinking that some ICTs like TV are not always good for kids.

(ii) Expenditure on ICT Goods and Services

The amount of money spent in a month to access ICT products and services were found to vary but the highest expenditure were found to be put in mobile phones and also to some extent in radios (Figure 3.5). Expenditure on mobile phones is mainly through buying vouchers and battery charges, while for radios recurrent expenditure is mainly through battery replacement.

Having a good number of respondents using between 10,001 to 50,000 TZS per month and taking into consideration their income that was mostly found to be between 50,000 and 100,000 TZS and also less than 50,000 TZS (Figure 3.5) shows how useful the mobile phones have become in the rural communities.

It was further indicated that the money spent for charging mobile phones, which is their main expenditure was from savings in their agriculture and other businesses and marginally from employers, relatives, friends and spouses or partners. This was confirmed by approximately 95% of the respondents. Likewise, about half of the respondents indicated to forego part of their daily expenditure in drinks, cooking oil, kerosene, sugar, textbooks, fish, watching football (paid) and meat to charge their mobile phones. This indicates how important and contributory the promoted agriculture and other businesses are in the socio-economic development of this community.

(iii)   Means of communication and access to information

The study findings indicate that the best means of communication and access to information was again mobile phones as was indicated to be the first choice by more than half of the respondents. However several means of communication and access to information were also indicated through ranked accumulated selection including mobile phone (93.5%) which is closely followed by radio (93.4%). Others though marginally used are community meetings (31%), TV (28.9%), community information resource center (22.2%), notes boards (13.3%) and newspaper (6.6%). This indicates that though the information resource centre was put in place for quite sometimes now, it hasn't picked up as expected thus calling for some measures to improve the situation for higher return on investment and contribution to the community socio-economic development.

(iv)   Access and Use of Internet services

Despite the increase of internet access in Tanzania especially when mobile companies started to provide such services and availability of supposedly internet, the study findings show very low access to internet services by members of the surveyed communities. This was indicated by close to 89% of the respondents who do not have access to internet services. Even the 11% who reported to have access to internet services, more than half of them indicated

seldom access, despite the fact that all of them do basic website surfing through their mobile phones.

(v)   Common mobile phone usage
Following the fact that mobile phone is the most used ICTs in the community as revealed by the study findings, its usage is very much diversified. Statistics (Figure 3.6) indicate that the most frequent use of mobile phones is receiving and making calls. This also applies to short message service (SMS) that together with the former have increased by introduced affordable bundles by mobile companies with a number of free SMS and airtime for a fixed period.

The mobile financial transactions through Mpesa, Tigopesa and Airtel money also indicated to be among increasingly accessed service through the mobile phones. However the findings here also complement the previous one which indicates that internet access and its services in the surveyed communities are still farfetched thus denying members of the rural communities some benefits associated with mobile phones.

As an extension of the usage of their mobile phones and specifically information services, the respondents indicated a number of them. These information services include:
- Communication on relatives and friends on issues such as wellbeing/health, weddings, entertainments, meetings, death, marriage etc.
- Communication on social and religious information to fellow Christian or Muslims, religious events etc
- Communication on official matters such as communication with employer, Communication with social security/health official e.g. police and NHIF/Dispensaries, community events or meetings information, Projects or groups related meetings, Health/disease related alerts on human, animals and crops diseases for prevention purposes e.g. New castle information in Kyamulaile where all stakeholders were notified and action taken timely.
- Communication on expertise related aspects such as expert advice on crops, livestock and fish farming interventions and other information from extension officers and relevant research institutions' personnel.
- Agriculture and other business related news and information like markets information on prices of community produced commodities e.g. where to sell rice, cassava, fish and at what price etc, Information on job/business opportunities like orders from customers e.g. furniture orders etc.
- Entertainments news and information such as sports e.g. Europe Football etc, Music such as Bongo Flavor, America music etc.
- Other information, news and social networking such as training opportunities information, examinations results like form IV and form VI results, BBC Swahili News and face book.

(b)   Available Services

This part covers the places where individuals in this community get access to ICT services such as the already mentioned radio, TV, computer, internet services, landline phones and mobile phones. It also reports on government services that are or likely to be accessed by communities using ICT and its related tools.

(i) Places for accessing relevant ICT tools

The place that provided most of the access to ICT tools was found to be home (Figure 3.7) mainly through mobiles, radios and rarely through TV. The next most accessed place with ICT tools was the community resource center, though yet with the low number of respondents.

This indicates that the ICT services in the surveyed communities are still limited and therefore information resource centers need to be improved to ensure they attract as many individuals as possible in the communities. Other places for ICT tools access includes shops and neighbors or relatives' houses especially for TVs and sometimes internet (Facebook) that are still scarce in this community.

(ii) Government services received or accessed using ICT

The majority, more than 86% access some government related information and services using ICT. The accessed government related services are shown in Table 3.5. The most accessed is information from experts (i.e. government officials such as extension officers). This is followed by market information mainly on prices, despite the fact that the content is limited. There is an urgent need therefore to introduce more content and sustainable mechanisms for exchange of information in the communities.

Apart from services indicated in table 3.5, respondents also indicated additional government services received or accessed using ICT. These services include appointments, constitution access and opinion submission, education on cost-effective agriculture, local and international news mainly via radio and TV, and meetings'/seminars' information.

These government services were received or accessed through several ICT tools. As it is indicated in the Figure 3.8, the most used tool for this purpose seems to be radio followed by mobile phones. This suggests that for any widespread and cost-effective government related communication or access to information with rural communities, repackaging of the communication or information should take into account these tools. It was also noted that the community resource centers, though not picked as expected, seems to be another way that government services are accessed. If improvement on its services and accessibility are made, its contribution is likely to increase and the subsequent community impacts in terms of socio-economic development are likely to improve.

As an extension of accessed government related services using ICT in Table 3.5 and others, the respondents indicated a number of services that they like to access. These services include:

- Agriculture related information and news such as modern and best practices to start and sustain crops, livestock and fish farming interventions in the community, business services advice on how to make profits, information about new technology on farming, access to agriculture/livestock data bank.
- Information from experts such as extension officers on effective agriculture undertakings, advice on fish farming business
- Information on business opportunities and marketing services including locally available products market prices preferably in Swahili and over the mobile phones
- Local and international news preferably in Swahili and accessible in radio (Figure 3.9), mobile phone or newly established community resource centres.
- Sports information and programs as designed by local government authorities for the community
- Information on development issues e.g. women or youth group entrepreneurship
- Government news and events such as parliamentary sessions, information on local government, important meetings and new developments.
- Information on education, health, social security and good governance such as education program for our children and lifelong learning, national examination results, awareness on dangerous diseases, community based services care and access to social security like NHIF, reports on how community resources are utilized.

(c)   Available Infrastructure

This part focuses on the infrastructure which is available to enable the use of ICT tools in a cost-effective manner. These infrastructures include availability of electricity, mobile companies to which the communities are subscribed. Also any other infrastructure that they require for successful application of ICT in their daily activities is presented here.

The findings indicate that electricity in the surveyed communities is still a farfetched service as more than 75% of the respondents indicated that they are not connected electricity. Therefore good part of their income that was also indicated in Figure 3.3 is used for the purpose of charging their ICT tools at an average of 300 TZS per one full charge that can last for a day or two depending on the usage and type of the battery. It was also noted that the charging is mostly done at the neighbors' and nearby village centre or shop with grid power, solar power, generator, inverter or car battery. Furthermore, it was reported that in some few cases going for charge may involve spending half a day or so due to required travelling time and the time spent waiting for the full charge.

The mobile phone service providers that are found and used in the sampled communities are as indicated in the Figure 3.10. It was revealed that though all major providers of mobile services are accessible in all the sampled communities, two companies i.e. AirTel and Vodacom are strongly present, thus any consideration to push the content or information to this community should consider this accessibility for wider impact.

