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COMPREHENSIVE ASSESSMENT OF EXTENSION SERVICES IN RWANDA

With field work conducted from May 1 to 4 and August 27 to September 2, 2011

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Modernizing Extension and Advisory Services

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May 1-14, 2011, and
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ACRONYMS

AAS	Agricultural Advisory Services
AES	Agricultural Extension System
APFs	Agricultural Platforms
AMIS	Agricultural Management and Information System
BTC	Belgian Technology Cooperation
CAADP	Comprehensive Africa Agricultural Development Program
CDP	Community Development Plan
CHW	Community Health Worker
CICA	Center for Agricultural Information and Communications
CGIAR	Consultative Group for International Agricultural Research
CIC	Community Innovation Centers
CIP	Crop Intensification Program
CRS	Catholic Relief Service
DAP	District Agricultural Platforms
DDP	District Development Plan
EDPRS	Economic Development and Poverty Reduction Strategies
eSoko	Electronic Mobile Market Information Service
FAO	Food and Agriculture Organization of the United Nations
FERWATHE	Union of Tea Growers
FFS	Farmer Field School
FtF	Farmer to Farmer
FTF	Feed the Future
GPS	Geographic Positioning System
ICT	Information and Communications Technology
IDP	Integrated Development Program
IFAD	International Fund for Agricultural Development
ISAR	Institut des Sciences Agronomiques du Rwanda (Rwanda Agricultural Research Institute)
INGO	International Non-Governmental Organizations
KWAMP	Kirehe community base Watershed Management Project
LoL	Land of Lakes
LWH	Land Husbandry, Water Harvesting and Hillside Irrigation
MIGEPROF	Ministry of Gender and Women in Development
MINAGRI	Ministry of Agriculture and Animal Resources
MINALOC	Ministry of Local Government, Good Governance, Community Development and Social Affairs
MINEDUC	Ministry of Education
MEAS	Modernization of Extension and Advisory Services (USAID)
MOH	Ministry of Health
MONAGRI	Moniteur Agricole/Agricultural Monitor
M&E	Monitoring and Evaluation
MTN	Mobile Telephone Networks
NAEB	National Agricultural Export Board
NAES	National Agricultural Extension Strategy
NAP	National Agricultural Policy
NAECO	National Extension Committee

NGO	Non-Governmental Organization
NUR	National University of Rwanda
OCIR	Office des Cultures Industrielles du Rwanda
OCIR-Café	Office for Rwanda Industrial Crops—Coffee
OCIR-Tea	Office for Rwanda Industrial Crops—Tea
PASNVA	Project d'Appui au Programme Stratégique de Transformation de l'Agriculture
PRA	Participatory Rural Appraisal
PRSP	Poverty Reduction Strategy Program
PSTA	Strategic Plan for the Transformation of Agriculture
RAB	Rwanda Agricultural Board
RADA	Rwanda Agricultural Development Authority
RARDA	Rwanda Animal Resources Development Authority
RHODA	Rwanda Horticulture Development Authority
SAPs	Sector Agricultural Platforms
SIM	Subscriber Identity Module (cell phones)
SOW	Scope of Work
SWAP	Sectorial Wide Approach
SWC	Soil and Water Conservation
SWOT	Strengths, Weaknesses, Opportunities, Threats
TNA	Training Needs Assessment
UIUC	University of Illinois at Urbana-Champaign
USAID	United States Agency for International Development
VCT	Value Chain Training
Vision 2020	Framework of Rwanda's Development until 2020

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EXECUTIVE SUMMARY

A Comprehensive Assessment and Recommendations on Strengthening the Rwandan Agricultural Extension System

Purpose of the MEAS Assessment:

To identify opportunities for investment in terms of:

- Policy direction and support
- Structural arrangements
- Collaborative activities
- Training
- Effort
- Funding

Key components of the assessment included:

- Current policy and institutional capacity at national level
- Linkages between national and field-level extension activities
- Research and extension linkages
- Adequacy of advisory services
- Pre- and in-service agricultural training
- The use of ICT tools and techniques to support extension
- Nutrition extension
- Gender issues

The Modernizing Extension and Advisory Services (MEAS) team begins this report by recognizing that **if Rwanda is to realize its publicly stated national goals of increasing agricultural productivity and reducing rural poverty, the country must have strong, well-trained and competent extension workers and farmer-driven extension system.** Fortunately, the country has nearly all the needed elements to bring this about if the various elements are brought into proper alignment with each other and some needed short-term jumpstart investments are made to bring about needed change in critical areas. We make these observations not only on the basis of our observations and interviews in Rwanda, but also against the comparative background of our work with the Worldwide Extension Study that is monitoring and tracking Extension programs in countries around the world.

The current Extension landscape in Rwanda is one that is marked by a great deal of flux and change, and one in which a variety of different extension models are being experimented with and used. To provide clarity and focus, it will be important to refer often to the overall development strategy and the role that Extension is called to play within that strategy.

The MEAS team agrees fully with the Ministry of Agriculture and Animal Resources (MINAGRI) in terms of its short- and long-term strategy to develop the agricultural sector in Rwanda. First, the technology transfer function, especially the supply and sale of inputs, should be increasingly and progressively taken over by the private sector. However, this process will take considerable time and, in the process, farmers and farm households must learn how to increase their agricultural productivity and farm incomes. This process will require the development of a pluralistic extension system whereby the

public sector (a coalition of resources from MINALOC—Ministry of Local Government, MINAGRI—Ministry of Agriculture, and MINEDUC—Ministry of Education) and the private sector, as well as non-governmental organizations (NGOs) all have critical roles to play in bringing about agricultural development.

A critical part of this process of increasing farm incomes will be for farm households to learn how to intensify and diversify their farming systems. Because farm size is very small in Rwanda, both men and women farmers will need to learn how to produce and sell more high-value crops, livestock, fishery and other products. Also, especially in Rwanda, farm households need to learn how to pursue sustainable farming systems, so their farms will remain productive over the long-term. These options and decisions are largely dependent on the local agro-ecological conditions, access to different markets (e.g. distance and transportation options), as well as gender and household interests.

Extension Policy and Institutional Assessment

The MINAGRI's April 2009 National Agricultural Extension Strategy document highlights the importance placed by the Government of Rwanda on developing a pluralistic agricultural extension system that captures the strengths of **Top-Down** approaches as well as the strengths of **Bottom-Up** approaches

The team agrees that the Government of Rwanda's stated **Guiding Principles** for its new Agricultural Extension Strategy are sound and based on well recognized core concepts within the field. Extension must:

- Be participatory
- Utilize multiple approaches and multiple methods
- Be farmer-led (i.e. demand-driven) and market-oriented
- Be process and results oriented
- Involve multiple actors in delivering extension education, information, and services
- Build on already existing initiatives

Rwanda Agricultural Board and National Agricultural Export Board

The recent restructuring that produced the Rwanda Agricultural Board (RAB) and the National Agricultural Export Board (NAEB) out of previously separate agencies within MINAGRI was a positive step in the right direction in terms of linking Extension and Research closer together. And, the related move of redeploying RAB subject matter specialists (SMSs) to the four new zonal offices, where they can be closer to the farmers and front-line extension workers they will work with and serve, is a positive development that needs to be built upon as RAB moves forward.

Although this new RAB configuration is definitely an asset to be valued and utilized, nonetheless, it still will have some "growing pains" that will require guidance and monitoring.

It is recommended that particular attention be paid to helping RAB staff learn how to function in their new roles as Extension subject matter specialists, including how to develop a collegial "two-way" relationship with the new MINALOC frontline district and sector agronomists they will need to be working with at the local level.

Priority setting in Rwanda takes place through a unique multi-party consultative process called *imihigo*. At the district level mayors direct district-level *imihigo* discussions that take into account

national needs and priorities, farmers' needs, as well as local realities and opportunities. In one district that the team visited, although pineapple was not a national priority crop, the district planning team realized that the district had the potential to produce pineapples on a commercial scale and that farmers already had some experience, albeit on a small scale. The planning team negotiated with a fruit and juice processing company, Inyange, and established a market. Pineapples then became one of the focus crops for the district and they started pushing for 100 ha of pineapples the first year rising to 200 the second year. The district did the same with cassava when they heard of plans to set up a cassava processing factory in the region.

Once the priorities are set, the district mayor signs a performance contract with the president of the country in which the mayor pledges to 'deliver' certain volumes of production. The Executive Secretary of each sector also negotiates a similar public *imihigo* contract with the Mayor he reports to for the performance outcomes of that sector; and the contract is signed by the Mayor and the Executive Secretary. From that point on extension takes the form of campaigns, using all available resources, to mobilize farmers to produce. Even the army can be used to help mobilize farmers to produce.

Knowledge and skills become a crucial factor to ensure that farmers are able to produce the right quantities and quality required by the market. Therefore, MINAGRI has a huge role to play to ensure that frontline extension workers have the capacity and skills to provide the right knowledge and advice to the farmers and producer groups being served.

However, because the frontline extension workers (EWs) are under MINALOC, it is not clear how MINAGRI can build the capacity of frontline extension workers. There is a need to strengthen linkages between the two ministries (see 5.3.1.5 and 5.3.2 below for some practical opportunities for actualizing the linkages).

In line with District Agricultural Platforms being established under the BTC project, *it is recommended that similar platforms be formed at sector (SAPs) and cell levels to allow farmers to have more say in establishing extension priorities.* A major concern the team observed was the multiple functions that are often assigned to district and sector agronomists. Many are assigned a whole range of other duties outside agricultural extension like monitoring housing construction. The district sometimes hires high school graduates on short term contracts, say three months, to be the frontline extension workers for that period. When their contracts end, the sector agronomist takes over.

It is recommended that duties of district and sector agronomists be streamlined to focus on agriculture. This way, they will be able to develop the necessary expertise and have more time to provide quality advisory services to farmers.

Agricultural Education and Extension Education

Whereas this assessment was conducted when there were still several separate universities, the recommendations in this section are made with the impending move to one national university in mind.

The National Agricultural Extension Strategy (NAES) of April 2009 recognizes agriculture as the "pillar of economic growth" (p5). An important pre-condition is the existence frontline EWs who are appropriately trained to drive the agricultural modernization process.

The best approach was to look at MINAGRI's strategic vision and check capacity of EWs to work towards that vision.

Relevance of pre-service training

The need in the field is for general agriculture extension workers who have both technical and process skill training. As of now, universities only offer training in specialized agricultural fields like: *crop production; horticulture; agro-forestry; animal production; veterinary medicine; soil science; soil and water management; irrigation and drainage management; agricultural mechanization; agricultural economics; agribusiness. Therefore, t*here is practically no training in extension methods and management skills. Therefore, graduates with any of the above qualification are recruited as agronomists at districts (degree) and sector (diploma) levels. In addition, there was no evidence of demand-driven extension skills being taught in the current pre-service training programs.

In-service training

There is no systematic training for district and sector agronomists to enable them provide advisory services across the board. It appears that in-service training was curtailed by the placing of district and sector agronomists under MINALOC (Hakizimana 2007) and cell agronomists are almost 'bare-foot' EWs.

Enhancing Extension training[1]

There is practically no training in extension methods despite the fact that NAES definition of extension (p16) recognizes the need for extension professionals with knowledge and skills in "communication, adult education and facilitation" methods.

It is recommended that an appropriate faculty be strengthened to provide leadership in developing more effective extension training skills and knowledge.

The strengthening process would involve systematic training needs assessment (TNA), stakeholder workshops, curriculum design, and development of modules. Modules will include:

- Extension methods;
- Participatory extension methods and approaches;
- Participatory Rural Appraisal (PRA) and extension program planning;
- Extension management – including matrix management;
- Adult learning;
- Training methods and audio visual techniques;
- Farmer institutional/cooperative development;
- Group dynamics and problem solving;
- Agricultural information and communication technology (ICT) management;
- Gender and youth in agriculture;
- Extension research, including experiential learning/action research projects.

NAES already recognizes the importance of several of these:

- **Extension methods.** NAES (p22) recognizes the existence of many methods.
- **Participatory extension methods and approaches.**
- NAES has a strong farmer participatory orientation. A precondition for the success of these approaches will be the availability of knowledgeable and skilled frontline staff, both public and NGO extension workers.
- **Participatory Rural Appraisal and Program Planning**

[1] It should be noted that the MEAS project is in the process of developing training modules for these different skill areas needed by both field extension workers and extension managers. These modules can and would be shared with these faculty members who want to provide both pre-service and in-service training for extension workers.

- Participatory rural appraisal (PRA) is an excellent approach for field extension workers to both learn what type of extension services farmers want and an effective way to identify innovative farmers and then to engage them in participatory farmer experimentation and evaluation.
- **Farmer institutional/cooperative development**
- Farmer institutional development is one of four specific objectives of NAES (p.17) and is particularly important given the Government's plans to gradually disengage from extension service delivery in favor of private extension services (NAES p.21).
- A key and indispensable factor for the privatization process will be to establish strong and effective farmer organizations that are: motivated and sufficiently independent to effectively represent their interests; able to articulate their needs; contract private advisory services; monitor and evaluate performance of delivery services; articulate and defend members' interests; and lobby for these services.

Many of the farmers' association in Rwanda today were created "mainly to benefit from assistance of NGOs and not to share their efforts and capacities to solve common problems" (NAES p.12). Thorough knowledge of farmer institutional building and understanding as to how groups work on the part of field level advisory service providers will greatly enhance extension efficiency.

Extension management training

Extension management, including matrix management, is a technique of managing an organization through a series of dual reporting. It should be noted that the move of district agricultural staff to MINALOC has led to an "absence of a functional relationship between MINAGRI and the decentralized agricultural extension services" – especially at district level and below (NAES p.14). Training in matrix management for senior staff in MINAGRI and MINALOC could restore some functional relationship between the extension field staff and the MINAGRI. Hakizimana (2007 p.6) alludes to the need for the MINAGRI "to establish a working relationship with local government authorities to ensure access to information from the farmer and also to advise these farmers on the applied technologies".

Therefore, it is recommended that relevant management staff within MINAGRI and the MINALOC be given in-service training in matrix management.

Focus of current advisory services

Current advisory services focus on production agriculture, especially for the priority staple food crops. Little attention is being given to emerging high-value crop and livestock products that could increase farm income, especially for small-scale men and women farmers. Given that the "agricultural production system in Rwanda is dominated by small-holder farmers with less than one ha of cultivable land" (NAES p.5), farmers need to do all they can to maximize income from their small land holdings. They could greatly enhance their incomes by adding appropriate high-value crop and/or livestock in the process of intensifying and/or diversifying their respective farming systems. This would be sharply in line with the Government's Strategic Plan for the Transformation of Agriculture (PSTA II) global objective of "…maximization of profits for agricultural production…" and the development of entrepreneurship and market linkages (NAES p.7). Prior to the current NAES, Government had already adopted a comprehensive programme which was named the Integrated Development Programme (IDP) with ten pillars, one of which was "*Post-Harvest Processing and Marketing* – to assure food security and promote commercialization of agriculture through support for value addition and an increase in internal and export sales" (NAES p.9).

Part of the reason why field extension workers continue to focus on disseminating production technologies is that the current training at universities and colleges primarily focuses on crop and/or

livestock production practices. Therefore, field extension workers do not have the needed skills and knowledge about providing advice beyond the basic production practices. Knowledge and skills about high-value crops, as well as small-scale agro-processing and value addition is critical, given the government's plans to put special focus "on modernization of agriculture, agricultural processing industry and development of the informal sector" (NAES p.6). It should be noted that during interviews with the Minister of Education, he also expressed the need for universities to come up with a more "market-oriented" curricula.

It is recommended that an appropriate faculty be strengthened to provide leadership and training on developing agricultural value chains.

Therefore, the faculty would develop modules including the following themes:

Theme 1: Animal products processing (*small scale processing, storage, transportation, grading, packaging, safety, quality assurance*).
Theme 2: Crop products processing (*small scale processing, threshing, storage, transportation, grading, packaging, safety, quality assurance*).
Theme 3: Marketing and market analysis (*analysis of comparative advantages, organizing markets, negotiations, linkages, price factors, transportation*).
Theme 4: Small agri-business management (*financial management, value chain analysis, principles of value chain, entrepreneurship*).

The above would be based on the country's priority value chains since opportunities, constraints and challenges along all value chains are "commodity specific."

Therefore, this university should also develop a degree program in agricultural extension, with a value-chain orientation.

Therefore, it is recommended that the degree program target first those that are already in the field, especially diploma holders, in order to quickly address the current knowledge and skills needs.

The MINAGRI and/or MINALOC, through this university and/or CICA, should use the modules to provide short-term in-service training for the field extension workers. Although the NAES envisions a "…gradual disengagement of public services from direct extension service delivery…" (p.8), it is hoped that MINAGRI and MINALOC will both maintain oversight on human resource development to ensure continual availability of appropriately trained human resources, be it in the public or NGO sector. This would be in line with one of PSTA's ten strategic axes which is "Strengthening capacities of service providers, privatization and promotion of private sector" (NAES p.7).

However, developing this capacity, especially in the private sector, will take considerable time. If the MINALOC plans to set up a community innovation centers (CICs) for each of the 416 sectors (which would be easily feasible, given that there are already good meeting rooms in each sector office), then these centers could provide a focal point for both training farmers as well as distance education for cell level extension staff and farmer group leaders. It is hoped that, through joint planning and matrix management training, both MINAGRI and MINALOC can develop a shared vision regarding the skill needs for sector and cell-level extension workers, as well as farmer training using these proposed CICs.

Given the lack of familiarity with agricultural extension degree programs, it is recommended that the awareness creation process includes experience sharing visits to other universities with extension programs within the region like Haramaya University in Ethiopia, Sokoine University in Tanzania, Egerton

University in Kenya, Makerere University in Uganda and Bunda College in Malawi. The team to visit these universities would include MINAGRI and MINALOC officials, as well as the Rector and/or Dean of the selected university. While the MINEDUC is important and could be included in the visiting team, ministries of education do not normally worry about specific details of individual programs. They usually have no problems with well-articulated needs for new programs coming from universities.

Type of Graduates Needed

Given that the role of all sector-level agronomists is to function as generalists, irrespective of their training background, it would make sense to come up with a general agricultural extension degree program.

Therefore, it is recommended that an appropriate faculty be strengthened to develop a strong general agricultural extension degree program

To accomplish these objectives, there will be a need for a catalyzing dialogue among the main stakeholders involved in agricultural extension delivery - especially MINAGRI, MINALOC and MINEDUC; to develop consensus on the vision and goals of the extension system and setting up priorities for action; analyzing the training needs of extension staff; and helping agricultural universities make their curricula more responsive. Catalyzing dialogue on training might require an external intervener to initiate the process. The dialogue will lead to the development of modalities for implementing the desired training. The custom-made training programs could be run as a partnership between the university and MINAGRI, possibly through the new Training and Capacity Building (TCB) unit within the new Rwanda Agricultural Board (RAB) or CICA. In addition, MINALOC must be included in developing these custom-made training programs for their staff.

Improving the Capacity of Key University Faculty

Generally, agricultural training given at the four universities visited (ISAE, INATEC, NUR, and Umutara) is weak due to:

a) Critical shortage of qualified faculty, especially extension training faculty. On average, the universities have only a third of the critical faculty that they require)
b) Lack of equipment and facilities for practical training.

The Minister of Education alluded to these weaknesses above and further suggested mentoring programs with experienced universities in the West. Also, the lack of M.Sc. training in the country (apart from Soil Science and Environmental Management) acts as a disincentive for B.Sc. holders in the extension system, like district-level agronomists. They do not see career advancement as a prospect for themselves.

It is recommended that an appropriate faculty be strengthened to provide quality training and to provide M.Sc. level training in order to address the current staff shortages and the need to improve career prospects for those already in the service.

Need for a professional platform (i.e. an agricultural extension professional association)

Rwanda is experiencing multiple approaches to extension involving a wide range of extension service providers using a wide range of strategies and approaches. The effectiveness of these different approaches and service providers is not well known, but some appear to create “farmer dependence” due to the distribution of free or subsidized inputs. Therefore, there is a need for systematic studies to assess the effectiveness of the different approaches and strategies. These studies would yield data and information that would inform planners. Interesting topics would include: *effectiveness of outsourcing*

training; effectiveness of the model (or lead) farmer approach in extension; the effectiveness of farmer field school approach beyond integrated pest management (IPM); partnerships and linkages in extension service provision; decentralizing extension through local administration; cooperatives and other famer institutions as a vehicle for agricultural extension; role of non-government organizations in agricultural extension; frontline extension workers training needs. In additions, *adoption studies* could be conducted on a whole range of commodity values chains being promoted across the country.

An extension professional platform would encourage such studies and sharing of evidence-based best practices. The university agricultural faculties would find this as fertile ground for conducting research and sharing the results as part of their faculty professional growth and also for their teaching. In the absence of a professional platform, extension workers are, on-their-own, struggling to find the best way of making a difference at farmer level. There is no way of harnessing the experiences these extension workers are going through, for purposes of learning and sharing. Therefore, an agricultural extension professional platform would provide practitioners an environment for professional growth through life-long learning as they meet (face-to-face) or otherwise learn from each other, as well as encouraging each other to conduct research and learn from their work. Also, data and information generated through this professional platform (or through specially commissioned studies) would help inform policy formulation and policy change processes.

An extension professional platform would also provide an environment for open debates that enable practitioners to internalize the concepts and policies, while translating these policies into a language that can be understood by rural communities. Establishing and running such an association requires a few 'champions' who initiate and show direction; as well as a volunteer university that would host this platform and act as a focal point.

The extension professional association recommended here is similar to the (American) Association for International Agricultural and Extension Education (AIAEE), the European Society of Extension Education (ESEE) and the South African Society for Agricultural Extension (SASAE). These organizations enhance professional growth by encouraging research studies and sharing of experiences. In both cases leadership (champions) and the initiative to form the associations came from universities but they draw membership from across the extension profession in their countries and beyond. But the initiative could come from anyone interested – including development partners. The Rwanda association could affiliate itself to the African Forum for Agricultural Advisory Services (AFAAS), which is a constituent member of the Global Forum for Rural Advisory Services (GFRAS), to benefit from other experiences in the continent and beyond.