Furthermore the respondents in these communities were requested to indicate the kind of infrastructure they need for higher contribution of their ICT tools to socio-economic development in the communities. The findings indicate that:

- Electric power needs to be improved either by having electricity covering these villages or affordable solar energy to many of the community households.
- Community resource center to have more ICT tools such as printers, reliable Internet access and a person dedicated in managing the center and operating the equipments in such a way that some of the news and information can be accessed reliably using ICT. This is also important due to the rare access to the traditional newspapers.
- Improvement of mobile networks in terms of the signal strength in some areas should be made for more reliable and extended mobile companies' services.
- More coverage to some important radios such as Radio Vision and Kasibante, for community purposes. .
- Information systems or database that may be updated regularly with locally produced products for marketing purposes within and outside the communities and Bukoba rural district council.

(d)   Impact of ICT on People's Life

Several studies have indicated impact of ICT in rural settings. This was also investigated in the studied communities. The findings include whether or not ICT enhance livelihood in these rural communities, and the purposes for which ICT tools are usually used for as well as the best of the tools. This also applies to how these ICTs contribute to improving the living standards and empowerment of the people, and the sector in which ICT plays a key role from rural community point of view.

The findings indicated that more than 97% of the respondents agreed that the earlier mentioned ICTs (Figure 3.7) enhance livelihoods. These findings also indicated that the most common purpose by which ICT tools are usually used for in this perspective is on information about friends and family, followed by access to information and knowledge and market information. The respondents also indicated other purposes by which they use ICT tools such as local news and information e.g. weather forest (See Box 4.1).

Box 4.1:   Summary of the Reasons for Using ICT Tools

- Access to market information e.g. market prices
- Availability of credits and subsidies
- Access to information on new products e.g improved seeds
- Job opportunities
- Information about friends and family
- News about sick relatives and deaths
- Banking services e.g. M-Pesa
- Social and religious events
- Entertainments
- Education opportunities
- Access to knowledge

The contribution of ICTs in improving living standards in this community was further looked at and it was found that ease communication is the leading area through which the contribution of ICTs can lead to improved livelihoods in the rural communities. This is also supported by previous findings which indicate communication to be an area very much strengthened with ICTs such as mobile phones that are used today in the surveyed communities. This has always been true when both first choice and the first three choices are considered (Figure 311). This is followed by increased access to key information and improved business and leaving behind increase income and access to education which are vital to a meaningful living standard thus a call for more improvement on the use of these ICTs in the surveyed communities.

As an extension of how ICTs contributed to improving living standards in the community (Figure 3.11), the respondents indicated a number of other impacts. This includes:

(i)   ***Cost reduction*:**
This is an impact that was mentioned by the majority of the respondents who repeatedly emphasized that the use of ICTs like mobile phone simplifies communication and handling of mobile financial services. Both has reduced the travelling cost. One of the respondents wrapped it all by saying:

Box 4.2:   ICTs reducing Travelling Costs

It was taking me the whole day travelling to my child's school to make payments that were required from time to time by the school management. In addition, I used to spend some money as bus and motor bike fair for such transaction. Today I just use the mobile to find out what is required and in the next few minutes I send the required money by M-pesa or Airtel money or Tigo Pesa thus saving not only money, but also time for other productive activities including taking care of my young children at home. Leonsia A. Kabohla*, 16th July 2013, Kyema Village, Katerelo Ward, Bukoba Rural*

In this way there is a saving of time and cost of paying for transport to school, leave alone the risk involved in running around with money. Also it was overwhelmingly indicated that such ICTs have reduced the cost of doing businesses and communicating with relatives.

(ii)   ***Widening or increasing knowledge:***
ICTs such as mobile and radio that are accessed by majority in this community have increased instant access to information in and out of the community thus widening our knowledgebase. This includes access to current news and events, radio programmes on Agriculture and health related topics on issues that are interesting to the community, crops, livestock and fish farming interventions e.g. Successful controls of devastating banana wilt disease.

Furthermore it was found that ICT tools contributed in increasing empowerment and voice of the rural poor in decisions that affect their lives. This was by more than 75% of the respondents. The tools that played a major role in this empowerment were led by radio according to more than 77% of the respondents. This empowerment issue was yet to get significant contribution from internet, email and even by mobile phones as their contribution indicated to be much lower than half of the respondents thus a need to strengthen these ICTs in this area too.

Access to local related information is one of the areas that might bring significant impact of ICTs in this area given abundant local information and relevancy in this community socio-economic development. This applies also to communicating information to members of the community. The best tools for sources of access for such local related information which also happened to have the same pattern to the ones to use in communicating information to members of the community, were found to be led by radio followed by mobile phones and a word of mouth. This means any effort to increase digitized and accessible local information is likely to have the digital platform for its dissemination in the community and beyond. On the other hand it was also noted that though internet, email, and the established community resource center are vital for extended access of local information to internal and outside world, it has not picked up as shown in Figure 3.12 thus a call for further improvement in these ICTs too.

Respondents were also asked to speak out the reasons for choosing the above (Figure 3.12) as the best tools. The following were responses given:
- It is relatively cheaper to buy a radio and every family, even a poor one can afford it
- Availability of some locally made programs in the radio such as on agriculture and other business information for the community.
- Radio can access more up to date news locally and beyond
- Radio can quickly disseminate information to the majority at the same time.
- Mobile is relatively easy for communication, cheaper to buy and easy to maintain
- Social and economic opportunities of owning a mobile are known
- Most of the individuals in the community are having a mobile thus easy to communicate to each other and beyond.
- Radio and mobile can be accessed anywhere any time by the majority. Also many mobiles nowadays come with radio and torch functionality making it multipurpose.
- Words of mouth cover many people especially in the neigh hoods and it is still popular though mobile phone is faster.

Additionally, sectors in which ICTs can play a key role from the perspective of the studied local community were inquired and findings indicate that agriculture was leading followed by social/entertainment as the first choice or education when accumulated results from 1st to 3rd choices are considered (Figure 3.13).

The least sector in which ICT can play the role were in environment and government information services which might also be related to unavailability or lack of awareness on ICTs thus, need for the government efforts to work on the two areas.

(e)   Application of ICT in Agriculture
Agriculture is the main source of the income and food security in the studied communities. It is one of the sectors where ICT can play a key role as the findings in previous section indicated (Figure 3.13). Therefore in this part we look for ICT services that are the best for the agriculture.

Based on the first choice and the first three choices the findings indicate that the Bulk SMS, mobile phones and radio are the best ICT services for agriculture (Figure 3.14). The least ICT services for agriculture are internet and video conference which is in line with the fact that both are not yet utilized by the majority of the people in the surveyed communities thus a need to come up with strategies for improving at least the internet given its importance, through community resource centers in place.

The impact of using ICT including mobile phone in agriculture was also studied and the findings indicated that increased market price was the leading impact with 77.8% of the respondents supporting it. This is followed by reduced travel time by 73.3%. This implies that we have to continue putting effort on ICT services that have caused both impact such as the earlier mentioned local marketing information and M-pesa through mobile phones, radios and community resource centre. The least ICT in impact to agriculture was found out to be created employment opportunities. This is indeed yet to materialize especially in these rural areas where most people are working on their own rather than depending on employment.

Furthermore the problems and challenges associated with application of ICT in agriculture were studied. The findings indicate that inadequate availability of ICT services to rural farmers was the leading major obstacle with more than 75% of respondents supporting it (Table 3.7). This was followed by lack of education of farmers on the use of ICT with 67% of respondents supporting it. This implies that as we design new programs or review the existing one, we should improve ICT services especially the ones suitable to rural farmers and those providing relevant awareness campaign to ensure they are utilized and benefits the communities.

4.1.4 Knowledge Management

Knowledge codification refers to a process in which knowledge initiators document and store knowledge in ways that make sense to famers so they are able to refer to it and reuse it for future use. In the case of the rural areas, such codification may also include <u>how</u> knowledge is presented so that people understand, access, and apply it.

(a)   ***Combining Internal and External Knowledge***

The majority of respondents (71%) agreed that government leaders and extension officers either visited farmers personally or held meetings to discuss farmers' experience and identify problems they might encounter before employing new ideas. The project coordinator recounted that mixing old with new methodologies was one factor that contributed to success for the MAF project. Farmers were selected to participate in the pilot based on their past experiences. Those who had somehow attempted new initiatives on their own were picked, introduced into the programme and provided with skillsets and tools to move forward. Existing knowledge was not ignored or wasted; rather it was used to complement new knowledge, and in this way, farmers more readily accepted and took ownership of innovations.

Agricultural and land management experts working for TAMP added an approach for combining internal (existing) and external (new) knowledge. When introducing eco-system management in rural Bukoba, they first observed the positive and negative impact of human activities on the environment. They asked the village people to reflect on what they had experienced with their ecosystem now and in the past. They then used a GIS to draw a map that reflects the topography of the area now and then. Once they had listened and observed and had secured the will of village and opinion leaders and politicians in the area they invited the community people to join with them as they conducted training. They also engaged with other knowledge resources available in the district – for example local NGOs and international organizations that offer the same or similar programmes – and invited them to share their knowledge and resources. A very significant element of this initiative is that they do not abandon the villagers until they are sure that the community able to implement the knowledge that is being transferred. Nor is knowledge alone enough. They also provide equipment to implement the knowledge and external experts to follow and encourage the community to push forward. Thus a process of knowledge creation is implemented that combines existing, internal community activities with the development and practical implementation of new ideas to improve agricultural production and hence the lives of the people.

But the agricultural and land management expert also discussed a serious weakness when it comes to documenting and storing knowledge for future reference or reuse. *"There is no information at any level – region, district and village included,"* he said. He cited the example of the initiatives by Kagera Agricultural and Environmental Management Project (KAEMP) to use GIS technology to locate resources. Software or hardware equipment that were supplied to the district to help in land management in the region and information developed under this initiative can no longer be located. He added: *"If we need to build a long-lasting information base we should change our mindset on how we safeguard explicit knowledge and its infrastructure."*

(b)   ***Knowledge for Tangible Political Payoffs***

The data revealed that there is an absence of political and therefore systemic support and that this is major issue in integrating hard (external) knowledge into rural communities.

An agriculture expert working with the community to implement an *Agro-Ecosystem Management Project* in Kagera explained that if the knowledge is not seen by politicians to provide direct advantage to them to increase their popularity in their constituencies, they are likely to influence farmers not to adopt the new ideas. A district extension officer described a similar experience with members of the District Council. *"When you bring a new idea to them, they simply say this won't work for our people. Our people are used to doing things in certain (i.e. old) ways."*

Development delivery with tangible political payoffs often seems to determine the success or failure of development projects in rural communities. The Overseas Development Institute (ODI) conducted a study of aid programs that appeared to be effective in lower-income countries – namely Tanzania, Uganda and Sierra Leone. The study looked at what capacities are in place for institutions to effectively manage aid and deliver services. The findings suggest that programmes in those countries that were successful were so, in part, because they sought to deliver tangible goods and services on which politicians could capitalize in their campaigns (ODI 2013, 35).

New approaches must be found to overcome obstruction of this kind. One approach may be to involve councillors and politicians at earlier stages of an initiative, even before implementers begin to share any information with the community. If the politicians become identified with sources of the knowledge, they may see that it is in their best interests to capitalize on and promote the new knowledge so that they will gain politically. If this approach can be tied directly to bottom-up citizen engagement that utilizes methodologies to allow community people to explain their needs and express their wishes – directly participating in dialogue about their own development – implementation of knowledge-sharing programmes may be more successful.

A study tour to Uganda demonstrated how potential obstacles on the part of politicians could be overcome. As a direct result of being included in the study tour, councillors became champions of an MAF idea to empower the community to address poverty. A group composed of selected farmers, councillors, and extension officers and other leaders in the district visited Uganda to learn how local authorities there are involving rural community people in development initiatives. They also visited farmers and witnessed the difference made when local farmers adopted innovations and new technology. The group witnessed how farmers in Uganda improved their livelihoods, and increased food security and their incomes. The tour was an eye-opener for group members. When they came back, they shared the knowledge they had gained from Uganda with their fellow farmers and councillors.

(c)   Oral and Hands-on vis-à-vis ICT
Presenting and documenting knowledge in rural areas are still dominated by the African way of persevering and passing on knowledge in the oral format – with extension officers meeting with farmers in the village to explain what and how to do something. One of the fishpond Group members put it well: *"knowledge was stored in our human machine (brain); any time*

Extension officers organized demo farms at the Citizen Information Centres (CIC) and at few selected farms in the village. 61%of respondents in the study agreed or strongly agree that demo farms are the best way to present and impart knowledge. The extension officer went through all steps of the process with village people at the CIC demo farms. Individuals made personal visits to the demo farm when they needed further clarification or answers to the specific questions. The demo farm performed well, and farmers learned and applied what they learned because they could see real outcomes from the beginning. The data highlights a very important point with respect to how knowledge is most effectively transferred in Tanzania today. The value of the hands-on demonstration must not be overlooked, especially at a time when more and more emphasis is being placed on transmission of knowledge via expanding technologies.

Then there is the situation at the Citizen Information Centres in the pilot communities, each of which has at least one computer, a TV set and a DVD player. Optimistically, extension officers and project coordinators wished their CIC to operate as "Knowledge Hubs" with advanced technology infrastructures; unfortunately their optimism could not match on-the-ground realities. Both community respondents and extension officers agreed that the computer-based systems are not being used to document and store knowledge because of the poor infrastructure (or the absence of it altogether), insufficient human capacity and the unavailability of updated and relevant content. Furthermore the CICs are relatively far from communities they are intended to serve. This limits the regular access villagers have to the centres, regardless of how relevant the information they have might be.

On the other hand, the study showed that there insignificant use of mobile technology in rural areas, with 99% of respondents indicating that they own mobile phones. Yet they complain that mobile usage is expensive and network speed insufficient, limiting their use to sending text messages, calling friends and relatives, operating mobile banking or listening to music. Extension officers use their mobile phones to communicate with community people or farmers on urgent matters. Aside from mobile phones enabling individuals to communicate with friends and families, at this point there is very little use of mobile technology to transfer images to the community.

Even paper-based systems do not work, according to village leaders, due either to a lack of equipment (such as photocopier or printer) or the capacity to utilize them properly. But even if this problem were overcome, as one respondent put it, printed materials would be less accessed because people do not have a culture of reading. The level of literacy is an important issue that must be taken into account in considering how to expand knowledge in rural Tanzania today. There is often information posted on village notice boards, and 81% of respondents agreed that notice boards could be "effective" and "very effective" in providing information for community people. However concerns were raised during focus group

discussion that information on the notice boards is not updated. So people find no reason to visit them frequently.

Furthermore, as has been learned through other projects, the content of posters and how they are designed are extremely important factors in determining how well knowledge is shared. Keeping in mind the literacy issue, printed materials must be carefully designed with strong image content chosen with great care to convey the desired information. Otherwise very contradictory – even negative – messaging may result.

(d)   Retaining and Retrieving Knowledge
As was discussed above, practical demonstration programmes are considered to be the most impactful methodologies for imparting and sharing knowledge in sectors such as agriculture, animal husbandly, forestry, etc. But they are not without challenges. For example even in the case of the pilot projects discussed above, while the farm demos either at individuals' farms or at the Citizen Information Centres are public, they are not maintained all the time. In fact at the time of the study, the demos had been abandoned because donor funding had ceased, pointing to the critical issue of sustainability for on-going support for learning initiatives. Furthermore, the banana plantations were in bad shape and cattle were no longer being kept. So in place of what should have been valuable resources where knowledge could be available to be shared within the community there was *de facto* a museum.

Furthermore, it is not set in stone that selected farmers will allow their farms to be used as models indefinitely. In many cases success may depend on what social relationships exist amongst neighbours. If there are not healthy, positive relationships, there is little likelihood that anything much will be demonstrated that will be of value to prospective "learners." Neither does there exist any mechanism to retain what knowledge extension officers have if/when they are transferred. Likewise should a well-intentioned operator of a demo farm die, whatever knowledge and experience he/she may have will likely disappear.

There are even legitimate questions about the whole "best farmer" model and how effective a mechanism it really is to transfer knowledge within a community. As Dawey (1997) puts it, experience that may be rewarding for one may be unrewarding for another. In other words what seems to be working for one farmer might not readily transfer to another farmer. It is important that knowledge come from variety of sources, including extension officers, councillors, village leaders, district leaders and experts through different channels.