It is recommended that the university selected to provide agricultural training, with strong support from both MINALOC and MINAGRI, will provide leadership in setting up and running this new professional association of extension workers.

The current official platforms initiated by MINALOC and MINAGRI through PASNVA, which are structured from national to village level, are essentially for planning and implementation purposes – and everybody will say what they are doing is working (PASNVA report).

Extension Information and Communication Technology (ICT)

Few sectors have undergone as much rapid transformation recently as the ICT sector, and many of the latest innovations have a high potential to dramatically change how communications activities are conducted with both farmer and internal Extension worker audiences. In looking at the whole spectrum

of a pluralistic Extension system, we need to take a multi-layered approach, because different socio-economic groups within Rwandan society will have access to different types of ICT devices and services.

It is important to begin by recognizing that the Ministry of ICT has done an excellent job of laying the foundational framework for a robust ICT infrastructure in Rwanda that can be built upon to strengthen the delivery of Extension services (including internal communications and training within the public sector extension system).

The NICI (National Information and Communications Infrastructure) plans (phase 1 and phase 2) were created with the express purpose of using GOR resources to create the necessary "building blocks" for a comprehensive ICT infrastructure, and then having the private sector eventually run the infrastructure as soon as a proper regulatory environment had been created.

A major ICT constraint for the country thus far has been affordable, high-speed internet connectivity. Up until now, Rwanda has had to rely on satellite based data services, which are both slower and much more expensive than fiber based services. Consequently, there has been a great deal of demand for getting off of satellite and onto fiber.

Under MINICT direction, the GOR just completed building a 2,600 km country-wide fiber optic backbone ring that connects all 30 Districts of the Country with the capital, Kigali. By virtue of the national network design featuring a true circular "ring" design with 2 exit points – one each in Mombasa, Kenya and Dar Salam, Tanzania – the network can survive even a catastrophic failure at a single location and still maintain service for most users. MINICT also has plans for a "last mile" deployment of wireless broadband that should be completed within the next 24 months. In the meantime, again as a result of careful planning by MINICT, Rwanda's mobile phone network currently covers 95% of the land mass of the country (and the areas without service are generally areas without much human population – such as forests and game preserves).

We strongly recommend, therefore, that going forward, Extension should plan on leveraging these ICT infrastructural resources to the maximum extent possible, both for internal communication and training and for communicating with farmer audiences directly.

District and Sector level Extension workers – ICT

District workers currently have both laptop computers and internet connectivity, but the connectivity is currently relatively slow (that will be addressed soon when the fiber ring is lit up and extension district offices are connected). Sector level staff members currently have computers, but lack any sort of connectivity for their machines which severely limits their usefulness for any sort of timely two-way communication, data sharing, or information gathering. ***This must be changed as quickly as possible.***

ICT Observations from Visits with Farmer Groups

Among farmers, the dominant ICT device is the common voice/sms capable cell phone. Among all the farmer groups we visited with, there were never less than 1/3 of those present who had a cell phone on their person. And, in most groups, that figure was between 50% - 80%. In contrast, almost no farmers owned a computer, and only a few had ever used one at a public telecommunications center (and those were primarily younger farmers).

Farmer groups such as Imbaraga use computers more than typical farmers.

Agricultural Information and Communication Centre (CICA)

CICA was created through the PASNVA project, in recognition that a national center was needed to deliver 5 essential information/communication services. Those were: (1) a documentation center and library; (2) a GIS lab; (3) a group for managing the MINAGRI website and the AMIS Portal (Agricultural Management and Information System); (4) staff to develop Extension publications; and (5) staff to develop extension audio-visual materials.

We support the findings of the BTC final evaluation report of PASNVA, November 2010, when it said that CICA represents a fundamentally sound beginning on which MINAGRI can continue building. We also agree with the general findings that: *"CICA should be integrated in MINAGRI, as a separate unit for extension, communication, and information; providing services to service providers as well as to other MINAGRI agencies, projects and programmes."*

The current staff, who are working on the AMIS computer portal and in producing new publications, are very talented and productive; however, the current number staff assigned to these tasks is greatly inadequate for the volume and importance of the work to be done.

e-Soko is a new service to provide current market price information to farmers and other parties in the food market chain via low-cost cell phones using either sms or via voice. e-Soko was developed by MINAGRI and the Rwanda Information Technology Authority (RITA) with funds from the World Bank. The service currently provides information on all major agricultural commodities (staple crops, vegetables, and fruits) sold in 50 markets throughout the country. For several reasons the platform on which eSoko is based is currently up for major revision, so this is a good time to consider how to make this service stronger. When we surveyed farmers in the field, few of them knew of the existence of the eSoko service, but when it was fully described, virtually all farmers seemed very interested in having access to that sort of real-time information

Extension ICT Recommendations

Future investment plans for advancing both MINALOC and MINAGRI's agricultural improvement goals should focus, at least in part, on how best to enable Extension (and indeed the whole agricultural production sector) to best utilize this valuable new networking resource. Such an investment strategy would include:

- Utilizing current cellular data capacity immediately for extension work connectivity in the field (and in the sector-level extension offices).
- Equip sector-level Extension workers with a cutting-edge tablet computer with cellular data capacity and also standard "wifi" (such as an iPad2). As was demonstrated by the ICT specialist on this assessment team who used his iPad2 in farmers' fields throughout the country, such a device would radically change how "plugged in" and productive Extension workers could become. Such a device could be used not only to enhance currently inadequate methods of internal electronic communication, but also empower the extension worker to become more of a "knowledge worker" while working with farmers. With an iPad2, Extension workers would have access to email and web resources wherever they went (including the field). The field staff could also be trained on how to use their iPad2's as information gathering devices – taking photos with the built-in camera, mapping important locations and issues with the built-in gps, or even shooting videos of successful farmers demonstrating a particularly successful technique that could be used to help train other farmers (like the videos being created in India's successful "digital green" project. Finally, internal procedures within CICA/MINAGRI could be developed to

electronically package and distribute all extension publications with a searchable reader for the iPad2 so that every worker had the full AMIS library pre-loaded on their iPad.

- CICA needs to be strengthened so it can produce more of the type of extension information that farmers want and need to become economically successful. The staffing of CICA needs to be both underwritten with more solid funding support and integrated within MINAGRI as a cross-cutting, integrated communications and IT service group.
- Strengthen the AMIS portal. Information on the AMIS portal is currently stored in the pdf file format, and while that preserves the look and feel of paper-based publications, it does not necessarily display as well on small portable computers or smartphones. Also, the portal currently lacks a way that multimedia elements such as video resources can be played back in a consistent way on all computing devices. We recommend bringing in an external technical consultant to work with the current AMIS staff to explore how to migrate to more of a Cascading Style Sheet (CSS) method of coding the master documents and using html5 methods of embedding multimedia content (such as video) in webpages so they will playback well in all types of computing devices (including iPad2's). Finally, we recommend that the more basic text elements of the content on AMIS should be customized so that it can also be accessed directly by the farmers themselves using the technology developed by ForgetMeNotAfrica. This information would most probably be organized into a series of sequentially transmitted sms messages on a single concept or practice. These messages could be timed with weather and calendar specific release times.
- Improve and expand e-Soko services. Leverage the recent research results gained by Dr. Khin Cho and Dr. Don Tobias in Rwanda concerning what features farmers and others in the food chain want in terms of information from a phone sms-based market information system. Work with staff with the MarketMaker program at the University of Illinois (a MEAS partner) and the ForgetMeNotAfric group in the UK to transform the current e-Soko system and take it to "the next level" where it more fully and effectively meet the needs of Rwanda farmers.
- Collaborate with AFRRI and Farm Radio International on Radio Production. Work with AFRRI (the African Farm Radio Research Initiative) and Farm Radio International to strengthen the development and production of local radio. Farm Radio International has a proven track record of coaching and mentoring partner-broadcasters, and teaching them how to produce local documentaries and educational dramas for radio that reinforce the local culture and use local traditions of oral storytelling to convey agricultural information in an engaging way that audiences will respond to.

Nutrition Extension

The team observed that the Rwanda Government recognizes the impact of malnutrition on economic growth and poverty reduction and has made incredible progress in the nutrition and health sector through different programs like:

- Management of acute, severe, moderate malnutrition at the health facilities
- Increase coordination to enhance implementation of nutrition activities
- Micronutrient nutrition and existence of national food fortification alliance
- Existence of an active Nutrition Technical Working Group;
- Decentralization of nutrition activities at district and sector levels
- Community health workers in each village for social mobilization and referral service to health centers
- Nutrition support and counseling for people living with HIV/AIDS

- Prevention of Mother to Child Transmission of HIV/AIDS
- Growth monitoring and Promotion (GMP)
- Infant and Young Child Feeding including (Promotion, protection and support)
- Community Based Nutrition Programs
- Vitamin A supplementation for children 6-59 months and postpartum mothers
- One cow per family and one cup of milk per child initiatives

However, the nutrition situation remains a critical public health problem as the national prevalence of protein-energy malnutrition and micronutrient deficiencies are still major constraints to the well-being of mothers and children. There is a need for monitoring and evaluation of all nutritional interventions.

There are four community health workers (CHWs) per village who work on voluntary basis. To improve their effectiveness, *it is recommended that a review be conducted to establish CHWs training needs and to improve their incentives*.

Gender Issues

The country has a strong political will to promote gender equality as a pre-requisite for sustainable development.

The following highlights reflect some major achievements in advancement of gender issues in Rwanda:

- Rwanda has a Constitution that guarantees gender equality and there has been significant increase in the number of women in decision making capacities. There exists a mandated requirement that at least 30% of all positions be filled by women. As of 2008, 52.25% of parliamentarians were women, and 32% of Ministers and State Ministers were also women.
- Laws of inheritance, succession and land tenure give equal rights to women and men.
- The National Women's Council helps ensure that the governmental mandates regarding gender equality are appropriately implemented.
- Gender awareness has been generated throughout the country through the media, gender training and sensitization campaigns are ongoing.
- Rwanda has achieved gender parity in primary school enrolments since 1994, and the rate has increased from 76 to 90%.
- EDPRS has been globally recognized as one of the most gender-sensitive poverty reduction strategies.
- Ratification of CEDAW and the Beijing Platform have been integrated into national policies, the constitution and translated into Kinyarwanda.
- Women can now inherit land due to newly modified family law.
- Women's District and Guarantee Funds address poverty amongst the female segment of the population.
- Women have been mobilized to supplement the justice system and are part of Unity and Reconciliation through the GACACA courts.

A COMPREHENSIVE ASSESSMENT AND RECOMMENDATIONS ON STRENGTHENING THE RWANDAN AGRICULTURAL EXTENSION SYSTEM

1. Introduction

This In-Depth Study of the Pluralistic Extension System in Rwanda was undertaken during the first two weeks of May 2011 (May 1-14). A follow-up two person subset of the team returned to Rwanda August 27-September 2, 2011 to conduct additional field observations and consultations with key stakeholders, partners, USAID staff and GOR officials regarding final recommendations.

Due to the shortness of time on the first trip and the complexity of this mission, team members largely concentrated on their specific areas of interests and concerns, sometimes working together and, more frequently, working in smaller groups or individually.

During the first day (of the first trip), the team met with all USAID Mission staff and then moved on during the next two days to meet with senior officials in the Ministries of Agriculture and Animal Resources, Education, Gender and Family Promotion, Trade and Industry, and Information Technology.

During the next four days, the team moved to the field to meet with groups of men and women farmers, including farmer federations, cooperatives and associations. In addition, the team met with both public and NGO advisory service providers that were covering different crop and livestock systems. In the case of public extension, the team met with MINALOC agronomists at both the district and sector levels; however, we were not able to meet with key MINALOC officials at the national and district level (e.g. the district mayor). The NGO service providers were generally "commodity specific" (e.g. maize, beans, rice, etc.) in terms of providing advisory services to groups of farmers who were either involved in "consolidated land" projects (e.g. maize, rice, etc.) or for specific crop or livestock projects (i.e. coffee or one cow/family, etc.). In addition, the extension education specialist met with senior officials at all universities that train agricultural personnel so he could assess their extension education programs. Finally, the gender and nutrition specialist met with rural women, including time at hospitals, to assess the important nutrition problems being faced by the rural poor.

The final three days were spent with International NGOs who are providing different advisory services to rural farm households, as well as meeting with other key donor agencies, including the Belgian Development Agency (BTC), which has been investing in agricultural extension for the past 3 years and will further expand these investments for the next 5 years, focusing specifically at investments for the national and district levels. In addition, the team met with officials from the Food and Agriculture Organization (FAO). During these last few days, the team focused specifically on key issues limiting the provision of extension and advisory services to small-scale men and women farmers, as well as other key problems, especially the research-extension linkage problems between MINAGRI and MINALOC. On Friday afternoon, the team met with the Minister of MINAGRI to explain and discuss specific options about how the pluralistic extension system in Rwanda might be strengthened.

On the follow-up trip in late August, Paul Hixson and Jeff Mutimba returned to Rwanda representing the full team. They visited with the Minister of Education, the new Director General of RAB, the Deputy Director of RAB in charge of Animal Resources, representatives of JICA and BTC, the CICA Coordinator and the Program Manager of PSTA II, the Permanent Secretary of MINALOC (and 2 Deputy Directors of MINALOC), two district Mayors, and several district and sector level agronomists. The follow-up trip concluded with meetings with the Minister of MINAGRI and the USAID E07 team.

2. Background

The MEAS team was charged with providing a comprehensive assessment of the pluralistic Extension Services in Rwanda. This includes focusing on the unique contributions that both public and private partners, as well as international and domestic non-governmental organizations (i.e. INGOs and NGO) can make in serving the needs of farm and rural households across Rwanda. Key components of the assessment included a) the examination of current extension policy and institutional capacity at the national level (i.e. MINAGRI); b) linkages between extension activities at the national level (MINAGRI) and field extension activities being carried out by MINALOC extension workers at the district, sector and cell levels; c) research and extension linkage issues being addressed by MINAGRI at the national and zonal level; d) the type and adequacy of extension and advisory services being delivered by international and domestic non-governmental organizations in addressing specific crop and livestock systems; e) the availability and quality of both pre- and in-service agricultural extension training activities being carried out by universities; f) the use of ICT tools and techniques to support extension activities at the field or operational level; g) the adequacy of extension programs to address nutrition and food security issues among poor rural households; and h) how well and whether these different extension programs are addressing key gender issues within the country.

2.1 Evaluation Team

- **Burton Swanson**, Director of the Modernizing Extension and Advisory Services (MEAS) Project at the University of Illinois at Urbana-Champaign;
- **Jeff Mutimba,** Extension Education Specialist, Winrock International, and Regional Director for the Sasakawa Association for Extension Education (SAFE);
- **Tom Remington**, Senior Agricultural Specialist, Catholic Relief Services;
- **Pascasie Adedze**, Nutrition and Gender Specialist at the University of Illinois at Urbana-Champaign; and
- **Paul Hixson**, Interim Chief Information Officer for the Urbana-Champaign campus of the University of Illinois and ICT-Lead for the MEAS Project.

2.2 Objectives

The overall objectives of this mission were the following:

- Evaluate how the agricultural extension system in Rwanda has changed since independence, especially as the country now moves toward a more decentralized, market-driven production system, involving both staple and high-value crops, as well as livestock, fish and other high value products; with the goal being to both achieve national food security as well as expanding exports to further increase farm household income;
- Identify critical linkage problems and/or other obstacles within the current pluralistic extension system, as well as possible opportunities for strengthening this pluralistic extension system in Rwanda, including linkage issues, the types of human and financial resources needed, as well as training and other inputs (e.g. ICT options) that would enhance the capacity of this emerging, decentralized, pluralistic agricultural extension system;
- Determine a possible strategy and inputs that donor partners should consider as they seek to help Rwanda build a long-term and sustainable extension system that will both maintain national and household food security, as well as increasing rural household income over the long-term.

2.3 Approach and Limitations

The approach taken by the evaluation team during the first visit was limited by the length of time the team was actually on the ground in Rwanda. The team had a very aggressive schedule of meetings that were distributed in representative regions around the country. In order to carry out such an ambitious schedule, the team frequently had to split into separate sub-groups to conduct interviews in various geographical areas.

The follow-up trip in August succeeded in uncovering important additional information particularly regarding linkages between MINAGRI and MINALOC that was necessary to complete this assessment. The team addressed all the points within the Scope of Work (Annex A), including a description of the key the findings (Section 4) that led to key recommendations found in Sections 5. Additionally, the report includes a summary of field visits to the various stakeholders (Annex B), a list of the people contacted (Annex C); and the Terms of Reference and Scope of Work agreed upon with USAID/Rwanda prior to the Team's in-country assessment (Annex H).

3. Lessons from Selected Previous Projects and Recent GOR Restructuring Decisions

Prior to arriving in country on this trip, we contacted a number of colleagues and counterparts in Rwanda and were given access to a number of previous studies, reports, and planning documents related to extension in Rwanda. One of the most important documents we were given was the "Strategic Plan for the Transformation of Agriculture in Rwanda – Phase II (PSTA-II)" final report, February 2009. That report includes the following four key paragraphs:

> *"Vision 2020 seeks to transform the economy by bringing about a rapid increase in growth and significant reduction in poverty. By the 2020 target date it is expected that the country will have, among other things, reached middle-income status with per capita GDP having grown to US$900 from an estimate US$220 in 2000. Other goals include a reduction by more than one-half in the incidence of poverty and extreme poverty and improvements in a range of more general standard of living indicators.*
>
> *The agricultural sector is to be accorded a high priority in the Government's programme of development, with a fundamental transformation of the sector being required and planned for. This will, it is foreseen, involve the sector moving from subsistence to a commercial mode of production, thus attracting a substantial increase in investment. It will result in an increase in household incomes and a reduction in poverty levels, by 50 percent over twenty years. Agriculture is seen as a major engine of growth for the economy and its modernization is one of the six components (pillars) of the Vision. By 2020, the agricultural sector's contribution to GDP is expected to be 33.*
>
> *Vision 2020 recognizes that the private sector will, over time, assume the role of driver of the economy and the State's responsibility is stated as being to initiate, pilot, co-ordinate and monitor efforts. Whereas in the past the State had often "choked the initiatives of its citizens," vision 2020 envisages that in the future it would be the catalyst and stimulator of growth and change.*
>
> *It is worth noting that Vision 2020 assigns a high priority to achieving gender equality, placing it as the first crosscutting issue. As stated in Vision 2020, women make up 53% of the population and participate in subsistence agriculture more than men.*

Also, the umbrella ICT planning document, The NICI-2010 Plan, outlines a comprehensive strategy for developing a world-class fiber backbone infrastructure, and deploying advanced ICT technologies in the various sub-plans for education; human capacity development; social development; e-government and e-governance; private sector development; rural and community access; and national security, law, and order. Embedded within a number of those various sub-plans we could see opportunities for making dramatic changes in the way that agricultural extension information is shared and created throughout Rwanda.

In addition, the MINAGRI's April 2009 National Agricultural Extension Strategy document highlights the importance placed by the Government of Rwanda on developing a pluralistic agricultural extension system that captures the strengths of **Top-Down** approaches (Technology Transfer and Training & Visit) as well as the strengths of **Bottom-Up** approaches (Farming System Research, Participatory Extension, Farmer-to-Farmer Extension, Partnership Extension, Agricultural Knowledge Information System), as well as the eventual privatization of agricultural extension, including contracting for advisory service delivery. The team was glad to learn that the Ministry recognizes that *"each approach has its strengths and weaknesses in a given context."* The MEAS team strongly agrees and that the responsibilities for these extension activities will change over time. As the report suggested, the challenge becomes how to take advantage of the most profitable farming system and market opportunities within a given agro-climatic zone and then to match these opportunities to the human, economic, and development needs of that area. Also, the team agrees that the Government of Rwanda's stated **Guiding Principles** for its new Agricultural Extension Strategy are sound and based on well recognized core concepts within the field. Extension must:

- Be participatory
- Utilize multiple approaches and multiple methods
- Be farmer-led (i.e. demand-driven) and market-oriented
- Be process and results oriented
- Involve multiple actors in delivering extension education, information, and services
- Build on already existing initiatives

The MEAS project team believes that 3 core principles must inform all Extension programs in order to be successful: (1) farmer-led, (2) market-driven, and (3) decentralized. The GOR's agricultural extension strategy aligns precisely with all three core MEAS principles. Also, we learned that the decentralization of the agricultural extension system in Rwanda was achieved through the 2004-5 administrative reform that transferred the delivery and supervision of extension services from MINAGRI to the Ministry of Local Government (MINILOC).

As a result of this reorganization, MINAGRI is now responsible for coordination and planning of agricultural development programs; the agricultural sector information function; the monitoring and evaluation function; the regulation and control function; and the resources mobilization function. However, the direct delivery of public extension services, per se, is now being funded by and under the direct control of the Ministry of Local Government (MINALOC) at the district level.

Rwanda is blessed with three growing seasons per year each of which present different opportunities for farmers. Season A, September to mid-January is the main rain season – hence the main growing season. Season B, mid-January to April, is a short rain season – and farmers grow short season crops like beans. Season C, May to August, is the dry season – when farmers turn to marshlands for high value crops like vegetables and rice.

Priority setting in Rwanda takes place through a unique multi-party consultative process called *imihigo*. At the district level mayors direct district-level *imihigo* discussions that take into account national needs and priorities, farmers' needs, as well as local realities and opportunities. In one district that the MEAS Assessment team visited in late August, although pineapple was not a national priority crop, the district planning team realized that the district had the potential to produce pineapples on a commercial scale and that farmers already had some experience, albeit on a small scale. The district planning team negotiated with a fruit and juice processing company, Inyange, and established a market. Pineapples then became one of the focus crops for the district and they started pushing for 100 ha of pineapples the first year rising to 200 the second year. The district did the same with cassava when they heard of plans to set up a cassava processing factory in the region.