While the oral format is easily accessible and cost-effective, it is not without limitations. Although traditional methods may be used to document and present information, it is often not utilized in the way it was practiced in the past. Traditionally, elders and *knowledge-holders* in the community internalized history, technology and values, and then transferred knowledge to new generations. Always, the information was available, and the *knowledge-holders* served as mentors and young people learned techniques and wisdom while practicing the knowledge they imparted. Unfortunately in most communities today there are few if any

such mentors. Farmers in all the pilot projects said that knowledge from experts (mentors) is simply not available all the time.

While extension workers might be expected to fill that role, they are responsible for many communities spread over such wide areas that a single extension officer cannot meet all demands. Consequently farmers must wait until the extension officer is available – a problem if they need information right away to address an immediate problem. Even if officers try to use mobile phones to send texts or call farmers, unfortunately not all steps can be presented in this way. Thus there is a need to recruit or develop local *knowledge-holders* who can provide information, how-to-skills and moral support when and where it is needed.

(e)   Knowledge Maintenance
The data demonstrates that maintenance of knowledge-threads in terms of keeping them alive and updated is a complex subject when it comes to knowledge management in rural communities. Even when orally-documented knowledge exists it cannot be retrieved easily. Both farmers and extension officers agree that even with the literacy limitations and even though reading is not embedded in the culture of local people, it is very important to have available printed hard copies that provide step-by-step methods, how-to-do certain things or solve specific problems. 59% of respondents agreed that print materials could "effective" or "very effective" in documenting and presenting knowledge to rural people. Pamphlets, posters or flyers that contain a low amount of text but illustrate important steps, stages, things to do and other important information should be developed through well-thought-out and implemented initiatives that utilize the capacities of local artists, etc. trained to generate imagery from within the "canvas" of the community, working with content-providers such as the extension officers and researchers of MARDI, etc. Various media could be used: acrylics, watercolour, pencil sketches or computer-generated. It has been demonstrated that local artists working with school children, youth and others can develop skills to create imagery that will motivate entire communities and, working with content specialists, create essential information about new practices and methodologies to address the needs of farmers and others in the district. It is also critical that all materials created should be updated regularly and made available to everyone at home and at the Citizen Information Centres.

This speaks directly to a concern expressed by the district officer that too often knowledge being presented is superseded by current research and national and global trends, which results in local communities *"… still using expired knowledge."* In particular he was referring to information being made available through the HIV and AIDs campaign. The fact is that too often knowledge being communicated to people is out dated and does not reflect current research on topics such as HIV and AIDS. Brochures may be available in the villages containing information that is ten years or more old. Such knowledge may not respond to current needs. Knowledge is dynamic; and exchange and presentations of it should be as dynamic as the knowledge itself.

Farmers in Kyamuraile, Butelankuzi, and Kyema revealed they have experienced challenges trying to apply new ways of agriculture. Extension officers talked about challenges facing

the local farmers such as prices and markets and the absence of a milling machine and a machine to process sunflowers. But farmers said that the presentations extension officers make concentrate only on "success" stories.

"*They seem to fear that if they communicate negative information it will "turn off" and antagonize new farmers.*" The data indicates that little new knowledge is being presented to reduce the anxieties felt by village people; nor is knowledge being provided that consistently conforms to what community themselves consider to be needs and priorities for them. Degler[9] advises that it is imperative to ensure that knowledge that is shared and used is upgraded so it continues to encourage successful outcomes.

(f)   Social Capital and Knowledge Internalization

In this study the element of social capital appears to play a role as an enabling factor in the presentation and exchange of knowledge in rural communities. Through the study it became clear that the role of village and opinion leaders is important in encouraging community people to accept and adapt new knowledge. Also, from the data gathered it is clear that available networking infrastructure increases the possibility of exchanging knowledge. In the discussion between the NGO responsible for implementing the MAF project and district officers, it was apparent that regular face-to-face meetings between the district leaders and responsible organizations was essential to any success of the pilot projects in the areas.

In addition to the Citizen Information Centres, respondents suggested that places like worship meeting places, markets, schools, community health centres, and village executive offices are the most preferred places to disseminate information in the community. One of the best famers in Kyamulaile said people have always had information on their fingertips – even before all the electronic gadgets, such radio and cell phones existed. That said,

> "*The grapevine is the best channel among the community people. Once people see something is working or not working; the information will circulate in a very short time as the time it takes an eye a blink. The knowledge around upland rice, cassava, and poultry circulate even before the information was officially announced in our village.*"

In both small groups and in surveys, farmers indicted that they share knowledge on cassava, upland, poultry and sunflowers with their neighbours, friends and relatives. One of farmer said: "*The knowledge and experience I acquired was something that I couldn't hide because it brought immediate value and I could see immediate change. So I wanted to share it with others so that they could practice agriculture in a different way to improve the quality of their lives.*"

---

[9]Duane Degle. 2001. "Knowledge Maintenance Strategies: Gaining User Involvement. Retrieved on August 14, 2013 from: http://www.ipgems.com/present/knowmaint.htm.

The study found that in rural communities peer-to-peer learning seems to work well for knowledge-sharing and utilization of the knowledge shared. This was confirmed by the Tujiendeleze Group leader's report Kyamulaile. The group started with only 12 people but grew to 30 in less than a year. One of the group's regulations is that members are required to focus on applying knowledge that is adopted by the entire group. Members meet regularly to discuss the progress and challenges and seek external support when it is needed.

Village leaders also agreed that those who applied MAF techniques in a group had better results than did those who worked individually. In the previous season the Tujiendeleze Group was able to harvest 2.5 tonnes of maize and 1.5 tonnes of cassava.

Research by Wachsmuth, Lenzen, and Knoblich (2008) confirms the value of the group. Their findings illustrate that communicating face-to-face in a sharing context enables people to go beyond verbal cues. Indeed they begin to synchronize their body sway, imitate each other's body postures and actions and function as a unit able to accomplish the common goal. Clearly, social interaction is a critical component for knowledge exchange. It consolidates knowledge in a concrete format and context. Learners who interact with skilled members eventually appropriate those skills, and move from the periphery to the centre; ultimately they become more active and engaged with the common goal and hence assume the role of "old-timers" (Lave and Wenger1991).

(g)   Use of Broadcasting: Television, DVD and Radio

Seventy six percent of respondents expressed the belief that TV or DVD can be "effective" or "very effective" tools for knowledge transfer. But farmers in all areas expressed scepticism about agricultural programmes aired on TV or produced on DVD. Because of electrical problems facing most communities in rural Bukoba, few people can access TV programmes. Those who were able to watch TV programmes on TBC or at the Citizen Information Centres were not convinced that they are effective in convincing people to adopt new method of agriculture. The reason for this may be the fact that the TV programmes they saw lacked any local flavour in terms of presenters, content or images. As one of the villagers put it *"we think that examples of impact of those programmes on TV programmes or DVD are exaggerated and artificial."* This strongly points out that for any media programmes (TV, DVD, radio, etc.) must have local context if it is to influence learning. The greater involvement there is on the part of local people, whether as subjects or in production, and the use of directly relevant imagery and inclusion of messages that make sense for the local population, the greater the benefit. With local content and relevance, audiences will start to internalize messages and relate to images, and local audiences may even begin to identify role models within the programmes.

The research confirmed that apart from the demo farms, the most available and preferable tool for knowledge exchange is radio, with 91% of respondents agreeing that it is "effective" or "very effective" in communicating knowledge. Radio is probably the most accessible medium in rural Tanzania today. The study revealed that 93% of the respondents own a radio set, are aware of information transmitted over radio and are able to recall messages and

information from programmes. As an example they talked about a radio programme on Vision Radio when Researchers at MARDI had a programme on *banana bacterial wilt* and new alternative seeds that resist draught and produce more crops in a shorter time compared to traditional crops. Yet, the radio has not been fully utilized to bring knowledge to the communities. The leaders of NGOs and researchers at Maruku posited that they are unable to use radio frequently to broadcast to communities on different issue because airtime is expensive.

It was also noted in the discussion about radio that production values matter. Participants indicated that the most interesting parts of radio programmes, especially those on Radio Vision, are those that contain different voices — the voices of farmers, extensions officers, leaders of NGOs, district leaders, and agricultural experts. One participant said: *"We hear the voices of people we know talking about issues that are affecting our day-to-day life."* The manager of Radio Vision explained how community radio is supposed to operate:

> *We welcome programme coordinators and authorities to come and talk about different programmes. It is our intention to promote communal programmes and institutions that host those programs. But we don't want our radio programmes to be used for political platforms. Therefore, with few resources we have to go to the villages and ask intended beneficiaries about what they thought about those programmes . . . and whether or not they make any difference in the lives of the people.*

Although it might be subject to criticism by development players and especially by politicians, the role of "facilitation" is critical in communication for development. Radio provides opportunities for both the demand and the supply side. The leaders and providers of programmes or services (supply side) are able to talk about what they do with and can offer the community; at the same time community people (demand side) are able to share their feelings and opinions about the services they receive. In this sense, the voice of the community, which is for the most part ignored or suppressed, can be raised to the extent that it starts to demand accountability and quality of service. By engaging directly in and with community people, radio can start to identify gap s of knowledge and begin to bring different knowledge holders to respond to voices expressing their concerns.

5.0 PROPOSED INTERVENTIONS

5.1 The Interventions Related to Productivity Enhancing Factors

Agriculture in Tanzania and Bukoba rural in particular is a very low capital or input intensity activity, using relatively low farm inputs such as fertilizers and improved seeds. Subsequently, agriculture has persistently registered lower productivity and a lower growth rate than other activities such as services, thus affecting negatively the pace towards poverty reduction. Poorly developed marketing arrangements are exacerbating the problem even further. These are the major productivity enhancing factors which require scaling up.

(a) *Market Promotion and Value Addition*

(i) *Context and Rationale*
Marketing and low prices that are offered by the market were repeatedly pointed out among the major factors hindering growth in all the rural communities of Bukoba rural district. There are cases where instantaneous response in terms of investment expansion by farmers and therefore improved production (and productivity) in farming upland rice, sunflower, fish and poultry farming etc, is apparent if the new interventions are geared towards market promotion and value addition at micro scale. Thus the following strategic interventions are strongly recommended.

(ii) *Proposed Strategic Interventions*
A number of interventions are required to address the challenges of marketing and value addition

→ Scaling-up the capacity of processing
For the sunflower and upland rice processing and the milling machines are critical if marketing and value addition of the two crops are to be realized. This will not only motivate farmers to expand their investments in the two enterprises, but also ensure farmers improved incomes. As pointed out earlier, the study finding has revealed that the willingness to grow upland rice and sunflower is very high. Thus, to promote value addition and production procurement and installation of both the processing machines for sunflower and poultry as well as the milling machines for upland paddy are paramount. This should include construction of buildings where machines will be installed and provide for storage facilities.

5.2 Local Ecosystem and ICT Related Interventions and Solutions

The preceding chapters show that Bukoba rural district is among the areas facing a number of ecosystem related impediments. These impediments have not only caused further environmental stress, but also hindered performance of the development initiatives implemented in the district. Eventually, the most dependable livelihood sources are impaired and the living standards of the people in many communities are inversely affected. The field

survey conducted in Katerelo, Butelankuzi and Kyamulaile wards for example reveals that the impacts of environmental stress include loss of productive land, a significant reduction in productivity, loss of forest and negative effects on the quality of water, and the hydrological regime, among other consequences (See for example figures 5.1 (a) (b) and (c).

Figure 5.1 (a):   Deforestation for Charcoal Making and Trade

Disruption of the ecosystems in Bukoba rural reduces productive capacity of natural resources which negatively affect far more than 340,000 people or 91,000 households in the district who largely depend on these resources for production and therefore for their livelihoods. This is equivalent to 20 and 23 percent of the total regional population and number of households respectively. Note also that, environmental resources are more or less public goods which are characterized by Non Excludability and Externalities.

Non excludability is one of the characteristics of the public good such as environmental goods (and bad) which says that once an environmental good or service is produced, no one will be excluded from its consumption. Likewise, an externality refers to as some benefits or costs from the production process of environmental resources which spillover to other communities not directly related to the production process.

As pointed out earlier, deforestation taking place in one community of Bukoba rural will tend to affect negatively the hydrological regime including reduction of water flowing to water bodies such as rivers and lakes. Since rivers like Kagera river is a trans-boundary resource which serves communities beyond Bukoba rural, Kagera region and Tanzania. It is therefore evident that disruption of the ecosystems in Bukoba rural affects millions of people from other communities beyond Bukoba rural.

Figure 5.1 (b): **Deforestation for Charcoal Making and Trade**

Figure 5.1 (c): **Deforestation for Charcoal Making and Trade**

(a) *Fish Farming: Construction and Fencing of Ponds*

(i) *Context and Rationale*

Fish farming is one of the initiatives under MAF project which has been implemented in Bukoba rural since 2008. Fish farming is carried out through fish ponds and is practiced by farmers in the rural communities of Bukoba rural district as a source of food and it is an income generating activity. The response has been positive and extremely high as evidenced by a large number of individual farmers and famers' groups specialized in fish farming. During the field survey total number of individual farmers participating in fish farming in Bukoba district was approximately 20, and there were a total of 10 farmers' groups. An average of 2 group members practice fish farming while many other group members are constrained by start-up capital particularly capital for pond construction.

According to the 2012 baseline survey, initial training of fish farming technology to farmers was offered in 2010 by Kagera Development and Credit Revolving Fund (KADETFU) which is a local based Non Governmental Organization (NGO). Farmers were trained on how to

construct fish ponds together with the standard and specialized method to manage and undertake fish farming.

Despite the initial training and guidance to farmers, implementation of fish farming projects in the communities of Bukoba rural has led to threats and stress of the ecosystems. Most of the participating farmers and especially the new ones do not observe environmental rules and values. For example some fish ponds are constructed close to the water sources and in the wetlands thus disrupting the hydrological regime in these areas and therefore threatening sustainability of such environmental resources. In addition, almost all fish ponds in place today are poorly constructed. Farmers complain that the walls of the ponds do not stay long before collapsing mainly because construction of these ponds is done with very limited engineering standards. Further, none of the fish ponds have been encircled by fence and/or nets, which pose a serious danger to children playing around these farms. That apart, there have been frequent thefts and fish snatched by wild birds because fish ponds are not sheltered by fence and nets. This problem was evident in the three wards where this survey was conducted (Katerelo, Butelankuzi and Kyamulaile Wards), but they are very common in other Wards such as Kemondo, Kasharu and Katoro where the project is implemented.

More rigorous capacity building training and orientation programmes must be designed to steer-up fish farmers. Among others, these training should focus on fish farming technologies, suitable way to construct fish ponds and the fish farming relationship to the natural environment. In addition, farmers must be assisted by way of expertise in construction of fish ponds so as to make these ponds strong and sustainable. The training should target both the new beneficiaries as well as the old ones.

(ii)   Proposed Strategic Interventions

→   Construction of a Training Center

Since capacity building training is a continuous and everlasting activity given the fact that new entrants will continue joining the industry, the proposed intervention will require a permanent training building equipped with other training facilities such as Public Address System (PAS) and projectors.

Figure 5.2:   Agricultural Research and Information Center in Bukoba Rural

These facilities will be used for capacity building training in the longer period. This intervention can be implemented or rolled out gradually from one Ward to another. Initially, experts from Bukoba district council will be the trainers or resource persons. As noted, such training infrastructure and facilities will be used to train the targeted beneficiaries to enable them manage their fish farming projects with environmental consideration for the benefit of majority of the people today as well as in the future.

→   Procurement of Fencing Materials and Nets

Fencing of ponds and use of nets is necessary if the fish farming investments are to be sustainable and therefore beneficial to farmers and the entire community. Fencing and use of nets will minimize thefts and loss of fish stocks, especially the young stocks and breeding stocks through wild birds thus improving productivity and make the returns to investments positive. There is an urgent need therefore to scale up the budgets for fish farming projects to ensure availability of the required materials and equipments to fish farmers.

Figure 5.3:   Some Fishing Ponds in Bukoba Rural

(b)   Fish Feeding

(i)   Context and Rationale

Fish farmers use leftovers, crop residues (banana, tomatoes, spinach and corn) to feed their fish stocks. Most of these fish feeds sink very fast when they are dropped in the fish ponds thus, making it difficult for fish to feed, and therefore affecting negatively both fish productivity and income generation.