Once the priorities are set, the district mayor signs a performance contract with the president of the country in which the mayor pledges to 'deliver' certain volumes of production. The Executive Secretary of each sector also negotiates a similar public *imihigo* contract with the Mayor he reports to for the performance outcomes of that sector; and the contract is signed by the Mayor and the Executive Secretary. From that point on, extension takes the form of campaigns, using all available resources, to mobilize farmers to produce. Even the army can be used to help mobilize farmers to produce.

Knowledge and skills become a crucial factor to ensure that farmers are able to produce the right quantities and quality required by the market. MINAGRI therefore has a huge role to play to ensure that frontline extension workers have the capacity to provide the right knowledge and skills.

A major concern the team observed was the multiple functions that are often assigned to district and sector agronomists. Many are assigned a whole range of other duties outside agricultural extension like monitoring housing construction. The district sometimes hires high school graduates on short term contracts, say three months, to be the frontline extension workers for that period. When their contracts end, the sector agronomist takes over.

It is recommended that duties of district and sector agronomists be streamlined to focus on agriculture. This way, they will be able to develop the necessary expertise and have more time to provide quality advisory services to farmers.

We further learned that a recent reorganization within MINAGRI consolidated various divisions under two specialized agencies: the Rwanda Agricultural Board (RAB) and the National Agricultural Export Board (NAEB). The goal was to effectively move extension and research activities into closer contact with each other (especially under RAB, but also through NAEB), since there have been continuing research-extension linkage problems within MINAGRI. This restructuring and re-alignment of resources appears to be headed in the right direction and has the advantage of moving subject-matter specialists closer to the end users, as they are deployed to four new zonal offices around the country

However, because this is a new relationship between MINAGRI (both RAB and NAEB) and the recently established extension activities, personnel and financing which is now under MINALOC (especially the district mayors), it is recommended that special attention be paid to establishing productive new functional and structural linkages between all parties so that the needs of the farmers are best served.

We also reviewed the PASNVA project. PASNVA is a French acronym that in English translates to the National Agriculture Extension Support Project. PASNVA was a joint Extension strengthening project funded by €4.5m from the Belgian Technical Cooperation (BTC), and a €170k counterpart fund from the

government of Rwanda. The goal of the PASNVA project was to "support MINAGRI in developing and carrying out a decentralized agricultural extension system." It had two major components.

The first was the establishment of the Center for Agricultural Information and Communication (CICA). Within CICA, five distinct services were to be established: (1) a documentation center and library; (2) a Geographic Information Service (GIS) laboratory; (3) a group for managing the MINAGRI website and the AMIS Portal (Agricultural Management and Information System); (4) competent staff to develop useful extension publications; and (5) additional staff to develop extension audio-visual materials. The second major component of PASNVA was to develop and pilot-test this new decentralized extension system using "multi-actor alliances" that are "adapted to the local agro-ecological and socio-economic context." The PASNVA project operated from August 2007 through November 2010, and recently underwent a final project evaluation. The team was able to download and review the final PASNVA evaluation report prior to our visit to Rwanda.

The Executive Summary of the *Strategic Plan for the Transformation of Agriculture in Rwanda—Phase II* (PSTA II) outlines the following programs, including the specific sub-programs, including:

1. **Intensification and development of sustainable production systems**
   a. Sustainable management of natural resources, water and soil conservation;
   b. Integrated development and intensification of crop and livestock systems;
   c. Marshland development;
   d. Irrigation development;
   e. Supply and use of agricultural inputs; and
   f. Food security, vulnerability management.

2. **Support to the professionalization of producers;**
   a. Promotion of farmers' organizations and capacity building for producers;
   b. Restructuring of proximity services for producers; and
   c. Research for transforming agriculture.

3. **Promotion of commodity chains and agribusiness development**
   a. Creating an environment conducive to business and entrepreneurship development and market access;
   b. Development of traditional exports;
   c. Development of non-traditional, high-value export products;
   d. Production and value addition for domestic staple products;
   e. Market-oriented rural infrastructure; and
   f. Strengthening rural financial systems.

4. **Institutional development**
   a. Institutional strengthening and capacity building
   b. The policy and regulatory framework for the agricultural sector
   c. Agricultural statistics and ICT
   d. M&E systems and coordination of the agricultural sector; and
   e. The decentralization program in agriculture.

These programs have implications for the pluralistic extension system in Rwanda, and the following issues need to be addressed: For example, 1) teaching farmers how to intensify and diversify their farming systems to increase farm household income, while using their natural resources (land, water,

etc.) more efficiently and using sustainable farm management practices; 2) organizing producer groups, associations and cooperatives, and then training them how best to improve their linkages with both input supply firms and emerging new market opportunities (i.e. value chains); 3) increasing the productivity of priority crops, especially for high-value crops, livestock, fisheries and other products, so that producers can increase their farm household income; and 4) training field extension workers, in each of these three previous program areas, so that field extension workers can provide more effective extension services to the farmers being served.

Also, the MEAS team was given access to a redacted version of a recent November 2010 trip report to the USAID Rwanda Mission's SO7 Team prepared by Judith Payne, USAID e-Business Advisor. The insights gained from this report and the list of contacts greatly helped in making useful pre-trip arrangements and getting up to speed on country and ICT issues.

In short, the agricultural transformation strategy currently being implemented is exactly what Rwanda (and other developing countries) should pursue. These programs will enable Rwanda to achieve national food security, as well as increase farm household income and progressively reduce rural poverty and improve the livelihoods of small-scale farm households across Rwanda. For more detailed information on this Ministry of Agriculture and Animal Resources (MINAGRI) strategy, go to the following website: http://www.minagri.gov.rw/

4. FINDINGS

4.1 Extension Policy and Institutional Assessment: Overview of the Pluralistic Extension System in Rwanda

4.1.1 Key Institutional Issues Identified by the Decentralized Agric. Extension Road Map[2]

The agricultural extension system has changed substantially since the colonial period (before 1962) and the post-colonial period up to 1980 where the primary focus was on export crops, including coffee, tea, pyrethrum and quinquina. During this earlier period, extension was a very top-down system where farmers were required to follow key production practices as defined by the colonial and post-colonial governments and as implemented by the field extension workers. During this post-colonial period, a large number of public extension workers were hired and began testing new extension methods, however, all of these methods were still top-down, without any serious participation of farmers in defining local needs and priorities.

From 1980 through 1994, the extension system was still dominated by the government using a top-down approach, including Training and Visit (T&V) Extension introduced by the World Bank (WB). At the same time the international NGOs began providing agricultural extension services. After the 1994 genocide, an emergency phase was started (1994-1998) and both national and international NGOs began creating new farmer associations. Most of these NGOs did not and still do not work closely together in providing advisory service and coordinating their respective extension activities. Then in 1998, "sector-level" MINAGRI extension workers (i.e. agricultural monitors or MONAGRI) were officially removed as national government employees. This removal, however, created a serious gap between MINAGRI institutions and the farmers being served. However, there continued to be extension advisors for key export and cash crops (e.g. coffee, tea, Irish potatoes).

During the past decade, new extension approaches have been considered to provide improved advisory services to different categories of farmers. It has become widely accepted that extension services should be provided through a pluralistic extension system including the public sector (i.e. at the national, district and sector levels), international and local NGOs, as well as the private sector. It is also widely accepted that extension service providers should be more participatory (i.e. more farmer-driven) and market-oriented. For example, there is a strong focus on developing commodity chains for key staple crops (e.g. maize, beans, rice, wheat) to achieve national food security, as well as export crops (e.g. coffee, tea, and key horticultural crops) to improve rural livelihoods by increasing farm household income and, thereby, reducing rural poverty. Another key goal is to improve household nutrition by having one cow per family, especially among small farm households.

4.1.2 Role of MINALOC within this Decentralized Agricultural Extension System

As noted earlier, in 2004 the GOR decided to formally pursue a new extension strategy by decentralizing agricultural extension activities to the Ministry of Local Government (MINALOC), so these activities would be more focused on the specific needs of farm households within each district. The reason for this change was to make this decentralized extension system more participatory and farmer-driven. The specific goals of this new strategy were the following:

[2] First draft of the Decentralized Agricultural Extension Road Map prepared in December 2010 by Violet Nyirasangwa, PM2 Manager; Mary Rucibigango, former Coordinator of the PASNVA Project and now Coordinator of the Center for Agricultural Information and Communications (CICA) and Anecto Kayitare, Consultant.

1. Intensification and development of sustainable production systems,
2. Support the professionalization of producers (farmers),
3. Promotion of commodity and value chains, including agribusiness development, and
4. Institutional Development (of this new decentralized extension system).

The public agricultural extension system, as well as other government services, was formally transferred to MINALOC with the passage of the decentralization policy in 2004, and then fully implemented nationwide by 2009 as part of these expanded local government offices at the district, sector and cell levels. Currently, there are 30 districts, 416 sectors, 2148 cells serving 14,876 villages across Rwanda. In each district, there is an "agronomic" extension officer (i.e. advisor and administrator), as well as a veterinarian who supervises animal health practices throughout the district. These district-level extension officers generally have a B.Sc. degree in some technical area of crop or livestock production, or agricultural economics/agribusiness. Their primary duties are to supervise and support the sector-level extension workers, as well as handling district level administrative matters. These activities and outcomes are then submitted to the District Mayor in MINAGRI, but with no direct reporting to MINAGRI.

At the sector level, there is an agronomist (with either B.Sc. degree or a post-secondary diploma), who is also trained in a specific subject matter area, such as crop or livestock production or agricultural economics. In addition, in some sector officers there is a diploma-level animal health specialist who is currently funded by MINAGRI, since these positions were not included in the MINALOC budget when these extension services were transferred to MINALOC. At the cell level, the frontline "agronomes" may or may not have a secondary school diploma in agriculture; we were told that many of these cell level extension workers just have general secondary school diplomas, without any specific training in agriculture. In addition, these cell level officers have multiple government tasks to carry out (e.g. infrastructure, seed distribution, especially for staple crops, etc.); therefore, they provide limited advisory services to farmers.

From a performance perspective, sector-level agronomists appear to be the best trained, front-line public extension workers. These sector level agronomists are expected to provide both training and technical advisory services to groups of farmers within their specific sector. In addition, they are also expected to supervise the multi-purpose cell level extension workers. It should be noted that most of these sector-level extension staff are relatively young and only have training in specific technical areas, such as animal health, soil management or agribusiness management. In short, none of the extension workers at the district, sector, and cell levels have any training in "extension methods" (e.g. "process skills") that front-line extension workers will need to provide effective advisory services to rural households. These skills are especially important in providing effective advisory services to producer groups, farmer associations and commodity specific cooperatives.

One key challenge of field-level agricultural extension at the district/sector level is that the formal linkages between MINAGRI and MINALOC have yet to be formalized in consistent ways across the country. This reduces the cohesion of the Extension system as a whole and needs to be addressed. Until this is done, the lack of strong, clear, formal linkages will continue to negatively impact the planning, delivery, and evaluation of Extension services in Rwanda.

Another major problem is that although MINALOC provides funding to the district governments to cover salary costs of field level extension workers, there is a serious shortage of funds to cover the operating expenses of those staff. As a result, there are very limited program and transport funds available to enable district/sector-level agronomists and veterinarians to provide needed services to the

farmers being served (e.g. conduct field demonstrations, give technical and marketing advice to farmers, and carry out other needed farmer training activities), especially at the sector level. It should be noted that the current plan within the new BTC funded extension project is to organize DAPs in each district, so they can review and "approve" funding for these proposed annual extension work plans that are expected to address key farmer priorities within their respective districts.

Also, there are no funds available to provide in-service training (both technical and process skills) to up-grade the skills and knowledge of these MINALOC extension workers, especially at the sector level. As noted throughout this section, these skills and knowledge are needed so these field extension workers can provide the needed advisory services to the farmers being served. For example, helping farmers get organized into producer groups, associations and cooperatives and then getting them linked to markets.

At the present time there appears to be very little collaboration between the pluralistic extension service providers (i.e., public, private and NGOs). For example, there are numerous international and local NGOs operating within the different districts across Rwanda, but most of these projects are focused on specific crop (e.g. rice, maize, beans, cassava, Irish potatoes, coffee, etc.) or livestock projects (e.g. one cow/one family). Most of these donor-funded projects last for only 3-4 years and then terminate. Therefore, most of these extension activities are not sustainable on a long-term basis, because most NGOs just move on to another project (i.e. with a different focus and/or in different districts).

Most small-scale farmers will need to learn how to intensify and/or diversify their farming systems, if they are to increase their farm household income. Given the current population growth, this issue becomes increasingly important if small-farm households are to increase their household incomes and, thereby, ensure improved family nutrition and health care, as well as educating their children. In short, to increase their farm income, most small-scale farm households must learn how to continue intensifying and/or diversifying their farming systems and these extension activities must continue on a long-term basis since markets continue to change.

There has been considerable discussion about how to create a more farmer-led, demand-driven extension system. At the district-level, District Agricultural Platforms (DAPs) are being established under the new BTC funded project to help create a more "bottom-up" extension system. These DAPs are expected to function as "Steering Committees" that will help set extension priorities and allocate resources to each sector extension worker, with the overall goal of improving and strengthening advisory services within each district. The key functions of each DAP will be: a) coordinate extension activities within the district, b) approve the proposed extension plans for the different extension service providers within the district; c) monitor and evaluate (M&E) these different extension programs and service providers; and d) set and communicate these extension priorities to both AAS teams at the zonal level as well as the National Extension Committee (NAECO) at the national level.

Each DAP is expected to have 15 members, including 9 (60%) representative farmers from within the district, including a minimum of 3 women farmers. The other members of this DAP will be the district agronomist and veterinarian (2), a district representative (i.e. the vice mayor for economic affairs), two NGO or project representatives, and one private sector service provider. It should be noted that these farmer representatives must be balanced across the different sectors as well as the key crop and livestock systems within the district. These DAPs are expected to meet once a month to discuss extension priorities, approve extension programs, monitor and evaluate extension activities and, wherever possible, to recommend priority innovations that might be disseminated and scaled up by

extension workers within the district. One concern is who will select these DAP members; if these members are selected by the Mayor, rather than farm leaders as outlined in the next section, then this decentralized extension system could remain largely "top-down."

The plan to establish sector agricultural platforms (SAPs), cell committees and village farmer focal groups is not included in the new BTC funded project to make extension activities within MINALOC more farmer- and market-driven. **However, it is strongly recommended that SAPs be created within each sector**, so that a) lead farmers can help establish extension priorities for all farmers within their respective sector and b) so the elected chair of each SAP could automatically serve as the sector representative on the DAP at the district level. In this way, this SAP leader would fully represent the interests and needs of farmer groups, associations and cooperatives within their respective sector. As done in other countries, the head or president of each farmer association, cooperative, and other farmers groups should all serve on these SAPs, so that they can clearly discuss and identify the needed extension activities to be carried out within each cell and village. In short, creating these SAPs would ensure that the resulting extension activities being approved and funded by each DAP would reflect the needs of farm households within each sector.

Finally, it was recommended that two "focal farmers" be identified within each village who would serve as local "advisors in agricultural extension." These focal farmers would carry out two roles within their village. First, they would identify key problems or priorities within their village and, second, they would assist with the delivery of extension services to other farmers within their village. Also, one of these focal farmers might also serve on the SAP at the sector level.

4.1.3 Extension Methods Currently Being Pursued by MINAGRI

Considerable attention and priority is being given by the MINAGRI to the Farmer Field School (FFS) methodology in Rwanda. There is no doubt that FFS is an excellent way to train farmer facilitators at the cell and village level about using Integrated Pest Management (IPM) practices for selected crops. As reported in the Decentralized Agricultural Extension Road Map, since 2008 many farmer facilitators and co-facilitators have already been trained to use IPM for key crops including Irish potatoes (145 facilitators have trained 5,010 potato farmers), bananas (114 facilitators have trained 3,400 banana producers), tomatoes (60 facilitators have trained about 2,000 tomato farmers) and cassava (70 facilitators have trained about 2,100 cassava producers). It should be noted that most of this FFS training courses have been delivered by national level researchers and/or AAS teams at the zonal level.

However, it should be noted that these FFS training courses being implemented under MINAGRI generally bypass the front-line extension staff, especially at the zonal level. Therefore, It would be important in the future to involve these front-line extension workers (especially at the sector level) in the continuing FFS training courses being implemented by MINAGRI, so these front-line extension workers can help train and backstop these facilitators at the cell and village level.

In addition, many other extension methods can and should be used in training and supporting farmers, depending on the different crop, livestock, fisheries and other agricultural products (e.g. sericulture, bees, agro-forestry, etc.) being produced or processed (e.g. post-harvest handling or processing). It should be noted that training the field extension workers in the appropriate and recommended extension methods is covered in the forthcoming Agricultural Education and Extension Training section of this report; therefore, these proposed methods will not be discussed in this section. However, due to the topography of Rwanda, considerable attention must also be given to appropriate and needed soil and water management practices across Rwanda. Therefore, while FFS may be an effective method of teaching farmers how to use effective and sustainable IPM practices, other

extension methods will also be needed to train farmers how to intensify and diversify their farming systems, especially as they start producing and marketing new high-value crop, livestock and other products. In short, MINAGRI needs to link more closely with MINALOC in providing integrated extension and advisory services to small-scale men and women farmers throughout Rwanda.

4.1.4 Weak Research-Extension Linkages

As part of the reorganization of the MINAGRI, it is anticipated that research and extension activities at the national and zonal levels will be somewhat better integrated. For example, the Rwanda Agricultural Board (RAB) is expected to integrate and disseminate research recommendations at the national and zonal levels (see attached Annex E). This will be done by integrating the Institut des Sciences Agronomiques du Rwanda (ISAR or research) with the Rwanda Agricultural Development Authority (RADA) and the Rwanda Animal Resources Development Authority (RARDA) under RAB. As a result, there are subject matter specialists (SMSs) for the specific crop and livestock systems, especially at the zonal level. It should be noted that the same arrangement is true for the National Agricultural Export Board (NAEB), which has three major units, including coffee, tea and horticultural crops (i.e. Rwanda Horticulture Development Authority or RHODA). However, these organizational modifications at the national and zonal level do not address the major linkage problems that still exist between MINAGRI and the MINALOC employed district and sector extension workers.

Even with the successful use of the imihigo contract system, there is still a lack of clarity as to how MINAGRI and MINALOC can best work together in a regular on-going fashion. Thus, our repeated call for these two agencies to proactively seek to formally strengthen and clarify this very critical relationship.

In addition, the National Agricultural Export Board (NAEB) has been created to strengthen the dissemination of advisory services for key export crops, including tea, coffee and horticulture products. It is planned that advisory services for these export crops will be handled and financed by the cooperatives themselves, which are producing and marketing these crops. However, there is some uncertainty about the capacity of the smaller cooperatives, which are still in the process of getting established, to hire competent professional extension workers who can provide high quality advisory services for their members. However, if this information can be shared to all participating institutions (public, private and NGOs) through Center for Agricultural Information and Communications (CICA), then part of this problem can be addressed.

It should be noted that the recently established CICA will be a key institution in linking research at the national and zonal levels, with extension professionals, especially at the district and sector levels, as well as with all other parties in Rwanda's pluralistic Extension system. The information shared through CICA will be accessible to everyone involved in agricultural production (public extension workers, private contractors, NGO's, cooperatives, and even farmers themselves). CICA has a very limited number of competent and experienced staff members who are working with researchers and SMSs within RAB to transform key research findings into understandable technical advisory materials. These different extension and training materials are being prepared in different formats (e.g. leaflets, posters, audio-video, etc.) and these materials will be released and disseminated in both hard copy materials and electronically, so that field extension personnel, especially at the district and sector level, can easily access and use these technical advisory materials in a format and language that can be easily understood by farmers.

The Coordinator of CICA, who headed up the BTC funded PASNVA pilot project that was implemented between 2007 and 2010, will be a key person in facilitating research-extension linkages

across Rwanda, especially with this decentralized, farmer-led and market-driven extension system. In addition, CICA could also help strengthen the current research-extension linkage problem by providing technical and market information to these district and sector level extension advisors. At the same time it must also be recognized that, simply having access to this type of technical or market information will not resolve many of these other administrative and training problems that must be addressed, if small farm households are to be effectively served by these district- and sector-level extension workers.

4.1.5 PASNVA

In November 2005, the GOR and BTC entered into an agreement to implement a new project (PASNVA—Projet d'appui au Service National de Vulgarization Agricole) to pilot test this new decentralized extension system in 11 of the 30 districts, including 2 districts in the Southern Province (now called zones); 2 districts in the Eastern Province; 2 districts in the Western Province and 5 districts in the Northern Province. This new PASNVA project went into effect in August 2007 and was implemented as planned until November 2010. This new project was aligned with the government's strategic planning, including **Vision 2020**, the **EDPRS** (Economic Development and Poverty Reduction Strategies) and the **PSTA-II** (Plan Strategique de Transformation de L'Agriculture-II) goals as outlined earlier. This new PASNVA had two main components:

1. Establish an Agricultural Communication and Information Center (CICA) and
2. Support the development of a Decentralized Agricultural Extension System.

The second component defined an important National Agricultural Extension Strategy (NAES), which was approved and adopted based on what was being learned through PASNVA. The guiding principles of this new decentralized agricultural extension strategy include:

1. Participatory extension;
2. Establishment of multi-actor networks (e.g. public, private and NGO service providers);
3. Demand-driven and market-oriented extension;
4. Process and result oriented extension; and
5. Building on already existing initiatives.

However, an evaluation of the PASNVA project found the following "lessons learned:"

1. The NAES strategy was not fully implemented in some districts during PASNVA;
2. Both MINAGRI agencies and projects, as well as the decentralized MINALOC extension workers at the district and sector levels were not well aligned with this new NAES strategy;
3. There was a lack of coordination between the extension service providers, especially between the national (MINAGRI) and district (MINALOC) levels;
4. The respective role of the different extension service providers at the district, sector and cell levels is not well understood by MINALOC officials (e.g. Mayors) at the district level.
5. The extension staff (e.g. agronomists and veterinarians) at both the district and sector level are inadequately trained (i.e. they lacked both the needed technical and extension methods skills); therefore, they lack the necessary professional skills to implement a more farmer-led and market-driven extension strategy within their respective service area.