(ii)   Proposed Strategic Interventions

→   Procurement and Installation of the Fish Feeds Processing Machines

To be able to achieve fish farming project goals and targets, there is an urgent need to facilitate investment in fish feeds processing plant and station (a fish feeds processing machine and the construction of a building where the machine will be housed) it within the fish farming communities such as Katerelo, Butelankuzi, Kwamlaile, Kemondo Katoro and Kasharu. This will enable fish farmers access fish feeds easily and feed their stocks of fish a

more nutritious and environmentally compatible feeds, which will also reduce the fish maturity and harvesting period.

→   Fish Feeds Storage Facilities

The Fish feeds processing machine and its building is one thing, storage of the processed stock of fish feeds is another requirement. To ensure a stable supply of fish feeds, a well constructed storage facility is inevitable. Like Training Center, this facility is required in all the Wards where fish farming have been supported by the MAF project. These facilities should be constructed gradually from one Ward to another.

(c)   *Trans-boundary Agro-Ecosystem Management Project for the Kagera River Basin*

(i)   Context and Rationale

Resources are not adequate to cater for the required interventions to protect the ecosystems in Bukoba rural. This is one of the critical factors affecting performance of the ongoing environmental management initiatives in the district, such as the Trans-boundary Agro-Ecosystem Management Project for the Kagera River Basin. The challenges of ecosystems in Bukoba rural are real, and they critically require corrective measures. Bukoba rural do not have adequate number of required ecosystem experts.

Trans-boundary Agro-Ecosystem Management Project for the Kagera River Basin for example reported that there are different ecosystem challenges in different areas in the region. Geographical Information System (GIS) is a critical instrument to enable Kagera region and specifically Bukoba district map out the ecosystem zones. To improve the human resources in this area, the project have trained GIS experts last year, but they are all idle because the project have not been able to acquire GIS software for the routine implementation of GIS and ecosystems activities.

(ii)   Proposed Strategic Interventions

→   Sponsorship of the GIS Experts Training

This project needs to be supported by way of re-training the existing GIS experts. In addition, an urgent measure is required to identify and train the new GIS experts. This support should be made by financing their training.

→   Procurement of GIS Equipments and Siftware

The project must be supported to acquire the GIS equipments and software. These interventions will allow Kagera River Basin Project and Bukoba district council to carry out the ecosystems GIS mapping on a regular basis and be able to update the GIS information for Kagera region and therefore Bukoba rural district.

(d)   *Community Radio*

(i)   *Context and Rationale*

Vision Radio has been instrumental in community education and the public education in Bukoba rural during the MAF project lifetime. As noted earlier, various radio programmes related to agriculture and the ecosystem were presented to educate farmers and the communities as a whole on agriculture and ecosystems.

Figure 5.4:   Bacterial Wilt (Mnyauko) in Bukoba Rural

Through these programmes farmers and other key players were also given chance to ask questions on various issues related to agriculture and the environment, where invited experts were used to answer and clarify issues raised by communities. Dissemination of technologies was therefore carried out easily. Action alert on disease outbreaks such as the prevalent Bacterial wilt which has devastated banana plantations in Kagera were also delivered to farmers and other members of the community.

Vision Radio has not been able to organize and air these programmes anymore after the conclusion of the MAF projects, and therefore communities in Bukoba rural no longer have access to the requisite information despite the fact that the challenges related to ecosystems are still evident.

Radio broadcasting is overwhelming medium which meets diversified needs to the audience. Kagera region intends to establish Kagera Community Radio (KCR) to cater for the needs faced by the communities in Kagera region. The intention is to give the communities a reliable source of information on various developmental issues such as the initiative to accelerate the achievement of MAF goals and targets, climate change effects as well as setting a platform for the voiceless and resource poor to voice out their feelings and needs. However, for many years now (about 8 years) KADETFU has been struggling to complete this process without success mainly due to bureaucratic reasons.

(ii)   *Proposed Strategic Interventions*
→   Support Vision Radio

In the short run there is a need to support Vision Radio so that the programmes used to be delivered by this radio before are restated. This can be done through financing or paying for

the relevant airtime and scale up the broadcasting capacity of Vision Radio to enable wide coverage.

→   Support the Establishment of Kagera Community Radio

In addition, measures must be taken to support KADETFU's ongoing initiatives to establish Kagera Community Radio. This is a long term solution to this problem, and the support should be in terms of expedite the process as well as ensuring that the radio has a reasonable capacity which will permit a regional coverage.

(e)   *Role of ICT and Expected Results*

(i)   *Context and Rationale*

The information and communications technology (ICT) sector has been a pioneer and a powerful catalyst in addressing the needs and interests of lower income communities in Developing Countries, despite the fact that it is only in recent years ICT's role in expanding economic opportunities has been acknowledged.

ICT has become the foundation of every sector and every economy, everywhere. The reasons for this are by now fairly well known. Information and communications technologies:
- Reduces transaction costs and thereby improve productivity
- Offer immediate connectivity (voice, data, visual – improving efficiency, transparency and accuracy)
- Substitute for other more expensive means of communicating and transacting, such as physical travel
- Increase choice in the market place and provide access to otherwise unavailable goods and services
- Widen the geographic scope of potential markets, and
- Channel knowledge and information of all kinds

In Bukoba rural scaling up of ICT services is necessary to facilitate implementation of the local ecosystems based initiatives such as dissemination of environmental information, environmental education of the local communities through radio programmes and bulky messages. In addition, ICT is critical for GIS ecosystem mapping.

(ii)   *Proposed Strategic Interventions*

→   Support the Ward Information Resource Centers (WIRC)

In addition to supporting Vision Radio and the Kagera Community Radio (KCR), there is an urgent need to support the Ward Information Resource Centers (WIRC) in areas where the project has been rolled out namely Katerelo, Butelankuzi, Kwamlaile, Kemondo, Katoro and Kasharu. This is particularly important through procurement of ICT equipment and facilities (such as Television Sets, Computer hardware as well as software) for the centers.

➔   <u>Finance Establishment of a Bulky Mobile Messages</u>

Since more than 90 percent of the respondents in the survey Wards own mobile phones, there is a need to sponsor establishment of a bulky mobile messages programme which will enable users (farmers) to share information on the ecosystems for sustainable management of the natural environment in Bukoba rural.

5.3   Knowledge Management and Rural Development

The purpose for establishing and equipping the information centres in Bukoba rural was to engage village people and facilitate the transfer of knowledge that they can use to make a difference in their lives and the environment surrounding them. However, the findings of the current mapping study shows clearly that these centres are not yet fully meeting the expectations for the poor residing in Rural Bukoba. A number of challenges hinder and delay these expectations to become true.

5.3.1   Knowledge Challenges in Rural Communities

(a)   Retaining and Retrieving Knowledge

Identify methods to offer and document knowledge in ways that it can be found and reused in the future. Knowledge that is owned by an individual rather than communally or publicly may not be always available at any time. The individual can decide to share it or not, or delete it or keep on some device (e.g. computer, mobile phone).

(b)   Information Computer Technology

The fact is that new information technologies are "not yet ready for prime time" as local infrastructures and capacities are wanting. As well as the technological restraints the issues holding back greater acceptance of and participation in technology-assisted learning may be generational in nature. Governments and donors must recognize and accept the realities of infrastructure in rural areas.

(c)   Insufficient Knowledge Assets

Knowledge generated at Maruku Agriculture and Research Development Institute (MARDI) is more used outside the region than with local audiences. This should not be the case. It is possible to find printed documents scattered everywhere in the community; four-color brochures are used as wall decorations in houses. Sadly the knowledge packaged in these documents is in language and format that commands little interest and is hard to process and is updated. So they are treated purely as decorations. Seeds planted will not grow into ripened fruit if part-way through the growth cycle they become ignored and left to their own devices. Likely they will wither and die.

(d) **Community Radio**

Radio is seen as having very significant potential as a "local" medium. However cost is a recurring issue and techniques to utilize it fully as a knowledge-sharing tool are not well understood by producers or content providers.

(e) **Sustaining Knowledge Initiatives**

The decline of the demonstration projects as well as the banana plantation and cattle projects – as sponsor monies ran out – is not encouraging.

Adequate funding must be provided in the first place to firmly embed knowledge projects in communities. Furthermore ways to sustain such initiatives must be built in from the outset. Knowledge sharing should not be viewed as a "time-limited" project. It is an on-going need and ways to nurture it must be found.