As a result, the extension workers in most districts and sectors during this first phase of PASNVA continued to implement a more top-down extension strategy that has limited impact on farmers. As a result, an in-depth study of key weaknesses was carried out to determine how this decentralized

agricultural extension system might be strengthened. The following section summarizes some of these key findings, some of which are already being acted upon.

First, as noted earlier, there is a lack of coordination, linkages and synergies between the key partner institutions, including MINAGRI and MINALOC, as well as with international and domestic NGOs, and private sector firms. Therefore, the goal is to facilitate the sharing of knowledge and skills, as well as, a best practice/best fit strategy among the different extension/advisory service providers. After assessing these different service providers, it was clear that agricultural extension activities are not properly coordinated, especially between the national and district levels.

As a result, as already discussed MINAGRI undertook reorganizing its different extension service providers at the national level under two major agencies: Rwanda Agriculture Board (RAB) and the National Agricultural Export Board (NAEB). Agricultural extension at the national level will be managed by RAB, which is now working to better integrate research and extension by implementing four key components, including:

1. Crop Intensification and Sustainability
2. Producer Organizations and Extension
3. Entrepreneurship and Market Linkages
4. Institutional Development

Another key component in better linking research and extension, especially between the national/ zonal and district/sector/cell levels will be the Agricultural Communication and Information Center (CICA). It should be noted that the personnel assigned to CICA activities are very competent, but they are assigned to different units within RAB/MINAGRI. Therefore, to better integrate and facilitate the flow of technical, management and marketing information between farmers, extension agents, subject matter specialists and researchers, it will be important to make CICA the conduit for the two way flow of information between MINAGRI (at the national and zonal levels), the MINALOC extension system at the district, sector and cell levels, and with different categories/groups of men and women farmers at the cell and village level.

4.1.6 The Role of International NGOs (INGOs) in Rwanda Agricultural Extension

There are two basic types of INGOs active in agriculture in Rwanda. These are the multi-sector, mega-INGOs such as CARE, AFRICARE, World Vision International (WVI) and Catholic Relief Services (CRS) and the more Agriculture-Focused INGOs such as Land O'Lakes, TechnoServe and Heifer Project International. Amongst the Mega INGOs, agriculture tends to not be a priority sector and is often included in an integrated livelihood or food security program that also includes health, water & sanitation, microfinance and education. Of the four Multi-Sector NGOs visited, only CRS has Agriculture as a separate sector with focused agriculture projects backstopped by a robust global and regional support structure. These "focused" INGOs embrace a value chain approach and, therefore, focus on higher value commodities such as coffee and dairy. Their focus and expertise make them a valuable partner for RAB. However, they are only sustainable as long as there is international donor funding. Some of the specific activities being undertaken by these INGOs will be summarized in the next section.

4.2 Crop/Livestock/Farming Systems

The focus of this assessment is Crop, Livestock and Farming Systems with a specific focus on production-oriented agricultural research and extension. Technology transfer is emphasized by international and national research institutions. This report includes a: (1) discussion of important

MINAGRI activities, (2) selected strategic, donor funded projects, (3) information on the role of International NGOs in agricultural extension (4) a brief summary of priority value chains, (5) specific recommendations for strengthening the effectiveness of research and (7) recommendations for strengthening a pluralistic extension system in Rwanda. The Government of Rwanda has prioritized agricultural development as the pathway out of poverty to food security. This prioritization has resulted in a strong, focused, vibrant and inclusive agricultural extension system.

4.2.1 Summary of Important Ministry of Agriculture and Animal Resources Activities

4.2.1.1 Crop Intensification Program (CIP)

CIP is a Rwanda government flagship program, a priority of both MINAGRI and the Ministry of Gender. It is the government's attempt to achieve measurable impact at scale and it both influences and focuses on bilateral and multilateral donor investments. CIP consists of the following three activities:

1. Land consolidation
2. Subsidized fertilizer and seed
3. Extension support

The CIP target crops are priority crops for the Government of Rwanda. The most recent data from the 2011 Season B is found in Table 1 below, which provides an indication of the scale and achievement of proposed targets. Please note that Rwanda has three basic cultivation seasons: Season A is the first rainy season, Season B is the second rainy season with a short and variable break in the rains between the two and Season C is the dry season where cultivation is located in the lowland and lower slopes.

Table 1: 2011 Season B Data

Crop	Target Area (Ha)	Actual Area (Ha)	Expected Production (MT)	Percentage of Target
Maize	120,000	80,025	340,513	67
Wheat	33,600	25,134	87,530	75
Rice	8,125	8,228	49,369	101
Irish Potato	92,000	53,219	1,043,528	58
Cassava	114,462	95,538	1,433,063	83
Beans	173,642	330,656	391,625	190

Fertilizer distribution in the CIP consisted of 3,809 MT of di-ammonium phosphate (DAP), 2,470 MT of Urea and 4,394 MT of 17-17-17 (NPK). Fertilizer for the cereals and potato is subsidized at 50% (note it is not clear what the rate of subsidy for fertilizer is as we heard different percentages from different sources). It was reported that wheat and maize seed is 100% subsidized. However, there is no subsidy for seed for Irish potato, beans or rice. As with fertilizer, there is some confusion over the rate of subsidy for seed – but it is clear that these subsidies are primarily focused on maize and wheat.

CIP supports the different value chains by engaging local NGOs as contracted Service Providers and also supporting local agrodealers for the sale of fertilizer and seed. In 2011, CIP contracted with 14 local NGO Service Providers. In addition, CIP collaborates with International Fertilizer Development Center (IFDC) in training and in designing and implementing bar code vouchers for fertilizer.

4.2.1.2 RADA Seed Development Unit

The Director of the RADA Seed Development Unit emphasized that the focus is on 'development' and not on 'production', implying an approach to strengthen an integrated seed system rather than create a standalone formal seed sector. Currently, maize and wheat seed is the focus of support and subsidy. The focus on beans is to give farmers access to small packets of seeds of new varieties, so they can then save their seed for use in future growing seasons. Also, this appears to be the focus for rice production where the seeding rate is relatively low, in comparison with maize and wheat, and where the focus on bananas is on getting farmers access to clean planting material via tissue culture and macro-propagation.

There is interest in investing in maize hybrids for both the mid and the high altitudes by engaging regional commercial maize seed companies (e.g. Western and Kenya Seed Companies). This has started with the purchase and importation of certified seed primarily from Kenya. Support also includes multi-locational variety nurseries and establishing a supply chain and eventually exploring local production in Rwanda. The Seed Development Unit of RADA is considering investing in a central seed conditioning unit to handle seed of all crops.

4.2.1.3 ISAR Technology Transfer Unit (TTU)

The TTU was established in 2004 to solve the problem that promising technologies, either developed or identified by ISAR, were not getting to the intended end users. TTU uses a watershed approach and trains farmers in participatory technology evaluation. TTU has had some successes, but overall impact has been somewhat disappointing due to limited funding and staff – especially staff with capacity in participatory research and extension. There appears to be an opportunity to revitalize the TTU under RAB.

4.2.1.4 'One Cow – One Family'

One Cow – One Family is a Presidential Initiative started in 2006. To date, over 45,000 families have received cows helping to increase milk production from an estimated 50,000 MT in 2000 to 350,000 MT by the end of 2009. There have been issues with targeting and tenders that have been referred to as 'loopholes of corruption'. These loopholes have been closed. One Cow-One Family integrates extremely well with donor supported dairy value chain investments.

4.2.1.5 Rural Sector Support Project (RSSP)

RSSP is a successful MINAGRI program that is entering a 3rd five year phase. RSSP appears to have a similar mandate as CIP, but perhaps with a greater focus on the development of irrigated rice. A total of 6,300 ha have been rehabilitated to allow for rice double cropping. RSSP works with over 20 local NGO Service Providers and supports Cooperatives with management skills, crop production (by RADA) and in business planning (by Ernst & Young). Currently, there is only one fertilizer recommendation for each crop across Rwanda. Also, RSSP uses a cascade training approach with RADA Subject Matter Specialists training both sector agronomists and local NGO Service Providers who, in turn, are expected to train Farmer Group Lead Farmers. The weak link appears to be the delivery performance of these Lead Farmers.

4.2.2 Lessons Learned from Select Government Agriculture Programs and a Summary of Important Donor-Funded Projects

Government programs all embrace a pluralistic extension system with specific roles for the public sector (RAB/MINALOC), local NGOs as Service Providers, and Cooperatives. Most of the INGO programs are well managed with clear and measurable targets, especially where there is reliance on subsidies for both seed and fertilizer. However, the provision of subsidized or free seed and fertilizer will substantially limit the expansion of the private sector, where they recover the cost of their advisory services through the sale of these inputs and other products.

4.2.2.1 HarvestPlus

HarvestPlus is a global project that seeks to reduce 'hidden hunger' directly through people's staple foods. This is done through biofortification – breeding varieties with higher micronutrient content **(**http://www.harvestplus.org/content/about-harvestplus). HarvestPlus is ready to deliver 6 high iron content bean varieties in Rwanda that were identified from existing collections and not the result of HarvestPlus discovery which is ongoing. Four of the varieties are climbers and two are bush. In addition to higher iron, these varieties are attractive due to the following composition:

1. Large size
2. Red mottle
3. High yield
4. Anthracnose resistant

HarvestPlus has identified service delivery organizations based on the following criteria:

1. Have existing, and proven competent, agricultural field staff
2. Working with farmer organizations (but not cooperatives) – from 500 to 1500 farmers
3. These organizations must be registered by the appropriate government authorities
4. They are already supporting, to some extent, the development of bean value chains

However, the services being provided by these organizations are not complete. Their current list includes one INGO (AFRICARE) and one participating local NGO that has agreed to deliver the following services to farmers at $3/farmer:

1. Certified seed production, with HarvestPlus paying for foundation seed, field inspection and lab analysis for certification (according to quality declared seed standards)
2. Seed packet promotion ranging from 1 kg to 5 kg
3. Training in agronomy
4. Willingness to deliver nutritional training

HarvestPlus is attempting to reach large numbers of farmers quickly (100,000 farmers in two years) and establish a sustainable seed system. They have decided to focus on reaching the 100,000 farmers through the following:

1. Produce and distribute certified seed free to farmers each season
2. Purchase back 75% of what women produce at a premium price
3. Distribute this additional seed to other farmers free of charge
4. Continue for another cycle to reach the 100,000

4.2.2.2 CIALCA

The Consortium for Improving Agriculture-Based Livelihoods in Central Africa (CIALCA) is a consortium of three International Agriculture Research Centers (Bioversity, CIAT-TSBF, and IITA) and works with government and nongovernmental partners in Burundi, Rwanda and DRC (http://www.cialca.org/). It is funded by the Belgian Directorate General for Development Cooperation (DGDC).

CIALCA focuses primarily on banana-based and legume-based systems. In the original 2006 organizational structure, CIALCA was research focused and top down. The role of the MINAGRI and NGOs was unclear and these two were not connected. This changed dramatically in 2008, when a CIALCA visiting scientist took a position in RADA. Through his advocacy, CIALCA agreed to support three extension agronomists within RADA and to appoint RADA to the CIALCA Consultative Committee (i.e. the integration of international research organizations with public research and extension).

Overall, CIALCA has been quick to adapt its "research for development" approach and currently works primarily through RADA, diminishing the role of NGOs, resulting in a more sustainable research-extension system. Also, CIALCA is seen as being strong in engaging farmers in the Research for Development (R4D) process and strengthening their capacity as participating partners (i.e. a more farmer-driven research extension system). However, their current weakness is the limited budgetary support being provided for the implementing partners (Cox, T. P. Describing the CIALCA Organizational Model 2011 Draft).

4.2.2.3 CATALIST

CATALIST is an International Fertilizer Development Corporation (IFDC) project funded by the Netherlands Directorate General for International Cooperation (DGIS) (http://ifdc-catalist.org/rwanda.php). CATALIST is based in Kigali with sub offices in Bujumbura, Burundi and Goma, DRC. CATALIST supports the Rwanda MINAGR Crop Intensification Program (CIP). CATALIST views CIP as an opportunity for reaching farmers at scale and supports agrodealer network development, participatory demonstrations, and the use of auctions and vouchers. CATALIST has trained 74% of the MINALOC Sector Agronomists (292 out of 416).

CATALIST assisted in the distribution of fertilizers via voucher exchange, as well as the distribution of potato, maize, wheat, rice, bean, and soybean seed. Longer term there is a need to strengthen the agrodealer network and to phase out the distribution of subsidized fertilizer and free seed. In addition to a full training schedule, CATALIST has a wide range of documentation (project reports, technical guides, case studies, radio transmissions etc.) in English, French and Kinyarwanda.

4.2.2.4 Dairy Competitiveness Project (DCP)

This USAID-funded project is managed by Land O'Lakes (LoLs). The objective is to increase the productivity and profitability of small holder dairying – in collaboration with 'One Cow – One Family'. This dairy value chain project is centered on local Milk Collection Centers (MCCs), where farmers can sell their milk and access a range of services. Veterinary services are provided by RARDA. LoLs works closely with RARDA to synchronize the fertility of project cows and to facilitate and improve artificial insemination via a combination of 2 hormone treatments and 2 rounds of insemination. Fertilization is reported to be 55% after the first round and 93% after the second. It was reported that Rwanda's dairy cows consists of about 75% Ankole (i.e. the local breed), 20% mixed or cross breeds, and 5% purebred Friesian.

Currently in Rwanda, 85% of the milk produced is actually consumed through the informal sector (within 30 minutes of milking). Thirteen percent is processed and purchased from milk kiosks, and only 2% is handled through the formal milk processing sector. The Dairy Competiveness Project also supports farmer-cow management, including the use of high quality forages, increased water intake and the use of supplements. The objective for the Ankole breed is to increase milk production from 3-4 liters to 7-8 liters a day. The team had no information on the progress to date in achieving these DCP objectives.

4.2.2.5 East African Dairy Development Project

The East Africa Dairy Development Project (EADD) is a regional project implemented by Heifer International and a range of partners including TechnoServe, ILRI, The World Agroforestry Center and ABS TCM (http://eadairy.wordpress.com/about/). This project is funded by the Bill & Melinda Gates Foundation (BMGF), with the objective being to double the income of 180,000 dairy farm families. Activities include:

- The development of 27 milk collection hubs, including chilling plants for bulking and holding milk for pickup by processors in refrigerated milk trucks.
- The formation of farmer associations that manage these plants as well as the dairy business service hubs
- The use of artificial insemination to improve local breeds of dairy cows (i.e. mixed or cross breeds) and, thereby, produce more milk
- Improved animal nutrition and health to enhance milk quality
- Extension training for dairy animal husbandry and business practices

Compared to the Dairy Competiveness Project, EADD-Rwanda tends to focus more on promoting the Friesian and attaining 15-20 liters milk production a day. Though the Milk Chilling Center is an effective hub, EADD is struggling to convince service providers to take up residence in the rural areas near their customers.

4.2.2.6 Green Mountain Coffee Roasters (GMCR)

CRS is implementing a project in Gikongoro with the 1,316 members of the KOAKAKA Coffee Cooperative. CRS supports farmers in establishing internal savings and lending groups, evaluating nutritional foods (including orange fleshed sweet potatoes and hi-iron bean), conducting FFS advisory services that will increase farmer knowledge about human nutrition and hygiene. This project is actually being implemented by a local NGO, in collaboration with CARITAS Gikongoro, with support from OCIR-Café and HarvestPlus/CIAT.

It should be noted that in January 2011, OCIR-Café ceased paying the 22 animators assigned to the KOAKAKA cooperative. These 17 men and 5 women were paid 15,000 FRW/month. The OCIR-Café agronomist remains employed by the government and he continues to provide technical support to farmers in 6-8 coffee cooperatives. Coffee being produced is sold to an intermediary, Sustainable Harvest. This is a potential model for an approach that supports both cash and food/nutrition crops in a pluralistic extension system that includes government extension, NGOs and the private sector.

4.2.2.7 Great Lakes Cassava Initiative (GLCI)

GLCI responds to the *cassava mosaic* and emerging *cassava brown streak pandemics* in six countries in East and Central Africa. Led by CRS and funded by the Bill & Melinda Gates Foundation, GLCI focuses on disease diagnosis, surveillance and monitoring and multiplication of planting material of disease resistant varieties. At the regional level, CRS collaborates with IITA and in Rwanda with ISAR, RADA and

a number of NGOs responsible for secondary and tertiary farmer managed multiplication (RWARRI, Ingabo, Caritas Cyangugu, Caritas Butare and Caritas Kabgayi).

However, linkages between RADA at the national level and frontline extension workers at the district and sector level appear to be very weak. This is another example of an extension approach where both research and extension partners, as well as between the public sector and NGOs are not well connected (e.g. cassava seed production is split between the public and the NGO sector). Also, there is limited or no involvement of the MINALAC extension workers and effectively no private sector involvement, beyond some tissue culture production and sale. Looking to the future and the development of a commercially sustainable seed system, both the MINALAC extension workers and the private sector must be engaged.

4.2.2.8 Project for Increasing Crop Production with Quality Extension Services in the Eastern Province (PiCROPP)

This JICA funded PiCROPP works primarily in rice production, supporting 4 rice cooperatives in 2 districts with a focus on increasing paddy productivity and seed multiplication. PICROPP sees the role of RADA as coordination, since they lack the staff capacity to directly implement extension activities at the field level and since they do not have the capacity to coordinate and/or implement extension activities at the district and sector levels. Therefore, PICROPP prefers to work with Cooperatives, especially in relationship to field consolidation in irrigated blocks, which are already organized into rice producer cooperatives. Also, these cooperatives are organized under the Rwanda Rice Farmers Union Federation (FUCORIRWA).

This project includes collaboration with IRRI, especially for the long-term training of Cooperative Agronomists who specialize in rice production and management. Again, there is concern over the proficiency, reliability and sustainability of local NGO service providers. Therefore, JICA employs extension trainers to train the Cooperative extension agronomists. Another important question is whether these cooperative agronomists will be sustainable after the PiCROPP ends (i.e. can FUCORIRWA finance their salary, travel and other costs).

4.2.3 Lessons Learned from Selected Projects

These eight projects have a great deal in common. Most are regional in scope and are implemented in other countries of the Great Lakes region and East Africa. Most of these projects have significant engagement of the International Agricultural Research Centers (IARCs) and of the National Agricultural Research Organizations (NAROs). However, due to the decentralization of public extension to MINOLAC, especially at the district, sector and cell levels, there is a major gap in these research-extension linkages in Rwanda. As a result, there is significant involvement of international and local NGOs, as well as Cooperatives, in these projects, assuming the availability of donor funding.

The decision to work through local NGO Service Providers or directly with Cooperatives seems to be influenced by the specific project managers' past experience. Both CIP and RSSP have contracts with numerous international and local NGO Service Providers. However, it was not possible to obtain written documentation about the performance of these local NGO service providers, or their sustainability after donor financing ends. Also, it was reported that there is reluctance for these local NGO service providers to actually live in those rural areas that are close to the farmers being served.

4.2.4 The Role of International NGOs (INGOs) in Rwanda Agricultural Extension and Development

There are two basic types of INGOs active in agriculture in Rwanda (with a focus on the US INGOs). These are the multi-sectorial mega-INGOs such as CARE, AFRICARE, WVI and CRS and the Agriculture-Focused INGOs such as Land O'Lakes, TechnoServe and Heifer Project International. Amongst the Mega INGOs, agriculture tends to not be a priority sector and is often included in an integrated livelihood or food security program that also includes health, water & sanitation, microfinance and education. Of the four Multi-Sectorial NGOs visited, only CRS has Agriculture as a separate sector with focused agriculture projects backstopped by a robust global and regional support structure.

4.2.5 Priority Value Chain Crops

There are seven Government of Rwanda (GOR) priority staple value chain crops including cassava, banana, beans, wheat, rice, maize, potato. These crops could be clustered into the following Crop Support Centers (CSCs):

1. Rice
2. Maize & Wheat
3. Potato, Banana & Cassava (though an essential food security crop, sweet potato is not included because it competes with rice)
4. Beans (discussion on adding soybean to the priority list)

4.2.5.1 Rice

Rice is a priority value chain – seen primarily as a source of income for rice producers. Rwanda is a CARD (Coalition for African Rice Development) Tier 2 Country, but has not yet published their National Rice Development Strategy (NRDS). Rice has compelling attributes that make it a priority crop:

1. There are published analyses for rice value chains in Rwanda,
2. There is broad donor support for rice production and strategic partners,
3. It is a crop value chain in which women play a traditional and important role (e.g. women's labor groups transplant and weed virtually all rice being produced),
4. It is a cash crop with potential for import substitution as well as regional export
5. It includes processing (4 modern rice mills are planned),
6. It is intensive and can be double cropped; also, it responds well to inputs – especially fertilizer (average yields range from 4.5 to 5.2 MT/ha),
7. It lends itself to consolidated mono-cropping in the lowlands – especially in the East and South, and
8. It tends to support farmer organizations and cooperatives, which can increase access to credit and inputs, as well as managing the irrigation system, which can enable post-harvesting and marketing.

The key Rwanda actors in rice include:

1. ISAR,
2. RADA (Norbert Sendege, the DG, is the rice task force chair)

a. Rice Subject Matter Specialists
b. Public Sector rice seed sector

3. FUCORIRWA (Federation of Union of Cooperatives of Rice in Rwanda consisting of 5 Rice Cooperative Unions, employing 36 extension agronomists (8 women),
4. Rural Sector Support Project (RSSP), and
5. JICA and IRRI

4.2.5.2 Maize

Maize is a 2nd 'non-traditional' staple crop value chain that is more important in East than in Central Africa where the Roots, Tubers and Bananas (RTBs) dominate. Maize is cultivated in the lowlands in the north because the nighttime temperatures in the lowlands are too cold for rice. Maize is cultivated by one million farm households on about 61,000 ha. Yields in 2007 were about 0.75 MT/ha, but they have increased dramatically to 2.58 MT/ha in 2010 due to the increased use of certified seed of improved varieties and fertilizer. Therefore, maize lends itself to consolidation, especially in the lowlands, during the irrigated, dry season 'C'. Some of the reasons why maize is considered very important in Rwanda include:

1. Rwanda is a net importer of maize
2. It is an emerging preferred food due to changing food preferences away from the roots, tubers and bananas (RTBs) and it appears to be less expensive than the RTBs, which is appealing to the urban poor
3. There is broad donor support for maize and there are key strategic partners
4. It includes milling and packaging within the value chain
5. It is high yielding when using certified seed of new varieties/hybrids and fertilizer (farmer yields in CIP range from 3 – 5 MT/ha)

4.2.5.3 Wheat

Wheat is a priority crop in the north, cultivated by small holders. The objectives are to increase improve quality and yields through the introduction of new varieties, as well as to increase production for consumption and to offset flour imports. No further information was available on strengths and weaknesses of advisory services for wheat production in Rwanda.

4.2.5.4 Banana

According to the Seed Development Unit Head, banana occupies 27% of the cultivated area in Rwanda. However, banana is under threat from two diseases, banana xanthamonas wilt (BXW) and banana bunchy top (BBT). The strategy is to discourage the production of beer banana in favor of matoke and dessert bananas. Disease free planting material of new varieties is promoted through both tissue culture and macro-propagation. Given the importance and complexity of disease management, Farmer Field Schools (FFS) appear to be the appropriate approach of providing advisory services to farmers.

4.2.5.5 Beans

One would be safe in describing Rwanda as a 'bean-based cropping system. In the 2011 B season (2nd rainy season), farmers planted over 330,000 hectares of beans, almost double the CIP target. The USAID-funded Rwanda Maize, Beans and Soybean value chain study (published in Sept. 2010) gave a figure of 176,000 hectares being cultivated by 1.6 million households; this is the same figure as the expected CIP target for the 2011 B Season, which was 174,000 ha). Rwanda is a bean exporter, though export figures are often inflated due to the re-export of beans from Burundi and eastern DRC. Farmers manage their own bean seed, but it was reported that they do not use fertilizer. It was reported that hi-iron bean varieties have been identified and released in Rwanda and will be intensively promoted by HarvestPlus, with the intention of reaching 100,000 farmers in the next two years. Seed of these new, hi-iron varieties will be promoted in small packets, with the objective of getting enough seed into the system, so that these new varieties are maintained within the farmer-bean seed system.

4.2.5.6 Cassava

The focus in cassava has been on the multiplication and diffusion of Cassava Mosaic Disease resistant varieties. USAID contributed to this effort under the CRS implemented the Crop Crisis Control Project (C3P). This effort has been followed by the Bill and Melinda Gates Foundation (BMGF) funded Great Lakes Cassava Initiative, which is being implemented by CRS in partnership with IITA, ISAR, RADA and local NGOs.

It should be noted that cassava is a priority Rwandan crop with yield targets of 20 MT/ha and with the expected annual production target of about 2 million MT. A new processing plant, with the capacity to process 250 MT of cassava roots/day, will provide a price incentive to cassava producers in the south of the country. Efforts must continue to identify new varieties resistant to both CMD and Cassava Brown Streak Disease (CBSD) and to strengthen a sustainable seed system that will ensure that farmers have timely access to quality seed at an attractive price.

4.2.5.7 Potato

The potato value chain is stronger today than it was in 2002, when it was described as being poorly organized with uncertain access to inputs of variable quality. The result was average potato yields amongst the lowest in the world. As a result, it was recommended that potato farmers need extension support in the following four areas (Crissman, C. 2002. "A Proposal for a Rwanda Potato Sector Development Program." Agricultural Policy Development Project Research Report No. 17. Abt Associates and USAID/Rwanda)

1. Soil Management
2. Integrated Crop Management
3. On-Farm Seed Potato Management
4. Integrated Pest Management

4.2.6 Key Findings

The Rwandan Agricultural Research System appears to be reasonably effective and accountable. This reflects the strategic importance that the Government of Rwanda gives to the agricultural sector. Some of these strengths and opportunities follow:

4.2.6.1 Strengths

1. Focus is on priority staple crops,
2. There is strong CGIAR-ISAR linkage & collaboration,
3. There is substantial donor contributions,
4. Inclusion of RADA and farmers through On-Farm Research
5. Seed sector crop specific and relevant
6. Support provided to Cooperatives for profitable value chains (coffee, rice, potato, dairy)

4.2.6.2 Weaknesses and Opportunities

1. Crop and livestock value chains should be connected into zonal and integrated farming systems that include "site-specific" crop and nutrient management recommendations,
2. Strengthening Research – Extension Linkages, especially in linking RAB with MINALOC extension workers, especially at the sector level in reaching farmers at scale,
3. Create learning opportunities for both MINALOC and NGO extension service providers,
4. Invest in a commercially sustainable seed sector, especially for maize, rice and potato,
5. Eliminate fertilizer subsidies, and privatize seed production, supply and sale,

6. Focus short-term seed subsidies on non-commercial crops, such as cassava, banana and, perhaps, beans.

4.2.7. Options for Strengthening Research-Extension Linkages

4.2.7.1 Proceed from Scalable to Scale

The overarching objective in strengthening agricultural extension in Rwanda is to take the proven scalable pilot projects to scale. There are proven technologies. What is needed is an effective and cost efficient approach to deliver at scale. This will require a holistic approach with strong leadership from MINAGRI and with clear responsibilities for MINALOC extension staff, especially at the sector level. The long-term goal should be to privatize input supplies, as well as continuing to strengthen farmer associations and cooperatives. Projects, such as those being carried out under CIP and RSSP, are building the needed value chains, but the key will be in making these value-chains sustainable.

4.2.7.2 Strengthen the Technology Transfer Unit

The current TTU is housed in ISAR. This is not surprising since ISAR has been the most important client in carrying out on-farm trials, primarily at the request of researchers. Though information on technologies is being communicated to RADA for onward transfer, there is no functioning feedback on the performance of these new/recommended technologies, nor on farmer evaluation and adoption. The reorganization of research and extension into RAB presents an opportunity to redesign TTU so it becomes more effective in the two way communications of recommendations through CICA.
The TTU would need to work with a range of customers including:

1. Research (national and international researchers), and
2. Extension service providers, especially through the MINALOC extension system, as well as through the private sector, cooperatives, farmer associations and farmer federations, as well as through INGOs and local NGOs.

There appears to be a significant opportunity to increase the integration of the TTU with CICA. This would be a more inclusive model that fits with a pluralistic extension system and where there are different paths of reaching different groups of farmers for different commodities.

4.2.7.3 Support Site Specific Crop Nutrient Management

The Government of Rwanda is promoting the expanded use of fertilizer on cereals through subsidies, complemented by the strengthening of an agrodealer network and farmer training. Currently there is a blanket recommendation regardless of farmer capacity and yield objectives, soil type and the management of manure and crop residues. There is a realization that fertilizer recommendations need to be nuanced. However, soil tests especially for Riceland that is flooded are not useful and may not even be required. It is recommended that the IRRI Site Specific Crop Nutrient Management tool be introduced for rice and if successful modified for maize fertilization. More efficient use of fertilizer within an integrated nutrient management program will help ensure that farmers continue to purchase and use fertilizer after the withdrawal of subsidies.

4.2.7.4 Support Integrated Seed Systems

Seed Systems are different for different crops. The risk is that the maize seed sector, including the importation of commercial seed (especially hybrid seed), will influence the support for the development of the other crop seed systems.

The approach for the self-pollinated crops (rice, wheat, beans) should be 'developmental'. That is, a focus on identifying promising improved varieties with potential to increase farmer yields and yield

stability. This can be done effectively through the promotion of the new varieties in small test packets, support to farmers to manage their own seed to maintain varietal purity, cleanliness and viability and to know when to purchase certified seed and renew their preferred varieties. The approach for the vegetatively propagated crops will require investment in disease surveillance and management to maintain quality material from primary multiplication sites to farmers' own fields. This is a rapidly evolving sector – in banana, cassava and potato – with the support of Bioversity, IITA and CIP working with ISAR. The seed system for the vegetatively propagated crops includes tissue culture, macro-propagation, and rapid multiplication technologies.

4.2.7.5 Local NGOs & Cooperatives[3]

The current and envisioned agricultural extension service in Rwanda is noted for its pluralism. Rather than striving to recreate the robust public sector extension system of the past, the government has embraced a policy to contracting service providers – usually local NGOs but also often universities and established Cooperatives. Contracting, when well-managed, can be more cost efficient than stand-alone public sector extension delivery, but this approach generally focuses on specific staple crop or livestock products. For example, efforts are being made by MINAGRI to privatize advisory services, especially for export crops, starting with the coffee sector. However, this will require the willingness of these extension service providers to reside in rural areas amongst their farmer customers. However, it was reported that most "trained" NGO and private sector service providers would prefer not to live in these rural areas. As service providers increase their skills they gravitate for the better paid, urban-based positions creating a need for continuous training of new, entry level, rural service providers.

4.2.8 Specific Recommendations for Supporting Agricultural Research

Some of the proposed investments that researchers suggested include the following:

1. Strengthening Technology Transfer from Research to Extension
2. Site specific nutrient management research for rice and maize
3. Integrated seed production systems for rice, beans and wheat
4. Great Lakes regional agriculture research for development integration (Burundi, Rwanda, eastern DRC)
5. Innovative cropping systems to ensure resilience
6. Integrated nutritional bean value chains
7. Sustainable cassava seed production system to deal with the emerging CBSD pandemic
8. Integrated Aquaculture for Income and Nutrition

4.2.8.1 Technology Transfer from Research to Extension

Though ISAR is much better staffed than in the past, it remains under staffed and, therefore, unable to devote much time to technology transfer. This chronic understaffing is exacerbated by the absence of key researchers on extended study leave. INTERNATIONAL DONORS might consider how to strengthen ISAR staff through short term posting of international researchers with experience and commitment to extension to ISAR.

4.2.8.2 Site Specific Crop Nutrient Management for Rice and Maize

The SSCNM tool is very promising and is being tested by IRRI and CRS with farmers in Mindanao, Philippines and soon with AfricaRice in Ghana. Sixty percent of the subsidized fertilizer is applied to rice, however, there is a lack of clarity about moving from a "blanket" to a more nuanced set of

[3] This section is based on interviews with UGAMA/CSC Centre de Service aux Cooperative, KOAKAKA Cooperative, ALUPA (Local NGO) and Rwanda Rural Rehabilitation Initiative (RWARRI)

recommendations (i.e. soil analysis alone is not useful); also there is a growing consensus to cease fertilizer subsidies. More effective, site-specific fertilizer recommendations can help ensure that farmer costs are kept to a minimum, while increasing profitability. In addition, farmers should be encouraged to continue purchasing and applying fertilizers after the cessation of the subsidies. There is a significant opportunity to adapt the Rice SSCNM to maize, and to integrate it with the different dairy and other livestock expansion activities that will increase the expansion and use of manure and other crop residues.

4.2.8.3 Integrated Seed Systems for Rice, Beans and Wheat

As with fertilizer, seed is currently subsidized. It appears that the focus of this subsidy is on, and will continue to be on, maize (especially hybrid maize). Across East and Southern Africa, maize exists as a profitable commercial product for both commercial and small holder maize farmers. However, virtually all other crops can be called 'orphan crops' as they have no or limited recurrent demand. These crops include rice, wheat and beans. It is easy for farmers to manage their own seed once they have the specific variety, because they are not hybrids but self-pollinating sustainable varieties. It is worth noting that the CIP bean area during Season B was almost double the target in spite of the lack of subsidized bean seed.

Whereas the production of hybrid maize should be considered as a commercial or private sector enterprise; seed for rice, wheat and bean varieties should be considered as public goods that are managed by the public sector with an overarching development objective. NGOs can be engaged to support farmer evaluation of new varieties and subsequent seed management of the varieties they elect to adopt.

4.2.8.4 Great Lakes Regional Integration

Rwanda is divided into 4 agricultural zones. Rwanda shares these agroecologies with eastern DRC and with Burundi. Current regional initiatives and projects are promising and can be embraced to expand the scope and increase the effectiveness of agricultural research for extension.

4.2.8.5 Innovative Cropping Systems to Ensure Resilience

There are compelling reasons for both land consolidation and monocropping. This enables planning for input delivery, monitoring, and both volume and timing of product delivery for sale, storage and processing. However, monocropping increases risks.

There are promising intercropping alternatives that can increase productivity and at the same time decrease risk. Examples include the use of banana as a shade crop for coffee and the intercropping of soybean with banana or coffee to maintain soil cover and to increase available nitrogen. Research and researchers have a potential role to play in explaining the relative merits of mono- and intercropping to ensure that policy decisions are based on best available information.

4.2.8.6 Integrated Bean Income and Nutrition Bean Value Chain

Bean is the most important crop in the Rwanda smallholder agricultural system, primarily for consumption and nutrition. However, bean is also widely traded across East and Central Africa with an ebb and flow from areas of surplus to areas of demand. Given the Feed the Future focus on both poverty and hunger – on both income and nutrition – investment in bean research is attractive. In addition to the ongoing development of new varieties with a focus on climbing beans and varieties high in iron – is the need for a robust program of farmer participatory variety evaluation, strengthened farmer seed management and hermetic storage and training in nutrition.

4.2.8.7 Sustainable Cassava Seed System in response to the emerging CBSD pandemic

The response to CMD has been effective and timely, and it appears that cassava area, yields and production are increasing dramatically (the overall increase in the yield of the roots and tubers increased almost 19% from 2009 to 2010). However, the new CMD resistant varieties are likely to be susceptible to CBSD, which has been reported in Eastern DRC, Burundi, Tanzania, and possibly in Rwanda. This is coming at a time when the Great Lakes Cassava Initiative is winding down. There is therefore both a need and an opportunity to accelerate the identification and release of CBSD resistant or at least tolerant varieties in Rwanda, the implementation of participatory farmer evaluation of these materials and the refinement and implementation of a cassava seed system that is more commercially oriented and therefore more sustainable.

4.2.8.8 Integrated Aquaculture for Income and Nutrition

The significant investment by the Rwanda government in the rehabilitation of existing lowlands for double cropped irrigated rice and even for the conversion of certain wetlands for rice presents the opportunity to embrace an 'aquatic systems' perspective and to incorporate the use of aquaculture at locations where flooding persists. Aquaculture has high potential and can serve for water storage and at the same time provide an opportunity for the landless and near landless, (especially women) to produce for their own consumption and for sale. The opportunity for an aquatic systems approach and for aquaculture can be explored by engaging the World Fish Center.

4.3 Agricultural Education and Extension Training

The National Agricultural Extension Strategy (NAES) of April 2009 clearly recognizes agriculture as "the pillar of economic growth and the foundation of sustainable development" (p5). An important precondition for the realization of agriculture's full potential is the existence of frontline extension workers who are appropriately trained to drive the agricultural modernization process. It is against this background that this part of the assessment was conducted.

4.3.1 Objectives of the Agricultural Education and Extension Training Assessment

The objectives of the agricultural education and extension training assessment were to:

a) Assess the current skills and knowledge of the field staff (both technical and process skills), as well as the technical expertise of the subject matter specialists (SMSs) and the management skills of extension officials (i.e., are they top-down or more participatory and farmer oriented in setting extension priorities);

b) Assess the capacity of key universities and schools of agriculture to provide needed pre-service and in-service training for the extension staff, including how students are currently being trained and/or should be trained for different positions within the extension and advisory systems (public, private, NGO);

c) Analyze the linkages between extension, agricultural education and research in light of the potential commitment by international donors to invest in capacity development of Rwanda's agriculture education and research system over the next two years.

d) Review extension system evaluations conducted over the past two years by donors such as the Belgium Technical Committee (BTC) and others that have focused on the education/research links with extension.

4.3.2 Methodology

Information for the section was gathered through: a) a review of official documents of the Ministry of Agriculture and Animal Resources (MINAGRI); b) interviews with MINAGRI officials both at the Ministry office and at the Rwanda Development Authority (RADA); c) interviews with agronomists at district and sector levels; d) interview with the Minister of Education; e) visits to and interviews with the staff at four universities namely Higher Institute of Agriculture and Animal Production (ISAE); Institute of Agriculture, Technology and Education of Kibungo (INATEK); Umutara Polytechnic and the National University of Rwanda (NUR); f) interviews with staff of the Food and Agriculture Organization (FAO); and, g) interviews with farmers at cell level. In addition, a telephone interview was held with the Academic Head of AYEVE Kabutare Agricultural and Veterinary School.

4.3.3 Pre-service training for extension staff

4.3.3.1 Higher Institute of Agriculture and Animal Husbandry (ISAE)

ISAE (a French acronym that stands for INSTITUT SUPERIEUR D' AGRICULTURE ET D'ELEVAGE) is organized into two faculties. These are:

Faculty of Agriculture and Rural Development with four departments

- Department of Forestry and Nature Conservation
- Department of Rural Development and Agribusiness
- Departments of Crop Production
- Department of Animal Production.

Faculty of Agricultural Engineering and Environmental Sciences with four departments

- Department of Agricultural Mechanization
- Department of Food Science and Technology
- Department of Soil and Agricultural Engineering
- Department of Basic Sciences.

ISAE runs five year programs. After three years, students get an advanced diploma. The best students go for another two years to get a degree. The programs offered are:

- Agribusiness
- Rural Development
- Animal Production
- Crop Production
- Agro-Forestry
- Soil and Water Management
- Irrigation and Drainage Management
- Agricultural Mechanization
- Food Science
- Veterinary Medicine

Running all the programs above, both at diploma and degree level, are 106 teaching staff. Of the 106, 8 are PhD holders, 44 M.Sc., and 54 B.Sc. holders. Students in all programs receive one extension course called *Communication and Extension* given by one lecturer during their third year. This one lecturer teaches an average of 600 students per year.

There is no practical training on campus. For practical training, students are taken to rural areas to look at different projects and programs and interact with farmers. These look and learn visits are not sufficient to develop practical skills. ISAE recruits students from high school – especially those who have studied agriculture at Agricultural and Veterinary Schools. It can therefore be assumed that the students who come from the agricultural secondary schools will have had reasonably good practical skills, but not necessarily sufficient to prepare them to work as an extension agent.

4.3.3.2 Institute of Agriculture, Technology and Education of Kibuko (INATEK)

INATEK is a Community Institute owned by civil society, churches, local administration, etc. The Institute is organized into two faculties which are:

1. **Faculty of Education**, which is the largest, with four departments

- Department of Economics and Management with Education
- Department of Arts and Humanities with two options
  - French and English with Education
  - Geography and History with Education
- Department of Clinical Psychology
- Department of Psycho-pedagogy

2. **Faculty of Rural Development**, with two departments

- Department of Agricultural Engineering
- Department of Agribusiness

There are plans to change the name 'Faculty of Rural Development' to 'Faculty of Agriculture' to more appropriately position itself to offer training in agriculture. Both the Agricultural Engineering and Agribusiness department run degree programs, which are based on the ISAE model. The institute (INATEK) has strong links with ISAE. The two departments offer five-year programs with diplomas after three years. The first graduates came out in 2010. Most students come to the institute with a high school certificate from agricultural schools and some field experience. However, it should be noted that Extension is not taught in any of the departments.

At the time of the visit, the Faculty of Rural Development had a student population of 355 spread across the five years (Year I: 125, Year II: 66, Year III: 30, Year IV: 69 and Year V: 65). These programs and courses are currently being taught by 24 staff (B.Sc.: 3, M.Sc.: 17, and PhD: 4). Therefore, the current teaching staff is not adequate. These Faculty members must rely on staff from other institutions that come and teach on a 'block' basis. Likewise, the institute does not have facilities for practical training. The institute does not have accommodation for students, so students must find their own accommodation.

The institute runs purely on fees paid by the students. However, it is believed that the fees at INATEK are lower than at others institutes and many students prefer coming to INATEK for this reason. It should be noted that INATEK has experience in running part-time programs (evening, week-end) in education and plan to start similar programs in agriculture and related programs.

4.3.3.3 National University of Rwanda

The National University of Rwanda is the oldest and multipurpose university in the country. It started in 1963. The Faculty of Agriculture has four departments and offers B.Sc. degrees in each of the corresponding fields:

- Department of Crop Production and Horticulture
- Animal Production

- Soil Science and Environmental Management
- Agricultural Economics and Agribusiness

In addition, the Department of Soil Science and Environmental Management offers a M.Sc. degree in Agro-forestry and Soil Management. Despite its age, the university does not have any other M.Sc. programs in agriculture.

It should be noted that there is only one extension course and it is taught during the 4th year for students in all the B.Sc. programs. At the time of the visit, the lecturer who was giving this extension course was on PhD study (sandwich) leave, but did teach this course during part of the time he was on campus. The lecturer was pursuing a sandwich program where he spent part of the time at a university overseas while he also did some of his PhD work at the National University of Rwanda. Also, at the time of this visit, the Faculty of Agriculture was experiencing a serious shortage of staff with 9 out of 28 staff out on study-leave as shown on the table below.

	B.Sc.		M.Sc.		PhD	
Department	M	F	M	F	M	F
Animal Science			2 on training	2 on training	3	1
Crop Science			2	2 available + 1 on training	4	
Agricultural Economics			2 on training		1	
Soil science			2	2 on training	3	1

The university has a small farm on which students do their practical training like managing crops and livestock. Students go on internship in the rural areas for one month and they write reports on their experiences and observations. The internship is also considered as part of extension training. The Faculty of Agriculture intends to adopt a village for community service.

There are plans to introduce four Masters and four PhD programs in:

- Applied Entomology
- Plant Genetic Resources, Plant Breeding and Seed Science
- Animal Nutrition and Management
- Agricultural Economics and Agribusiness

It is hoped that the Masters programs will start in 2012 while the PhD programs will be launched 2013.