(f) **Scratch my back and I will scratch yours**

External knowledge that doesn't seem to bring political payoffs is unlikely to go anywhere. The success of knowledge seems to depend greatly on championship by politicians. As long as this may be, the challenge is to develop strategies to motivate leaders to embrace knowledge and recognize how important it can be for their constituents – and that by being identified with benefits brought by introducing new ideas they will strengthen their support with the citizens from whom they must seek support.

5.3.2 Possible Interventions to Improve Knowledge Management

(a)   <u>Proposed Action 1:</u> *Develop Knowledge Utilities for Citizen Information Centre*

(i) **Context and Rationale**

Hands-on demonstration for learning remains the most effective tool for the learning environment in Bukoba at this time; but this methodology should not be slavishly adhered to as the sole approach. Rather it should be combined with and supplemented by other approaches, including using clearly focused communications simply produced and in simple language so that people can begin to "connect" the knowledge being imparted with the realities of their daily lives. The study makes clear that currently there are challenges to content when it comes to video and print production. For these tools to be effective (and they can be very effective if properly produced and utilized) much more attention must be paid to creating and packaging information and messages in ways that <u>speak directly to local audiences</u>. Otherwise they simply "tune out".

The centres contain a series of simple information and knowledge utilities to enhance basic knowledge access, storage, sharing, and training. Even in the absence of sophisticated ICT, the TV and DVD player can function well in presenting knowledge at the centre, if properly and sensitively produced. Villagers will know where to get new information, appropriate times to meet with mentors and experts who can address issues and share knowledge, with the purpose of improving their farming and other practices and their livelihoods.

(ii)   Proposed Strategic Interventions

→ District Extension Officers and relevant NGOs should work more closely with the Maruku Agriculture Research and Development Institute to document knowledge for community needs

→ Each CitizenInformationCentre should have CD or DVD-packaged content that contains relevant knowledge assets – including content on the environment, national politics, ways to reduce poverty, children, education, and gender issues

→ Each centre should develop a calendar system listing weekly topics for villagers to come and learn. This will help them know what kind of knowledge is available each week or month as outlined in a schedule to which they can refer

→ Begin using the provided computer to store information. This will require training for local people

→ Ensure adequate technical support is available at the Centre for troubleshooting and that power is constantly stable

→ Produce locally relevant highly graphic-oriented print materials that "speak to" users and clearly show steps, stages, what not to do, what to do, and so on

(b)   Proposed Action 2: Use Community Radio to facilitate knowledge and development

(i)   Context and Rationale

Radio stations are becoming increasingly popular resources to impart and exchange knowledge in rural communities. However, the themes around which each station develops programing are to a large extent determined by on-air hosts. Seldom do ideas or suggestions for themes come from the few callers to the studio. Sometime the radio station does not have relevant content for the audience; hence it runs music for hours. With appropriate resources and training radio can become an important agent for change by reinforcing their engagement with village people, and empower those who are traditionally "voiceless" to seize the opportunity provided through radio to address their development challenges and embrace knowledge.

Radio programs should be structured to inform, entertain, educate and share new knowledge on farming and other issues village people identify as important. Programs will enable people to hear themselves, their neighbours, and leaders on issues of importance, as well as share their voices with peer communities and hear in turn the opinions and ideas of policy-makers and external experts. Involving local people in radio program design and production builds a trust between the producers and villagers, increases confidence in people that they have knowledge to contribute, and allows the community people to generate ideas for discussion, take "ownership" of the process and demand accountability on issues.

(ii)   Proposed Strategic Interventions

→ Local radio crews working with the "knowledge team" interview informed villagers (men, women, youth, villagers, people with disabilities and leaders. Interviews may be group or individual and villagers will be encouraged to discuss their challenges and share success stories

→ Through the interviews themes and subjects are identified, fully driven by the interests and needs of the villagers

→ Conduct playback sessions of the material recorded to initiate discussions with larger groups of village people on identified themes, their knowledge needs, issues that concern them, application of new knowledge and techniques, impact and hindrances they experience in their villages, and things they hope for their families and communities

→ Bring knowledge resources (experts at district and MARDI and other knowledge generators) to address the concerns and answer questions

→ Identify knowledge needs and gaps that need further attention

→ Develop programs for broadcast and encourage people to promote them by word of mouth and sending text messages to their relatives and friends within and beyond their village.

→ The team working in the communities arranges interviews with all stakeholders involved to follow up on accountability of commitments made by all parties and on the effectiveness of the implementation of knowledge and to explore suggestions on improvements

(c) *Proposed Action 3: Increase Intellectual Capital in the Community*

(i) Context and Rationale

The purpose of establishing those centres is to disseminate knowledge to serve pastoralists and peasants. However, these peasantry and husbandry communities have many knowledge needs beyond agriculture and livestock — such as health, environment etc.). That is why it is important for extension officers to build up a broad body of source of content and to create a team of experts on which they can draw as required to assist people to acquire appropriate knowledge they need – at the times they need it.

Over time, people will start to establish the practice of meeting at the centre to discuss issues on a variety of topics. Radio can facilitate call-in opportunities for people to address issues that concern them most and can promote use of the centres to share this information. **ESRF** orother knowledge sources may send content via email or through a website, extension officers can download and share with it villagers so they all stay on top of current issues. In this way the centres can become relevant as supporting resources for the community and can help them access different knowledge resources or experts. At the same time the district would be able to work with the different partners to invest on the knowledge management activities in the rural communities.

(ii) Proposed Strategic Interventions

→ Work with knowledgeable farmers and other knowledge-holders to assume the role of mentor and apprentice

→ Increase the number of extension officers at each Citizen Information Centre to at least 2

→ Train extension officers and two other people from the community to operate and maintain the ICT and other knowledge facilities at the centre

→ Engage local leaders and politicians earlier in the initiative to become champions of the knowledge in the community. This will be effective if politicians can increase their popularity through dissemination of that knowledge

→ Use local knowledge that people are familiar with to shape their quality and quantity of values communal life and integrate external knowledge into the communities

→ Engage local people (students, artists, and youth) to participate in producing knowledge products (image, song) in local languages

→ Starting with the hands-on demonstration initiate positive action to incorporate support materials – such as radio programming underpinned by strong, consistent on-going human contact to encourage, top-up knowledge, answer questions, bring together other users and practitioners and expert, and share their experience and concerns with others.

(d) *Proposed Action 4:* *Utilize Social Capital*

(i) *Context and Rationale*

Perhaps one of the most common tools available in rural communities is "social capital" but this dimension is largely ignored in economic and development explorations, and never thought of as being a utility that can transfer knowledge to the rural people. Even in countries where technology is advanced and almost everything can be done through ITC, social capital has become very important for socioeconomic development of those communities. Attention should be given to the creation of social networks that are conducive to innovation and developing ideas.

Using social capital utilities to disseminate and expand knowledge in the community is significant because it affects rural people's capacity to organize information for their own development. People form one or more knowledge entities to perform their tasks effectively and efficiently. Through social capital knowledge becomes a communal assets and calls for collective actions to improve the welfare of the most vulnerable people, natural resources and food security and access to physical capital.

(ii) *Proposed Strategic Interventions*

→ Encourage group formations and give them autonomy to run their agenda.

→ Utilize the places where people willingly meet (markets, schools, village offices, health centres, churches and mosques) by making them channels to disseminate knowledge in the community

→ Capitalize on relationships and social interaction to communicate knowledge in the community

→ Encourage individuals to mobilize around activities that can improve their community and family welfare. Encourage them to try available knowledge or innovation to improve their performance.

(e)   **_Proposed Action 5: Establish Bottom-Citizen Engagement_**

(i)   **_Context and Rationale_**
Knowledge is a complex of information, meaning and interaction. Through conversations individuals make sense of what is going on and use this "sense-making" to move forward. Interaction in itself shifts individual perspectives and shared meaning. Someone says something, another responds. The response shapes other subsequent responses. In this sense, knowledge expands through the community. Therefore, it is important to begin where knowledge is most needed – i.e. at the grassroots. Typically, people know what works and what does not work in their situation. But this knowledge is locked in the people's brain (tacit knowledge); hence it is not utilized. It is critical for those who are involved in the rural development help process the tacit knowledge by creating an opportunity for the village people share it.

Bottom up citizen engagement will allow community people to explain their needs and wishes and directly participate in knowledge acquisition and planning. External experts will be able to listen and respond to a community's knowledge needs rather than import ideas, which usually work (if at all) for only a brief time in the community.

(ii)   **_Proposed Strategic Interventions_**
→ Begin by listening to the people. Extension officers may begin by conducting interviews of villagers on past experiences and encouraging them to share their experiences (both positive and negative). The Extension officers may create functional "knowledge teams" – e.g. with NGO workers, etc – to work together in the communities
→ As the team facilitates dialogue within the community between the people and the village leaders, it should also encourage them to consider their own attitudes toward knowledge being proposed. A local radio station may also be involved to stimulate and expand the dialogue
→ If recruiting Extension officers they should demonstrate an interest in becoming village animators and facilitators rather than being perceived as all-knowledgeable experts
→ As appropriate, a recorded-for-radio "Village Forum" might be arranged around one or more major themes. The forum, not more than two hours, would be hosted in the one of the villages. It would include villagers, policy-makers, and experts over poverty reduction education. Peers from other communities may also be involved to broaden the knowledge-exchange beyond one community. Through broadcasting the forum on radio, knowledge and the engagement process from one community can expand to other areas

(f) **_Proposed Action 6: Take Advantage of ICT_**

(i) **_Context and Rationale_**

The study points to the importance of <u>integrating as many techniques, methodologies and training and communications tools as possible</u> into knowledge/learning projects. This may become increasingly significant as new generations embrace the rapidly changing technologies.

Appropriate technologies, appropriately used, can be very important in helping disseminate relevant information, especially if they can potentially offer opportunities to insert "local" context into broader national programming. It is certainly an area worth considering and exploring in the context of on-line content, social media, video programming, print campaigns and even radio production.

(ii) **_Proposed Strategic Interventions_**

→ Establish a website targeting the knowledge-enhancement projects taking place in communities. The site must be consistently updated with information assets that are relevant for the community and that Extension officers can use to communicate with people. *ESRF-Tanzania online and TAKNet can assume this role*

→ ESRF may partner with mobile providers to utilize mobile technology to exchange and transfer knowledge in the district and beyond

→ Provide adequate training to Extension officers and others at the Citizen Information Centre related to how to use the Internet resources, including how to download files and how to store and catalogue them for access and use

→ Develop protocols with the providers of content and the web managers to create knowledge-resources in formats that can be easily accessed and utilized by the Extension officers and all others using the ITC resources at Information Centres

→ Pursue research into ways that social media can be exploited to serve development and foster knowledge-exchange

→ Utilize TV and podcast tools. Explore mechanisms that will facilitate the incorporation of local content (images; voices; etc.) when materials are being produced for different regions

6.0   EXPECTED RESULTS

Chapter five above has proposed suitable solutions and/or interventions which will have to be implemented and help eliminate all unsustainable practices to improve the quality and achieve the utmost utilization of the ecosystem, ICT services and other economic and social opportunities in Bukoba rural. This will subsequently ensure sustainable development of the local communities. Proposed interventions are critical to promote sustainable utilization of available resources by all players along the value chain. With the training or capacity building of resource managers (users), more producers will expand their investment, thus improving productive capacity of the resources they own, which will in turn improve their income generation capacity and therefore make a significant change of the life of people (improved livelihoods). When the proposed interventions are well implemented the capacity of all key players in rural communities is likely to be high which will subsequently improve their business opportunities, crop productivity and investment returns. This is a pre-requisite for improving their power to access basic needs such as food, water, education and health services, which are critical for improving livelihood of the communities.

It should also be borne in mind that any successful strategy or project must be financed. Resources must therefore be mobilized or obtained to scale up the identified projects. Project implementation is therefore an expensive venture which may not be successful if the resources are not forthcoming. For effective implementation, enough resources must be allocated. These are necessary pre-requisites to bear in mind.

REFERENCES

Davenport, Thomas H (1994). "Saving IT's Soul: Human Cantered Information Management." *Harvard Business Review*, March-April, 72 (2) pp. 119-131.

Degle, Duane (2001). "Knowledge Maintenance Strategies: Gaining User Involvement." Retrieved on August 14, 2013 from: http://www.ipgems.com/present/knowmaint.htm.

Dewey, J (1997) Experience and Education. New York: MacMillan

Duhon, Bryant (1998). "It's All in our Heads." *Inform*, September 12 (8).

Durham, Mary (2004). *Three Critical Roles for Knowledge Management Workspaces*. Retrieved on August 11, 2013 from: www.kmworld.com.

IpkeWachsmuth, Manuela Lenzen, and Günther Knoblich (2008). *Embodied Communication in Humans and Machines*. Oxford: Oxford Univ. Press.

Kangonet (2012): MDG Acceleration Framework Report for Bukoba Rural, Kangonet, Bukoba

KM World. "Information on Knowledge Management." Retrieve on August 12, 2013 from: http://www.kmworld.com/Articles/Editorial/What-Is-.../What-is-KM-Knowledge-Management-Explained-82405.aspx

Lark, D. R. (2004). "Understanding". Retrieved August 13, 2008 from http://nwlink.com/~donclark/performance/understanding.html.

Lave, J. and Wenger E (1991). *Situated learning: Legitimate Peripheral Participation. Cambridge*. Cambridge: Cambridge University Press.

Leydesdorff, Loet "The Construction and Globalization of the Knowledge Base."In Inter-human: Communication Systems Canadian Journal of Communication 28(3),

Millanzi and Mwisomba (2008): Report on information demand and supply in local Governance in Tanzania: the case study of Bukoba, Bunda, Morogoro, Uyui districts; UNDP in collaboration with SNV, Dar-es-Salaam

ODI (Oversees Development Institute) 2013: Retrieved on August 13, 2013 from: http://www.africa-platform.org/sites/default/files/resources/unblocking_results.pdf

TANZANIA (2010). Country Report on the Millennium Development Goals. Retrieved August 13, 2013 from: http://www.tanzania.go.tz/pdf/Tanzania%20Country%20Report%20on%20the%20Millennium%20Development%20Goals%202010.pdf.

UNDP (United Nations Development Programme) (2012): Support to Implementation of Catalytic Actions for the MAF – Tanzania, Project Proposal Document, UNDP, Dar-es-Salaam

UNDP (United Nations Development Programme) 2012. "Millennium Development Goals Acceleration Framework (MAF) Project-Bunda." Baseline Survey.

UNDP. 2008. "Information demand and supply in local governance in Tanzania: the case study of Bukoba, Bunda, Morogoro, and Uyui districts." Baseline Report.

UNDP. Retrieved on August 12, 2013 from: www.undp.org/content/undp/en/home/mdgoverview/mdg_goals/acceleration_framework/

URT (United Republic of Tanzania) (2008): Millennium Development Goals Report, PO-PC, Dar es Salaam

URT (United Republic of Tanzania) (2010): Millennium Development Goals Report, PO-PC, Dar es Salaam

URT (United Republic of Tanzania) (2011): Accelerating progress towards the MDGs, Country Action Plan 2010-2015, PO-PC, Dar es Salaam

URT (United Republic of Tanzania) and UNDP (United Nations Development Programme) (2012): Millennium Development Goals Acceleration Framework (MAF) Project – Buda District: Baseline Survey Final Report, PO-PC, Dar es Salaam

URT (United Republic of Tanzania) and UNDP (United Nations Development Programme) (2012): Millennium Development Goals Acceleration Framework (MAF) Project – Bukoba Rural District: Baseline Survey Final Report, PO-PC, Dar es Salaam

URT (United Republic of Tanzania): (2009): Tanzania Accelerated Food Security Project: Project Implementation Manual (PIM), Ministry of Agriculture, Food Security and Cooperatives (MAFC), Dar-es-Salaam

URT (United Republic of Tanzania): (2013): Public Expenditure Review for the National Agriculture Input Voucher System (NAIVS), Draft Report, MAFC, Dar-es-Salaam

Zack, Michael H.Managing."Codified Knowledge." In *Sloan Management Review,* Volume 40, Number 4, Summer, pp. 45-58.