4.3.3.4 Umutara Polytechnic

Umutara is a young polytechnic founded in 2004 by the community of Umutara province, now the northern half of the Eastern Province. The Polytechnic has been adopted by the Government of Rwanda as an official institution of higher education. The polytechnic is organized in four faculties:

- Faculty of Agriculture
- Faculty of Veterinary Medicine
- Faculty of Technology and ICT
- Faculty of Business Studies

The Faculty of Agriculture started offering a five-year general agriculture diploma/degree program in 2006 and had its first B.Sc. graduates of 16 in 2010. The students took only one extension-related course called Rural Sociology and Agricultural Extension in their 3rd year. Plans are to grow the faculty into five departments:

- Department of Agronomy
- Department of Animal Production
- Department of Soil and Environmental Science
- Department of Horticulture
- Department of Agricultural Economics and Rural Development

Each of these departments will offer diploma/degree programs in their specialized areas, including:

a) Diploma/B.Sc. Agric Hons (Agronomy)
b) Diploma/B.Sc. Agric Hons (Animal Production)
c) Diploma/B.Sc. Agric Hons (Soil and Environmental Science)
d) Diploma/B.Sc. Agric Hons (Horticulture)
e) Diploma/B.Sc. Agric Hons (Agricultural Economics and Rural Development)

It was hoped that these programs would start in 2011. However, at the time of the visit, the faculty was experiencing serious shortage of staff with only a 3rd of the minimum the Faculty required as shown in table below:

Minimum Staff requirements for the proposed degree programmes at Umutara

Department (option)	Academic staff in post	Academic staff required
Agronomy	**Three in post** Crop Physiologist /Weed Management Entomologist Plant Biotechnologist/Biometry	**Six required** Agronomist Plant Breeder Plant Pathologist Two Teaching Assistants One Technician
Animal Production	**Two in post** Animal Breeder/Biometry Teaching Assistant	**Six required** Animal Nutritionist and Biochemist Animal Production, Animal Physiologist, Animal Products Processing One Teaching Assistants One Technician
Soil and Environmental Science	**None in post**	**Seven required** Soil Chemistry/Soil Fertility Pollution and Waste Management GIS/Remote Sensing Environmental Policy and Law Two Teaching Assistants One Technician

Horticulture	**None in post**	**Seven required** Pomologist Floriculturist Covered Production Specialist Olericulturist Two Teaching Assistants One technician
Agricultural Economics and Rural Development	**One in post** Agricultural Policy Analysis	**Six required** Agribusiness Management, Agricultural Marketing, Natural Resources Economist Rural Sociology and Extension Two Teaching Assistants

Five of those on board were expatriates.

The Faculty of Agriculture has submitted a proposal to MINAGRI to take over maize extension in the surrounding area in order to intensify maize production through demonstrations, competitions and field days. Apart from the benefits to farmers, the hope was that this would also enhance practical training for students. The Faculty of Veterinary Medicine has also submitted a proposal to work on feed resources and to monitor diseases.

4.3.3.5 AYEVE Kabatare Agricultural and Veterinary School

AYEVE Kabatare Agriculture and Veterinary School was started in 1937. Students study either agriculture (crops) or animal production/health during their last three years of high school. The school is well equipped for teaching these practical-oriented subjects. It has a 59 ha farm on which students grow a wide range of staple field and horticultural crops, as well as raise a wide range of livestock, including cows, goats, pigs, rabbits and chicken.

Many of the students go to ISAE after finishing their high school diplomas. Others are engaged as animators at cell level. It is believed that those who studied veterinary services tend to be consulted more by farmers who need help with their livestock – and they can also work in veterinary shops.

4.3.3.6 Outreach Activities by the Universities

Apart from teaching, universities are expected to provide extension services to communities around their universities – and they have memoranda of understanding with surrounding districts to this effect. Essentially, this is supposed to be done as a free service to these communities. However, the extent to which universities conduct outreach activities is not clear. For example, INATEK admitted that they had no experience in outreach work and saw it as mainly to explain government agricultural programs. They thought, however, since many students came to INATEK with field experience, they would be able to provide meaningful services to farmers. In some cases the Ministry of Agriculture enters into formal arrangements, including memoranda of understanding, with the universities to train trainers in areas around the university and to provide extension activities on specific programs. In such cases, MINAGRI provides a portion of the resources to enable the universities to do the job. Where the partnership works well, students have an opportunity to learn from the field. However, the goal for successful partnerships of this nature remains elusive.

4.3.3.7 Research

Universities are expected to (and do) conduct research, as part of teaching and also as part of the professional development of their staff. However, very little of the research done at universities feeds into the national pool of knowledge – and there are no formal linkages with the National Agricultural Research Institute (ISAR).

4.3.3.8 Relevance of Pre-service Training

Training at universities is not based on demands from the field. In fact, there was no evidence of employers making their needs known to universities. ISAE and INATEK expressed a desire to conduct tracer studies to see how their graduates were employed and to identify training needs, but lacked the funds to do so. When coming up with a new curriculum, National University of Rwanda (NUR) consults with the MINAGRI for validation, but there is no evidence of custom-made programs based on the expressed needs of the MINAGRI.

Training at universities is specialized according to different programs listed above under each of the universities. Graduates of these programs are recruited as agronomists at either sector (if they have diploma) or at district level (if they have a degree) where they are expected to function as general agricultural extensionists. They are expected to provide advice to farmers on all aspects of agriculture irrespective of their training background. It is therefore not surprising that the overwhelming view of those interviewed was that these extension workers were inadequately trained for the job that they were doing – in terms of both their technical expertise and extension process (soft skills – or skills of working with people). Low extension worker competency was specifically mentioned by interviewees at the following organizations:

- Ministry of Agriculture
- Ministry of Education
- Rwanda Coffee Authority
- Rwanda Tea Authority
- World Vision Rwanda
- Umutara Polytechnic
- HarvestPlus
- Food and Agricultural Organization
- Dairy Cooperative Project
- JICA
- BTC
- Rwanda Agricultural Board

In addition, those interviewed at NUR and Umutara were not happy with the five year diploma/degree programs at ISAE and INATEK. Umutara argued that these diploma and degree programs should be separated and designed differently for their specific purposes. Some NGOs, like World Vision International, were thinking of building their own staff capacities. This problem is made worse by the huge extension worker to farmer ratio which ranges from 1:1500 (Norbert Sendege, personal communication) to 1:10,000 (RADA p6 n.d.) which makes it difficult for extension workers to reach all farmers. Farmer groups visited expressed a strong desire for agricultural knowledge and skills, but lamented about the small number of qualified extension workers (agronomists) at the sector level.

4.3.4 In-service training of extension staff

There is no systematic in-service training for district and sector level agronomists. They are recruited and sent to their work areas without mentoring and supervision to check on their performance. This is

despite the fact that they are expected to provide extension advisory services across the board, irrespective of their training background.

The Rwanda Agricultural Development Authority (RADA) provides limited training to extension staff and farmers on crop production and management techniques, including the use of organic manure and crop protection (RADA p 2 n.d.). This training can either be face-to-face or through print (for example, manuals and brochures). RADA can provide the training directly or through outsourcing and contracting other service providers, like universities and ISAR, to provide the training – especially for farmers, farmer trainers and cooperatives.

However, in-service training appears to be curtailed, following the decentralization program which shifted the extension function from the Ministry of Agriculture and Animal Resources to the Ministry of Local Administration. Therefore, the extension staff falls directly under the district administration. Under this arrangement, the MINAGRI can hardly monitor and provide training needs to the extension staff (NADA, n.d., Hakizimana, 2007). The MINAGRI is generally aware that "most field officers may not have the necessary competence to deliver services" (Hakizimana, 2007). Hakizimana also notes that the local authorities' capacity to monitor extension staff is equally limited. Private extension service providers provide some training – but mainly to farmers.

Some training is also given by the for-profit private sector. For example, entrepreneurship and small business development, mostly for cooperatives, is being given by Ernest and Young – but this is not sustainable, due to cost. There are also doubts about the effectiveness of this approach given that the contracted service providers have limited time to know and understand the local farming systems.

Cell agronomists for agricultural development are secondary school graduates from agricultural schools. They receive three months training at district level covering topics like erosion control, disease control, cultivation techniques, and agro-forestry techniques. There is no extension training.

4.3.5 Impending changes in the university system

During our second visit in August, we were informed by the Minister of State in Charge of Primary & Secondary Education , Dr Mathias Harebamungu, that the Government of Rwanda had decided to come up with one state university – University of Rwanda – with several campuses (and/or faculties) each specializing in one discipline. This was to rationalize the use of scarce resources. For example, currently, each university might have a Faculty of Water Management – and each trying to build its own capacities in terms of teaching staff, laboratories etc. The impending changes will mean pooling of these resources under 'one roof' for each disciplinary area. This will improve quality of university education which will also be easy to monitor.

Under the new system, no new academic program will be started without approval from Cabinet. The Government has set up an Inter-ministerial Committee (composed of all ministries) which will vet all proposals for new programs before presenting them to Cabinet. The Minister also emphasized that, for a new program to be approved, it has to have strong justification for the need and it should be sustainable. It would appear that the government's main concern here is the financial implications, to government, of any new programs. They do not want anybody to commit government to any program that it will not be able to sustain.

The Government has also set up a Workforce Development Authority (or Agency) that is going to set up technical and vocational schools. There will be horizontal and vertical movement of students – where a student could start with a short course at a vocational school and move to another vocational school

or a technical school depending on the skills needed. Even PhD holders can enroll at either depending on the skills needed.

4.4 Extension Information and Communication Technology (ICT)

Few sectors have undergone as much rapid transformation recently as the ICT sector, and many of the latest innovations have a high potential to dramatically change how communications activities are conducted with both farmer and internal Extension worker audiences. In examining this topic, we need to take a multi-layered approach, because different socio-economic groups within Rwandan society will have access to different types of ICT devices and services.

We also need to begin the examination of this topic by recognizing that ICT is no longer a fringe or tangential issue for Extension. Throughout the world, as is true in Rwanda, the successful Extension programs of the future will be those that place a high priority on using emerging ICT tools to their fullest for both internal communications and as teaching tools with farmer groups.

In some ways, Rwanda is similar to many other Sub-Saharan African countries in that common voice and sms-capable cell phones have become the "everyman computer" for the average citizen. The cell phone is nearly ubiquitous in both urban and rural settings throughout Rwanda. Billboards promoting a variety of mobile phone services are among the most prominent and numerous public advertisements in the country.

Today, the mobile phone has begun to branch out beyond its humble origins as a primarily voice-only device. Currently in Rwanda, Banque Popluaire du Rwanda offers BPR Mobile Banking through a conventional, low cost sms-capable phone. The service is offered at no additional cost to customers; comes in 3 languages (Kinyarwanda, English, and French); and allows customers to conduct many of their normal banking services, pay their power bill, purchase additional airtime from their mobile provider, etc. Both MTN and Tigo, the two most prominent mobile phone carriers, offer Mobile Money services through which any subscriber can send money to anyone else in the country and can even pay school fees via text messages. Mobile Money services are frequently used by younger professional workers in urban areas to send funds home to parents to help support them in their senior years.

Other recent innovations in using cell phones for advance ICT purposes include a MINAGRI sponsored service, e-Soko, to provide current market price information to farmers and others in the food chain on all the common crops in the country in over 50 markets.

We should also mention that through recent tracking of news events on the web as well as participation in the recent USAID sponsored Evidence Summit on Africa held in early June, 2011, both Paul Hixson and Burt Swanson became more familiar with the work of ForgetMeNotAfrica. That company has done some amazing work that enables the common voice-sms phone to perform tasks far beyond its original intent. Through using their technology, these inexpensive devices can now be enabled to do email, chat and even the text portion of social media sites like Facebook. As explained in greater detail later, we believe that MINAGRI should consider involving ForgetMeNotAfrica as a partner, along with MarketMaker from the University of Illinois, in an effort to strengthen the current eSoko service and take it to the next level of meeting farmer's needs. **http://www.forgetmenotafrica.com/** **http://national.marketmaker.uiuc.edu/index.php**

At the same time, we also need to recognize that the broad demand for ICT services in Rwanda cuts across a very wide swath of devices and deliverables. Although many uses focus on sms-cell phones and

low-income users, others focus on developing higher-end server-based applications that can meet the needs of cutting edge businesses.

In general, Rwanda has set an ambitious goal for itself of becoming the "Silicone Valley" of Sub-Saharan Africa. And, a significant amount of development resources are currently being directed toward turning that vision into a reality. A recent news feature from CNN's Richard Quest highlighted those efforts in an April 12, 2011 broadcast: **http://edition.cnn.com/video/data/2.0/video/business/2011/04/12/qmb.fc.kigali.ict.hub.cnn.html**

Accordingly, as we consider the ICT possibilities for Extension in Rwanda, it will be essential to not only look at what is being done today within Extension (or even what is on the current planning books), but to consider future possibilities within the context of a rapidly changing national capacity.

4.4.1 Ministry of Information and Communications Technologies (MINICT)

Dr. Ignace Gatare, ICT Minister met with our team and provided us with a high level overview of the Government of Rwanda's current ICT capacity and roadmap for future improvements. Overall, the team was extremely impressed not only with the scope and vision of the roadmap, but also with the way in which key target objectives have been met and then expanded upon.

Dr. Gatare explained that after the genocide the government had taken stock of their resources and came to the conclusion that while agriculture was the major economic driver for most of the economy, the key to the country's future development is to be found in developing the human and intellectual capacity of the Rwandan people. Given the potential for ICT developments to open up frame-changing advances in education, commerce, and communications, an early emphasis was placed on using ICT to help "leapfrog" Rwanda's overall development. Following that decision, ICT-related educational institutions at all age levels were given high priority status. At the primary level, Rwanda signed on to the 1-laptop-per-child program directed out of MIT, and today there are 60,000 1-laptop-per-child machines in the country. At the other end of the educational continuum, major development resources were invested in the Kigali Institute of Technology to create a first-rate training center for professional ICT graduates within the country.

The NICI (National Information and Communications Infrastructure) plans (phase 1 and phase 2) were aimed at using GOR resources to create the necessary "building blocks" for a comprehensive ICT infrastructure focused on having the private sector eventually run the infrastructure as soon as a proper regulatory environment had been created. The role of the regulatory environment is to insure that (a) the development and ongoing needs of the people of Rwanda will be met and, (b) at the same time provide private investors with an opportunity to make a reasonable profit for their services. Dr. Gatare stressed several times that the role of government in this process is not to compete with the private sector, but rather to facilitate and empower.

That philosophy could be seen in how his Ministry handled the recent development of the cellular telecommunications industry. Today, it is in the hands of private companies (primarily MTN and Tigo), and they operate within the regulatory environment of the government. Dr. Gatare also mentioned that his Ministry is trying to use funds from Rwanda's universal access fund to help upgrade the cellular infrastructure from edge (the first generation of cellular data service) to 3G (3rd generation cellular data service) in places where the demand for higher speed services warrants it. As in the US, Rwanda's universal access fund is a mechanism by which commercial data carriers are assessed fees to subsidize services for low-income households and high-cost areas in order to ensure that all citizens of the country will have access to communications services at realistic charges.

A major ICT constraint for the country thus far has been affordable, high-speed internet connectivity. Up until now, Rwanda has had to rely on satellite based data services, which are both slower and much more expensive than fiber based services. Consequently, there has been a great deal of demand for getting off of satellite and onto fiber.

Under MINICT direction, the GOR just completed building a 2,600 km country-wide fiber optic backbone ring that connects all 30 Districts of the Country with the capital, Kigali. By virtue of the national network design featuring a true circular "ring" design with 2 exit points – one each in Mombasa, Kenya and Dar Salam, Tanzania – the network can survive even a catastrophic failure at a single location and still maintain service for most users. The backbone has been tested and is waiting to be "lit up" as soon as commercial ISP contracts are established, which is planned to occur by approximately September 2011. Initial plans call for the fiber backbone to be used to provide direct fiber connectivity for government offices, hospitals, health centers, universities, polytechnics, and telecommunication centers that are located at the District level and at the National level in Kigali. This will directly support major national initiatives in e-government, e-learning, e-health, and e-commerce.

The ICT Minister emphasized that the GOR wants ICT developments to be citizen focused. With the first phase, the emphasis will be on providing connectivity – and citizen access -- to a wide variety of government services (including health, education, economic development, etc.). In that regard, he mentioned that the e-Soko project had just won an award from the third Technology in Government in Africa (TIGA) Awards in Addis Ababa, Ethiopia for its initial efforts to provide farmers with direct access to current market information via their cell phones. He indicated that this was the sort of innovation his ministry hoped to see more of in the future. We briefly discussed ways that e-Soko might be strengthened (better interface, more robust artificial intelligence, etc.) and, again, he indicated his strong interest and support.

After the fiber ring is up and running smoothly, the next focus will be on improving integration and lowering costs. MINICT is also working to complete a data center in Kigali along with a network operations center. These resources will open the way for the 3rd phase that will usher in cloud computing and the provision of software as a service. Cloud computing refers to the use and access of multiple remotely-managed, server-based computational resources by end-users with client software installed on their computing devices (including workstations and mobile devices) and an internet-based network connection between the two. As mentioned previously, the roadmap that has been drawn up by MINICT is impressive for both its focus on using ICT to meet the needs of Rwanda citizens and also for capitalizing on the latest technical developments in the field.

In terms of "last mile" connectivity to extend the fiber beyond the 30 Districts, current plans call for collaborative work with the Rwanda Development Board to run fiber to 500 cell towers in the country and from there broadcast something like WiMax (standard yet to be determined) to create an aerial "broadband" network. He encouraged us to visit with the RDB staff for further details.

Finally, Minister Gatare mentioned that digital television is scheduled to go live in August 2011. Up until now, adoption rate of television has been relatively low in the country, and the broadcast offerings have been relatively weak. With the implementation of the fiber optic network, the stage is set for some major changes. Television offerings will become part of what is available in the community telecommunication centers, and Dr. Gatare encouraged us to think about what sort of agricultural programming might be created to help inform and train farmers over such a network. Although it was not discussed further with the Minister, that idea might well tie in with some of the programming goals

for CICA, particularly if CICA staff approached the matter as a partnership venture with other interested parties (MINICT, MINAGRI, input suppliers, Imbaraga, farmer cooperatives, etc.).

In terms of the community telecenters, themselves, the Minister explained that while they have been upgraded to serve as business development centers, the training content currently offered for citizens is relatively weak and might represent an opportunity for Extension to demonstrate early on what could be done at this type of facility in terms of citizen (and farmer) education. He also shared there are current plans to build as many as possibly 1,000 additional community telecenters over the next 5 years, but that his agency will be looking for advice on how better to design and equip them to meet the country's needs (perhaps in a more efficient manner) and he would welcome our input.

4.4.2 Mobile Telephone Networks (MTN)

In meeting with MTN Chief Operations Officer Andrew Rugege and Senior Manager for Sales and Marketing, Yvonne Manzi Makolo we were impressed to learn that MTN currently offers cellular data services in over 95% of the land-mass of Rwanda. While much of that is at the slower "Edge" end of the spectrum, 3G services are currently provided in Kigali and other major cities. Mr. Rugege stated that MTN constantly monitors usage and if traffic in a given area seems to merit ramping up service from Edge to 3G, it can be done. Upon learning that data services were available so ubiquitously in rural areas, Paul Hixson bought a micro-sim card from MTN and had it charged with 1 GB of data services and installed in his iPad2. For the duration of the trip, which included 5 day trips to rural areas (both north and south), Hixson used his iPad2 continuously, including while in farmers' fields and in extension sector offices which had no internet connectivity. In all instances MTN's claim of near universal coverage proved true. Everywhere he went using his MTN micro-sim card, Hixson was able to use all the applications on his iPad2 that required internet connectivity (mail, web browsing, Google maps, Skype, etc.). At the end of the trip, despite having used the service extensively and having downloaded a number of very large documents, he had only used ½ of the data capacity he had purchased.

Mr. Rugege and Ms. Makolo also explained that MTN currently serves as both a cellular provider and an internet service provider. MTN expects to be a bidder once the testing of the national fiber ring is completed and a tender is opened for a commercial entity to provide management and internet services for the new infrastructure.

4.4.3 Rwanda Development Board

Later Hixson was able to meet with several staff at the Rwanda Development Board including: Gilbert Kayinamura, Grace Mutzinzi, Eddy Kayihura, and Tony Sebera (head of Infrastructure). The primary discovery made at that meeting was that current plans for "last mile" connectivity call for locations not currently linked with fiber are to be realized via an aerial broadband scheme. Although the RDB team has yet not completely finalized which spectrum will be used, the currently most favored option is to run fiber to 500 cell towers around the country, and from there to re-broadcast the signal using WiMax antennas. At end-point locations, the plan would be to use mifi-routers that listen to wimax coming in on one side and rebroadcast an 802.11 wifi signal to end users on the other side. The current project timeline would call for that aerial last mile implementation to begin sometime in the summer of 2012. It would be a rolling implementation, and RDB planners believe it will be fully operational in all locations by summer 2013. This means that sector level extension offices can plan on having broadband level wireless internet connectivity in their offices by summer 2013 at the latest (with some having that capacity as early as summer 2012).

4.4.4 District Level ICT

We visited the District Level Extension office in Musanze, where we confirmed that District level public extension workers currently have both a laptop computer and internet connectivity. That connectivity is currently relatively slow, but will soon receive a big boost when the new fiber network is activated. The District Agronomist in that office primarily uses her computer for tracking data, writing reports, using email, and conducting internet searches. She also told us that she uses her personal car for transportation in carrying out her work.

4.4.5 Sector Level ICT

We visited Sector level Extension offices in both the north (in Musanze and Gisenyi) and in the south (in Huye). For the most part, extension workers in sector level offices have access to shared computers, but those computers do not currently have any networking or internet connectivity. The ICT staff primarily use computers to write their reports. When we asked how information was shared with them from District or National Extension personnel, we were told that communication is done either via hardcopy, or if electronically, the usual chain of events is for the person who is sending an email to call the sector Agronomist and tell him that an email has been sent to him. Upon receiving such a call, the sector Agronomist has to use his motorbike or bicycle (if he has one) to travel to a telecenter (often several kilometers away) to logon at a public terminal and download the email. He then copies the document to a flash drive and hand carries it back to the local office, where it needs to be transferred to the shared computer and worked on. If the document in question is a report or document that needs to be completed and turned back in, the data download/upload process must be repeated in reverse. Obviously, this painstakingly slow, awkward arrangement totally undermines using computers for any sort of timely two-way communication, data sharing, or information gathering. This must be changed.

4.4.6 ICT Observations from Visits with Farmer Groups

The MEAS Team visited a number of farmer groups (including farmer associations, farmer cooperatives, and farmer federations), with membership ranging from very poor farmers to relatively well-off, progressive farm leaders. Without exception, in all of those groups, the dominant ICT device is the common voice/sms capable cell phone. It is nearly ubiquitous. In no group were there less than 1/3 of those present who had a cell phone on their person. And, in most groups, that figure was between 50% - 80%. In contrast, almost no farmers owned a computer, and only a few had ever used one at a public telecommunications center (and those were primarily younger farmers).

When meeting with each group, we asked members if they were aware of the new e-Soko service for market price information. A few were aware of it, but most were not. We then described the basics of what e-Soko provides and asked the assembled farmers if they would find that sort of service helpful. In every group meeting, that question sparked a lively discussion with farmers enthusiastically expressing a desire to use (and even pay a modest fee for using) such a service. It's clear that there is currently a high level of end-user interest in such a service. However, the fact that so few individuals even know of e-Soko's existence indicates that, at a minimum, there is a need for a larger public information awareness campaign.

The one group that we met with that seemed to have a higher order use of computers was Imbaraga, Rwanda Farmer's Federation. Joseph Gararanga, the Executive Secretary for the North (in Musanze) uses a computer daily, as do a number of his staff. That is not surprising, because Imbaraga is a highly progressive organization that provides a number of cutting edge services to its members. While we were there we sat in on a farmer field school training session and also saw a number of their demonstration areas for promoting new production and processing practices. We should note that

Imbaraga would be a wonderful organization to collaborate with in terms of launching any new ICT-based services for farmers.

4.4.7 Agricultural Information and Communication Centre (CICA)

As reported earlier, CICA was created through the PASNVA project, in recognition that a national center needed to be created to deliver 5 essential information/communication services. Again, those were: (1) a documentation center and library; (2) a GIS lab; (3) a group for managing the MINAGRI website and the AMIS Portal (Agricultural Management and Information System); (4) staff to develop Extension publications; and (5) staff to develop extension audio-visual materials.

Our assessment team supports the findings of the BTC final evaluation report of PASNVA, November 2010, when it said that CICA represents a fundamentally sound beginning on which MINAGRI can continue building. We also agree with the general findings that: *"CICA should be integrated in MINAGRI, as a separate unit for extension, communication, and information; providing services to service providers as well as to other MINAGRI agencies, projects and programmes."*

At the time of our visit, the CICA staff was operating out of temporary nearby quarters while finishing touches were being put to the new CICA building. The documentation center and library were temporarily closed, as was the GIS lab. Therefore, it was not possible to accurately assess how well the new facilities matched the needs of the program, but nonetheless, we were able to interview a number of key staff and examine a number of finished work products.

4.4.7.1 Agricultural Management and Information System (AMIS)

The team met with Sam Barigye, ICT expert and Angelique Uwimana, MIS specialist. The AMIS portal uses a Google search engine and is configured to display search results to end users showing AMIS documents first followed by documents from other sources (FAO, USAID, etc.). The site hosts an impressive collection of volumes in English, French, and Kinyarwanda. One other staff member does multimedia production, including creating audio programming for distribution to a variety of Rwanda radio stations. The staff members are young and talented, and have impressive training credentials. However the size of the staff is too small for the task at hand. Most of the text-based documents are currently posted on the web portal in pdf file format.

4.4.7.2 Publications

Clare Gatayire is in charge of Agricultural Extension material development. She is a one-person shop in charge of everything from bringing an idea through the planning process, working with the various collaborating agencies in the validation and prioritization processes, drafting content, working with contracted designers, directing pre-test activities with representative audience groups, revising and updating, and overseeing the printing and duplication process. We were very impressed with the thoroughness and inclusiveness of the validation committee process, which brings together representation from RHODA, RADA, ISAR, and OCIR Café. The only major group that did not nominate a representative to serve in that process was OCIR Thé. This validation process helps insure that the highest priority publication needs of the total agricultural research and extension programs rise to the top of the production list.

Clare is a highly productive staff member, having put out 20 new titles last year. In reviewing sample copies of recent work, we were impressed with the professional quality of the finished products, and how well they were written and designed for their intended audiences. Clare has a professional background in linguistics, language arts, and communications/information management, and is aided by having worked eight years for the Rwandan Institute for Agriculture Research. However, by any

comparison with peer communications units in SSA (or elsewhere), the publications division of CICA is understaffed. Having only one person to do all this work is a severe limitation.

4.4.7.3 e-Soko

As noted earlier, e-Soko is a new service to provide current market price information to farmers and other parties in the food market chain via low-cost cell phones using either sms or via voice. E-Soko was developed by MINAGRI and the Rwanda Information Technology Authority (RITA) with funds from the World Bank. The service currently provides information on all major agricultural commodities (staple crops, vegetables, and fruits) sold in 50 markets throughout the country. Current plans call for expanding the number of markets.

Market information from e-Soko can be accessed currently in three ways (listed in order of price and ease of use for low-income farmers):

- Via a sms text message sent to 7656 from any sms-capable cell phone. Normally, sms enquiries such as this would be charged 10 Rwandan francs (@ 1.6¢ US); however MINAGRI and RTB have signed an agreement with MTN to underwrite the service for six months to stimulate initial use of the system.
- Via a voice call to a phone number where Information Voice Recognition (IVR) software will provide the same information in response to voice prompts. The cost of an IVR inquiry varies based on the length of the call, but averages about 70 Rwandan francs (seven times the cost of sms method).
- via a web inquiry (which requires both a computer and internet access)

Although the service is relatively new, it already shows promise in terms of meeting a major need faced by farmers and others to have access to reliable, real-time market price information so that producers are not always at the mercy of middlemen. At the same time, e-Soko currently faces several issues that must be addressed, including:

- The current contract is ending with the vendor (Voxiva) that built and operates the ICT system at the heart of e-Soko. The current MINAGRI staff member assigned to coordinate e-Soko, Wilson Musonera, does not have administrative access to key parts of the ICT backend, and is concerned that MINAGRI is not positioned well to deal with potential system failures or even ongoing maintenance needs.
- There is a pressing need to develop a comprehensive, long-term strategic plan for the e-Soko service. Such a strategic plan should reflect customer needs, ease-of use requirements, user satisfaction metrics, technical development and support, and the economic sustainability of the service. In June 2011, a two person team from Cornell, Dr. Khin Cho and Dr. Don Tobias, came to Rwanda to conduct field research as part of a separate component 2 MEAS field research study to determine what farmers in Rwanda want from a mobile-based market information system. Drs. Cho and Tobias also work with MarketMaker in the US (a different sort of database-driven tool for linking producers with buyers of their products). They saw great potential for using their research to help guide how the next version of e-Soko could do an even better job of addressing the needs of Rwanda farmers.
- The team heard several anecdotal reports that the current version of the service is not as user-friendly as desired, in that users are not able to request aggregated data and sometimes if the syntax of a request is not perfect, rather than suggesting a way to modify the request, the system will simply respond that there is no data corresponding to that request. Spelling errors, for example, can give users the impression that the system has no information on the item in question.
- The current system only supports inquiries in Kinyarwanda. It would be desirable to also extend support to inquiries in English and French.

4.5 Nutrition Extension

4.5.1 Introduction

Many countries, including Rwanda, are starting to recognize the impact of malnutrition on economic growth and poverty reduction. As malnutrition continues to be widespread in different countries, economic growth will be delayed. Therefore any country which is looking for a sound and sustainable development should include nutrition strategy and policy as one of its major inputs. Several countries recognize the integral role of nutrition at the national level but making policy does not always translate into action for planning and implementing the outlined strategies. Sometimes the lack of experts in nutrition program planning is a barrier to policy implementations.

Reasons which may explain the lack of integrating nutrition into national policy agendas are: 1) misperception that nutrition outcomes are an output to growth and development instead of an input. It is well known that strong and healthy human capital is associated with economic development with high productivity, increased earnings, less absenteeism and fewer medical problems; 2) policy-makers perceive that once food security is achieved, good nutrition outcomes will follow. Therefore, policy implementation efforts will be directed toward increasing agricultural production. Once food security is achieved, it does not translate to the reduction of malnutrition.

Other social, environmental factors such as water sanitation, infant feeding and care practices, nutrition education regarding diet diversification and variety, cooking methods, household hygiene, food safety and storage are all integral to alleviating malnutrition. Thus, nutrition and health should not be viewed separately from economic development. Integrated health and nutrition strategies should consider the social, ecological and environmental factors of populations. National nutrition solutions cannot be found within one single development sector. It is the result of collaborative work among the ministries of agriculture, health and education and other related sectors. The lack of coordinated activities among these multiple sectors may interfere with the implementation of national nutrition policy strategies.

Collaborative work between the nutrition, agriculture, health and education sectors is crucial in alleviating malnutrition problems. Building capacity in nutrition and health will increase the number of highly trained health professionals to assess the problem, design, implement and evaluate programs. In addition, trained professionals will be able to strengthen and sustain support to Rwandan higher education institutions to fulfill the needs of the increasing number of students enrolled. At the community level, nutrition extension educators will be able to reach many people with accurate information about food and nutrition based on local agricultural conditions. On the policy side, nutrition extension experts have a major role to play in shaping policy decisions on community nutrition and health needs and ensure its implementation, monitoring and evaluation.

Nutrition extension, compared with agriculture extension, can be defined as a service to provide accurate nutrition information and advisory services needed by rural population. Nutrition extension agents are crucial to providing technical nutritional information to rural populations related to farm products, processing, cooking and nutrition education to prevent diseases. To be successful, the agent should therefore: 1) understand the food and nutrition situation in the communities (s)he is serving; 2) be knowledgeable of social, cultural and environment factors affecting adequate nutrition in the community; 3) prioritize nutritional problems; 4) be knowledgeable about public and private resources available in the community to solve problems; and 5) be able to work with community members as partners in solving problems. Therefore nutrition extension agents are very important in providing support and advice related to nutritional and health needs of the population. With proper training and

education, they are well equipped to transfer nutritional information to communities, teach them how to use the information through nutrition education, and provide hands-on activities using local agricultural production. Therefore, products and methods will reach the rural communities where they live.

4.5.2. Background

The 1990s events in Rwanda left the population in a very serious nutritional situation, in particular women and children under five years of age. Since then, the Government of Rwanda has made incredible progress in the nutrition and health sector. Nutrition is considered as a key to sustainable development. It contributes to achieving the Millennium Development Goals, to which Rwanda has committed itself. Malnutrition has a negative effect on the well-being of individuals, communities and the development of the country.

The 2007 Rwanda National Nutrition Policy validates that adequate nutrition is a universal right essential for the physical, mental and emotional development of children as well as better quality of life for adults. Several nutrition interventions focus on the period from minus 9 to 24 months, considered as a "window of opportunity," where effective nutrition interventions may contribute to reducing under-nutrition related problems, diseases and even death. In addition to the national nutrition policy, Rwanda ratified Millennium Development Goals and has made improvements toward its achievements.

4.5.3 Lessons Learned from Selected Previous Projects

The adoption of a national nutrition policy provides guiding principles and strategies to design, plan and implement nutrition interventions to fight against malnutrition and prevent nutrition related diseases. The Government of Rwanda is committed to ensuring better nutrition for its people. Since April 2009, considerable progress has been made in developing a national emergency program to eliminate malnutrition such as acute protein energy malnutrition. In the second phase, the government and its partners moved into strengthening monitoring systems for nutritional and health related problems of young children. Community health workers, considered to be nutrition extension agents, provide referrals to health centers.

Currently, there are many efforts by the Government of Rwanda to improve the nutritional status of the population through various programs at the community and the national level. Different nutrition interventions such as community-based nutrition programs, vitamin A supplementation in children between 6-59 months and post-partum women, and promotion of the consumption of iodized salt, "kitchen gardens", and "One Cow-One Family" have been implemented. However, the nutrition situation remains a critical public health problem as the national prevalence of protein-energy malnutrition and micronutrient deficiencies are still major constraints to the well-being of mothers and children. There is a need for monitoring and evaluation of all nutritional interventions.

Rwanda has made many efforts to increase national food production through the crop intensification and land consolidation programs to ensure household food security. However, decrease in rainfall and climate change, access to fertilizers, poor food distribution at all administrative levels and within households, household food insecurity, knowledge of good nutrition practices, and the reduction of household purchasing power are some of the factors identified by the government as constraints to improve the nutritional status of the population. Moreover, the lack of a strategic framework for action by government technical departments and partners inhibits the harmonization and effectiveness of interventions. The government has moved nutrition to priority status for development with multi sector efforts from the different ministries, donors, developments partners and civil societies. With the government leadership commitment, many strategies and initiatives are in place:

- Management of acute, severe, moderate malnutrition at the health facilities
- Increase coordination to enhance implementation of nutrition activities
- Micronutrient nutrition and existence of national food fortification alliance
- Existence of an active Nutrition Technical Working Group;
- Decentralization of nutrition activities at district and sector levels
- Community health workers in each village for social mobilization and referral service to health centers
- Nutrition support and counseling for people living with HIV/AIDS
- Prevention of Mother to Child Transmission of HIV/AIDS
- Growth monitoring and Promotion (GMP)
- Infant and Young Child Feeding including (Promotion, protection and support)
- Community Based Nutrition Programs
- Vitamin A supplementation for children 6-59 months and postpartum mothers
- One cow per family and one cup of milk per child initiatives
- Kitchen gardens for all Rwandans
- Deworming for children 12 – 59 months
- The new curriculum for undergraduate program in human nutrition at Kigali Health Institution has been approved by the cabinet to increase technical capacity in nutrition.

4.5.4 Findings

Rwanda has made considerable progress in the fight against malnutrition. At the same time, the ministry of agriculture is responding to food insecurity problems through land consolidation and crop intensification programs. However, there is still long away to go. The lack of capacity to disseminate accurate nutrition information will impede the development process to sustain food security efforts and improve nutritional status of the population. Training of nutrition extensionists (or community health workers) and agricultural extension agents, nutritionists in hospitals and knowledge gaps in linking research and extension are still problems that need to be solved.

4.5.5 Methodology

MEAS team members met with women farmers, members of the Ministry of Health, a nutritionist at UNICEF, community health workers in different districts, medical doctors, directors at district and sector hospitals and mothers with malnourished children. Areas we visited are: Kibuye hospital, Gihara health center, Kibeho health center and Shyira hospital. MEAS team members also reviewed existing documents on nutrition policy and the national multi-sectorial strategy to eliminate malnutrition in Rwanda (action plan for implementation 2010-2013); reports on food security in Rwanda and from the first national nutrition summit held in November 2009. Nutrition is also highlighted in the government vision 2020 and EDPRS documents.

4.5.6 Results from discussions

1. Community health workers (CHW) are considered to be nutrition extension agents since they provide information on nutrition and health at the community level. They are trained to provide medicine to the community members and provide referrals to the health centers. There are four community health workers at each village: 2 who are called “binome”, one for social affairs and the other for maternal and child health. Binomes are able to provide medicine to patients with malaria, diarrhea and tuberculosis. Community health workers are crucial because they perform household visits and identify cases needing special attention. These CHW are ordinary men and women who volunteer in the community and are not paid. Most of them are farmers and are often challenged to

fulfill their CHW job as well as farming for their own family. When they are called for CHW work, they leave their farms to attend to the sick or participate in meetings at health centers or at the district level. However, through the quality of work they perform, the ministry of health provides them with some money for their cooperatives. They keep about 30% of the money for their family needs and 70% is invested in their cooperatives.

Some CHWs need business training to understand how to use their cooperative savings. Some invested in the agricultural sector but others are waiting to have enough funds to start a small business. More training is needed for CHWs in the area of nutrition education and income generating activities to improve their own livelihood. They are very busy members of the community. They are farmers and their time is often divided between their family work and their CHW tasks. All of them expressed the need for incentives to be able to take time from their farmer or other household chores. They used the term "***insimbura mubyizi***", an incentive to pay somebody to stay on the farm in case they are called for CHW duties or meetings. They are equipped with cell phones to call for doctors or ambulance in case of emergency, but need transportation to move from one place to the other. They are worried about their mutuelle (public health insurance) the cost of which is going to increase soon. In sum, CHW are important assets to improve the health and livelihood of their local communities at village level. They can be trained to be extension nutrition agents to deliver low risk nutrition education and provide referrals for high risk patients to go to health centers or district hospitals. A thorough assessment of CHWs needs is recommended to understand how to better facilitate their tasks at home as well as CHWs.

2. Nutritionists at district hospitals or health centers do not have formal education in nutrition. Most of them are social workers who have not had nutrition courses except the training provided through the Ministry of Health. Sometimes, these trainings are more targeted for specific health problems. More professional development nutrition related trainings are needed for health centers and district hospitals.
3. Ministry of Health staff members in charge of nutrition need more training in the subject matter to be able to train CHWs to deliver nutrition services, and to conduct monitoring and evaluation of community nutrition programs.
4. There is a need to train medical doctors in nutrition and how to follow up on malnutrition cases. However, they are busy, have many patients to treat with an estimated doctor-patient ratio of 1/18,000. In addition, doctors have to deal with other infectious and chronic diseases complicated by under-nutrition problem.

4.6 Gender Issues

In the post-genocide era, the government of Rwanda has demonstrated its commitment to gender equality and equity in all areas. The government of Rwanda has ratified the following: The National Constitution of June 2003, the National Gender Policy, the National Gender Machineries, the ratification of the Convention on Elimination of All forms of Discrimination against Women (CEDAW), the Beijing Platform of Action, the Millennium Development Goals (MDGs), and the New Partnership for Africa's Development (NEPAD).

All these policies have been integrated into Vision 2020 and Economic Development and the Poverty Reduction Strategy (EDPRS) that recognize the role of gender equality at all levels. For centuries, Rwanda has been a patriarchal society which contributes to gender imbalances. Before colonization, women's positions were valued and respected in their families and communities. Women were allowed to participate in the country's political and public life. Women were very influential in management of

household resources and participated in decision-making at different levels during the monarchy. The institution of the Queen Mother played a major role in decision making. Historical examples of women's involvement in decision-making, such as female chiefs and the Queen Mother, are often cited as the foundation for the present level of women's political participation.

During the colonial period, gender inequalities were reinforced due to participation of men in the monetary economy with access and control over money as well as the access to formal education. During the post-independence period, men were still very dominant and very few women participated in decision making until 1990s.

In the post genocide era, Rwanda was marked by many changes in family relations and structure which shifted the traditional roles of women to become heads of households. In addition, the country has a strong political will to promote gender equality as a pre-requisite for sustainable development. The creation of the Ministry for Gender and Family Promotion (MIGEPROF) to promote gender equality is an important step. This ministry insures the integration of gender dimension into the development process and women empowerment.

4.6.1 National Gender Policy

The National Gender Policy insures gender equality in all aspects of Rwanda's development. It provides the foundation of mechanisms through which gender issues, policies and programs are developed, implemented, monitored and evaluated.

4.6.2. Gender Equality

In accordance with its mission, the Ministry of Gender and Family Promotion has put in place a National Gender Policy. This policy is a tool that clearly defines the process of mainstreaming gender needs in all public and private sector policies, programs, projects and budgets of the government. The following highlights reflect some major achievements in advancement of gender issues in Rwanda:

- Rwanda has a Constitution that guarantees gender equality and there has been significant increase in the number of women in decision making capacities. There exists a mandated requirement that at least 30% of all positions be filled by women. As of 2008, 52.25% of parliamentarians were women, and 32% of Ministers and State Ministers were also women.
- Laws of inheritance, succession and land tenure give equal rights to women and men.
- The National Women's Council helps ensure that the governmental mandates regarding gender equality are appropriately implemented.
- Gender awareness has been generated throughout the country through the media, gender training and sensitization campaigns are ongoing.
- Rwanda has achieved gender parity in primary school enrolments since 1994, and the rate has increased from 76 to 90%.
- EDPRS has been globally recognized as one of the most gender-sensitive poverty reduction strategies.
- Ratification of CEDAW and the Beijing Platform have been integrated into national policies, the constitution and translated into Kinyarwanda.
- Women can now inherit land due to newly modified family law.
- Women's District and Guarantee Funds address poverty amongst the female segment of the population.
- Women have been mobilized to supplement the justice system and are part of Unity and Reconciliation through the GACACA courts.

4.6.3 Women Empowerment

- A women guarantee fund has been established to help those who have insufficient collateral to access to loans.
- A women credit fund has been established to support rural women who are poor but able to engage in income generating activities (IGA).
- Initiation of CAPEC (Caisse Populaire d'Epargne et de Credit) to help both women and men but especially women who live in rural area to manage money and have IGA
- Extensive Training of women in project creation, presentation and management, production of handcrafts, agriculture, etc.
- Sensitization of women in decision making places and processes at all levels.
- Sensitization of women in different governmental programs such as GACACA
- Creation of different committees from the *Umudugudu* to the national level to combat gender based violence with the support of government and its partners.

4.6.4 National Women's Council

The National Women's Council (NAWOCO) was established in 1996 to be a social forum where girls and women pool their ideas to solve their problems and to participate in the development of the country. The council is organized from grassroots to national levels and provides opportunity for women to participate in local government at all administrative levels. The council organizes community sensitization on the rights of women to vote and stand for election. Its mission and objectives are:

- To compile views of all Rwandan women without discrimination.
- To train women to analyze and solve their problem together.
- To encourage women to participate in the development of the country.
- To sensitize women on the culture of patriotism and working for the country.
- To enhance women's ability to carry out their own activities.
- To represent women in the governance of the country to enable them to participate in government programs.
- To encourage women in the fight for equality.

The Ministry of Gender has established strategic linkages with the national women's councils, whose base at the grassroots level provides for important linkages between policy and implementation, ensuring that women's concerns are integrated in national policies and programs. The councils are an effective strategy for national development and the promotion of gender equality.

4.6.5 Gender Monitoring Office

A gender monitoring office was established to work hand in hand with other government institutions, such as the National Institute of Statistics, to ensure that gender are represented at all levels. Gender-disaggregated data is collected to be used in implementations of policies. The office monitors and provides statistics on gender performance at all levels of government and economic sectors.

5. Recommendations

5.1 Extension Policy and Institutional Assessment Recommendations

5.1.1 Introduction

Given the large number of farmers and farm households in Rwanda, as well as their average household incomes, it will be considerable time before most small-scale farm households will be able to

directly finance their advisory services. The exception will be specific high-value crops, such as coffee, that are currently in the process of being commercialized and are beginning to generate sufficient income from their exports to pay for these needed advisory services, generally at the time of selling these crops. In this case, these larger, commercial cooperatives will be able to finance their advisory services, which will be provided by a competent subject matter specialist (SMS), as demonstrated in one of the large coffee cooperatives. However, most of these cooperatives do not yet have the financing to pay for the services of post-secondary trained agronomes who currently operate at the farm level. Therefore, in the foreseeable future, both public sector and donor-financed NGO advisory services will be needed. It should be noted that the private sector will eventually take on increasing responsibility for the provision of technical advisory services, especially related to the sale of agricultural inputs (i.e. seed, fertilizer and pesticides); these advisory services are financed through the sale of inputs, as done throughout the world. However, this process takes many years and these recommendations are only successful if developed through public-private partnerships (PPP).

5.1.2 Sustainability of the Pluralistic Extension System in Rwanda

To a large extent, all International NGOs and most local NGOs are donor financed, and are associated with specific projects, such as those being implemented through CIP. The problem is that these projects generally last for only 3-5 years. Therefore, while there may be other donor funded projects that follow, but both the technical focus (i.e. which specific crops) and/or the target areas being addressed will likely differ from project to project. As a result, there will likely be continuing changes, in terms of extension advisors that will be serving different districts and sectors, as well as farmers. Therefore, it is uncertain which agronomists will continue providing advisory services on a continuing basis once the donor financing for CIP and other projects ends (including the provision of free seed and/or subsidized fertilizer).

In the case of the private sector, when they start generating sufficient profits from their sale of inputs, they will provide needed advisory services to the farmers they are serving. However, most advisors in the private sector (i.e. the store owner) do not have the technical training, capacity, interest or expertise to teach farmers how to diversify and intensify their farming systems. For example, to understand the key functions of agricultural extension systems, see the organogram shown in Annex G. Different farmers, based on gender, size of farm, agro-ecological conditions and access to markets, will likely need to pursue somewhat different types of more intensive farming systems. It is here that the public sector agronomists can and must play a key role. However, to do so, they will need to be trained about how to intensify and diversify farming systems, and must have access to both technical and market information. If small-scale farm households are to increase their farm incomes and move out of poverty, then they must learn how to produce both staple and high-income farm products, thereby using their available land and labor resources as efficiently and effectively as possible. These men and women farmers will further increase their household income as they learn how to produce and market more high-value crop, livestock and other products.

5.1.3 Decentralization of the Public Agricultural Extension System

As noted earlier, the public agricultural extension system was been formally reassigned to MINALOC, with the Mayor of the local government being the formal supervisor of these district agronomists. Some of these Mayors are assigning these district agronomists to a range of non-agricultural assignments thereby limiting their agricultural extension activities, which has a serious impact on small-farm households within the district. Also, most of these district-level agronomists have to monitor and coordinate the activities of the sector-level agronomists and most of their time is spent on administrative activities, not providing extension and advisory services to small-scale farm households

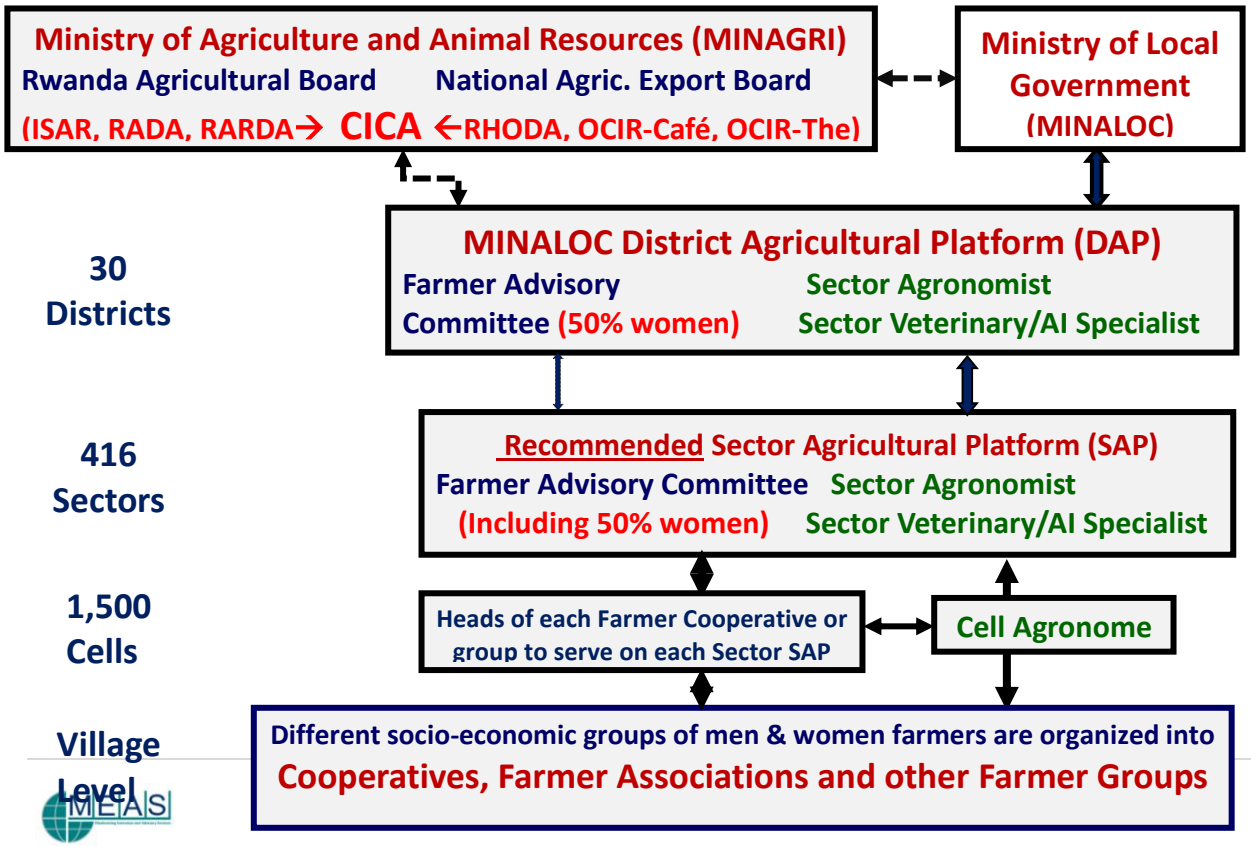
within their respective districts. Given that the MINAGRI is allocating most of its extension program resources to the implementation of Farmer Field Schools and largely bypassing the district and sector level extension workers, it is strongly recommended that MINAGRI reconsider how these resources are currently being allocated.

The key public extension workers, who can provide these extension services to small-scale men and women farmers within each district, would be the "sector-level" agronomists. However, most of these sector agronomists are relatively young and inexperienced. Therefore, the MEAS team recommends that both MINAGRI and MINALOC, as well as the donor community consider making key investments in training (both technical and process skills) and giving these agronomists the resources needed (i.e. communication tools, transport and program funds), so they can provide needed advisory services to farmers.

5.1.4 Developing a Farmer-led Extension System

As noted in the PSTA-II report (see Chapter II, Programme 2), MINAGRI wants the pluralistic extension system to develop the capacity and professionalism of producers. To develop this capacity, farmers will need both technical and professional skills, especially in leading and managing cooperatives, associations and other farmer groups. A key issue is for the leaders of these groups to have a role to play in both determining extension priorities, especially at the district and sector levels, as well as in monitoring and evaluating these advisory services. This is particularly important for the public extension system. Under the new Strategic Plan for the Transformation of Agriculture (SPAT-2) project being financed by BTC, District Agricultural Platforms (DAPs) are being established, with representative farmers making up two-thirds of the members.

Figure 1: Rwanda's Public Agricultural Extension System including MINAGRI at National/Zonal Level and MINALOC at the District, Sector and Cell Level



As shown in Figure 1 above, it was previously planned that similar platforms would be created at the Sector level, but creating these Sector Agricultural Platforms in 416 sectors was considered beyond the capacity of this new project. However, creating a more farmer-driven extension system will require such platforms to be established at the sector level. Therefore, it is recommended that DONORS consider supporting the development of either Sector Agricultural Platforms (SAPs) or Farmer Advisory Committees (FACs) at the sector level, so the needs and priorities of farm households within each sector are fully articulated through the DAPS at the district level.

Since the allocation of salaries, program and transportation resources for these district and sector level extension workers are handled through MINALOC at the district level (i.e. the District Mayor), it is recommended that these limited program resources will be progressively be put under the supervision and control of these DAPs as they are established. This is expected to be done at the district level by the new BTC project. However, in addition, it is recommended that SAPs also be created at the sector level and that the Chair of each SAP serve on the DAP, representing farmers from each of these sectors. Otherwise, the farmer representatives on these DAPs may be selected by the Mayor, rather than these representatives being nominated by farmer groups and cooperatives from within each sector.

In addition, it is recommended that the composition of these sector-level SAPs should include the leader or president of all cooperatives, associations and other farm groups within each sector. If SPAT-2 is to be fully and properly implemented, all farm leaders at the sector level must have a key role to play in decision-making at both the sector and district levels. If the public extension system in Rwanda is to be transformed, then there must be both SAPs and DAPs that will help determine farmer priorities and extension needs within each sector. This is another investment that the donor community should consider.

Also, it is recommended that these sector-level agronomists be trained to establish these SAPs and that these SAPs meet about once/month, so these agronomists can listen to the problems and priorities of these men and women farmer representatives within their respective sector. As noted in the ICT recommendations, if these sector level agronomists have the needed tools (i.e. both mobility and electronic access to AMIS and e-Soko) they can begin functioning as “facilitators” or “knowledge brokers” in a more innovative extension system that provide technical, marketing and management services to all major groups of farm households within their respective sectors. In addition, if a large LCD monitor can be installed in each sector’s meeting room, once these sectors get internet access, then these agronomists will be able to offer useful training sessions for different groups of farmers, depending on their interest and needs.

5.1.5 Developing a Market-Driven Extension System

There is no doubt that emphasis is being given to developing value-chains for the staple food crops being expanded under the CIP and other donor funded projects. The amount of labor involved in the post-harvest processing of staple food crops is relatively small in comparison with other high-value crop and livestock products, such as horticultural crops, herbs and medicinal crops, mushrooms, honey, sericulture, meat, milk, eggs, fish and other products. Therefore, the location of farms and their relative access to domestic and international markets will determine which markets are accessible and expanding, and then to determine which of these agricultural products can be successfully produced, processed and marketed

In short, as outlined in the PSTA-II Report (Chapter II, Programme 3) it will be very important to develop specific value-chains for different high-value crop, livestock, fisheries and other agricultural products. However, the production of these products will be fairly location specific and should reflect the specific interests and needs of small-scale men and women farmers within different sectors and cells in each district.

5.1.6 Helping Farmers Intensify and Diversify their Farming Systems

As implied in the previous section, men and women farmers should continue producing staple food crops to ensure both national and household food security. However, as fully indicated in the PSTA-II Report (especially Chapter II, Programme 1), if famers are to increase their household income and move out of poverty, then they must also learn how to intensify and diversify their farming systems, especially in producing high-value crop, livestock and other agricultural products. Obviously, these decisions will largely be determined by their relative access to markets, the size and agro-ecological conditions of their respective farms, as well as the availability of household labor and other factors.

It should be noted that those farmers who have moved into the "consolidated" production of staple food crops under CIP are receiving little or no advisory services to improve their backyard gardens, as well as teaching them how to produce poultry, pigs, small ruminants (goats and sheep) and rabbits. It was clear, in meeting with these men and women farmers, that they are very interested in learning how to start producing more horticultural crops and livestock products, but they do not know how to access, produce and market these different high-value crops, livestock and other products. Given that the intensification and diversification of farming systems will continue to change over time, as both urban and export markets continue to develop, only the public extension system is strategically positioned to take on these continuing, long-term advisory services. To do so, public extension workers, especially those at the sector level, will need additional training and resources so they can effectively help these men and women farmers get organized, start producing and marketing appropriate high-value products and, thereby, move out of poverty as is the goal of Vision 2020.

5.1.7 Needed Resources for the Decentralized Extension System in Rwanda

The details of the training, communications and resource needs of extension workers are outlined in the different sections of this report. However, it is important to emphasize that if this decentralized extension system is to be transformed, so it can serve small-scale men and women farmers on a continuing basis, then strategic investments will be needed. Given that the BTC will be making its investments to strengthen the public extension system at the national and district levels, it is recommended that further investments will be needed at the sector level, since this segment of the extension system will be receiving little or no support from this new BTC project.

Specifically, these front-line extension workers should be trained and supported to be the key facilitators and knowledge brokers within this new innovative, decentralized, farmer- and market-driven extension system. Rwanda wants to implement an innovative extension system, but additional investments are needed, especially at the sector level, if the country is to effectively implement its Strategic Plan for the Transformation of Agriculture—Phase II.

5.2 Extension Crop/Livestock/Farming System Recommendations

5.2.1 Proceed from Scalable to Scale

The overarching objective in strengthening agricultural extension in Rwanda is to take the proven scalable to scale. There are proven technologies but what is needed is an effective and cost efficient approach to deliver at scale. This will require a holistic approach with strong leadership from the

MINAGRI and the actual implementation by district, sector and cell level extension workers under MINALOC. Therefore, there should be clear responsibilities for those direct extension services being provided by MINALOC, private sector firms (i.e. progressively for technology transfer), increasingly by cooperatives and farmer associations (especially for high-value export crops), and by INGOs and local NGOs (especially for donor funded projects).

5.2.2 Strengthen the Technology Transfer Unit (TTU)

The current TTU is housed in ISAR. Though information on technologies is communicated to RADA for onward transfer, there is no functioning feedback on performance of the technologies and on farmer evaluation and adoption. The pending reorganization of research and extension into RAB presents an opportunity to redesign the TTU to more effectively meet the needs of farmers by supporting a wide range of service providers.

The TTU will need to support the range of customers including:

1. Research (national and international researchers), including donor funded research initiatives,
2. Public sector extension workers, especially MINALOC extension staff who are working at the sector level under the supervision of the district agronomists,
3. Over the forthcoming decades, private sector firms that will progressively take on more responsibility for technology transfer as they begin providing more inputs, starting with the staple food crops, but increasingly with high-value crop and livestock products.
4. Farmer cooperatives and associations, especially for export crops, where these larger, more progressive farmer groups can afford to hire their own advisors, and
5. Donor sponsored INGOs, who hire and work directly with local NGO service providers.

Another key issue is how the TTU is staffed and funded, as well as a clear indication of their mandate. However, there does appear to be a significant opportunity to increase the integration of the TTU with CICA, and this integration should be a top priority. The best example would be CIALCA, which (in addition to supporting ISAR researchers) is also training and supporting public extensionists at the sector level, as well as collaborating with INGO/NGOs in carrying out farmer participatory research.

5.2.3 Support Site Specific Crop Nutrient Management

The Government of Rwanda is promoting the expanded use of fertilizer on cereals through subsidies, complemented by the strengthening of an agrodealer network, which includes farmer training on the correct use of each fertilizer. Currently there is a blanket recommendation for each crop, regardless of farmer capacity and soil type, as well as the management of manure and crop residues. There is a clear realization that fertilizer recommendations need to be nuanced. However, soil tests, especially for rice land that is flooded, are not useful and may not even be required. It is recommended that the IRRI Site Specific Crop Nutrient Management tool be introduced for rice and if successful modified for maize fertilization. Hopefully, with the more efficient use of fertilizer, within an integrated nutrient management program, will help ensure that farmers continue to purchase and use fertilizer after the withdrawal of subsidies.

5.2.4 Support Integrated Seed Systems

Seed Systems are different for different crops. The risk is that the maize seed sector, with the importation of commercial seed (especially hybrid seed), will influence the support for the development of the other crop seed systems. The approach for the self-pollinated crops (rice, wheat, beans) should be more “developmental”. In short, identifying more promising improved varieties that have the potential to increase farmer yields and yield stability. This can be done effectively through the

promotion and distribution of these new varieties through "small test packets", as well as training farmers how to manage their own seed to ensure varietal purity, cleanliness and viability, as well as to know when they should purchase new certified seed and renew their preferred varieties. The approach for the vegetative propagated crops will require investment in disease surveillance and management to maintain quality material from primary multiplication sites to farmers' own fields. This is a rapidly evolving sector, especially for banana, cassava and potato, with the support of Bioversity, IITA and CIP working with ISAR.

5.2.5 Local and International NGOs & Cooperatives[4]

The current and envisioned agricultural extension service in Rwanda is noted for its pluralism, which is now being implemented in many developing countries. Rather than striving to recreate the previous, large scale public sector extension system, the government has embraced a pluralistic extension system including the decentralized MINALOC extension system, private sector firms (still very small) and other contract service providers – usually international and local NGOs as well as established Cooperatives. Efforts will be made to progressively privatize extension service providers, especially for key profitable export crops such as coffee. However, this will require a willingness of these farmer cooperatives to cover the cost of these advisory services, which takes time and much higher farm income. Also, for this approach to be successful, these advisory service providers need to reside in rural areas amongst their farmer customers. However, as noted earlier, many local NGO and commodity specific advisory service providers prefer living in the larger towns and cities, rather than at the sector and cell levels where most of these cooperatives and farmer groups are located.

5.3 Agricultural Education and Extension Education Recommendations

Whereas the assessment was conducted when there were still several separate universities, the recommendations in this section are made with the impending move to one national university in mind.

5.3.1 Enhancing Extension Training

While correctly alluding to the fact that there are many definitions of extension, the National Agricultural Extension Strategy (NAES) defines agricultural extension as "Dissemination and exchange of information between farmers and farmer's organizations with the objective to build capacities of producers to maximize the use of resources they have to improve, through the adoption of innovations, their economic and social standing" (p.16). Therefore, extension is an educational process that requires professionals with knowledge and skills in the use of different dissemination, communication, adult education and facilitation methods. Currently these knowledge and skills are not given at universities in Rwanda. Therefore, practically, there is no extension training in the country. Both pre- and in-service training currently focuses on crop and livestock technologies; not on the additionally needed process skills and knowledge that field extension workers need to be effective.

It is recommended that an appropriate faculty be strengthened to provide leadership in developing more effective extension training skills and knowledge.

Ideally, all agricultural faculties should offer training in extension methods and needed process skills. However, given that there is very little experience currently in the country and given the decision to have one primary College of Agriculture within the integrated Rwanda University system, it would be

[4] This section is based on interviews with UGAMA/CSC Centre de Service aux Cooperative, KOAKAKA Cooperative, ALUPA (Local NGO) and Rwanda Rural Rehabilitation Initiative (RWARRI)

better to start by strengthening these skills and knowledge within the selected faculty. This strengthening process will involve systematic training needs assessment, development of responsive curriculum, assessing capacities of the faculty (human and materials) to provide such training, training of the faculty staff to run this program, as well as providing the necessary materials for running this new program. Therefore, it might be necessary to hire and assign a suitably qualified expatriate to the faculty to drive this process of building a B.S. degree program in Agricultural Extension. Essentially, this curriculum revitalization process would involve at least two national stakeholder workshops and a survey. The first workshop would be to examine and agree on the current inadequacies and the actions needed. This would be followed by a national survey to broaden consultations and also assess the needs of the extension professionals in the field. After the survey, a report would be prepared as well as a proposed curriculum. Universities do respond to well-articulated needs – contrary to the 'ivory tower' phenomenon that normally characterize institutions of higher learning. The report and the proposed curriculum would then be presented at a second national stakeholder workshop for validation and debate on implementation modalities. This would be followed by the development of training modules which will include the following topics:

- Extension methods
- Participatory extension methods and approaches;
- Participatory Rural Appraisal (PRA) and extension program planning;
- Extension management – including matrix management
- Adult learning;
- Training methods and audio visual techniques;
- Farmer institutional/cooperative development;
- Group dynamics and problem solving;
- Agricultural information and communication technology (ICT) management;
- Gender and youth in agriculture;
- Extension research, including experiential learning/action research projects.

The National Agricultural Extension Strategy (NAES) of April 2009 recognizes the importance of most of these skill and knowledge areas – some of which are explained below.

5.3.1.1 Extension methods

The NAES recognizes the existence of a range of extension methods (p.22) and the importance of making careful choices, depending on the situation. Successful use of the methods depends on the knowledge and skills of frontline extension workers who use them. These extension workers need knowledge and skills to set up and conduct demonstrations; organize and conduct field days, and design and deliver extension messages orally and through a range of information communication technology (ICT) channels being developed by CICA.

5.3.1.2 Participatory extension methods and approaches

The NAES is based on several principles, all of which have a strong farmer participatory orientation. A precondition for the success of these approaches will be the availability of knowledgeable and skilled frontline staff, both public and NGO extension workers. Frontline extension workers need to have knowledge and skills in social mobilization and participatory planning. Frontline extension workers also need other social skills, like conflict management and decision-making. However, it was observed that the nature of extension deployment does not allow for truly "participatory farmer approaches." Extension workers are usually assigned non-extension duties by district mayors whose employment is based on signed performance contracts assessed on a half yearly basis. With this pressure on their

shoulders, mayors assign extension staff to duties that can show quick results like supervising road and housing construction

5.3.1.3 Participatory Rural Appraisal and Program Planning

Participatory rural appraisal (PRA) is an excellent approach for field extension workers to both learn what type of extension services farmers want and an effective way to identify innovative farmers and then to engage them in participatory farmer experimentation and evaluation. For example, to determine how different categories of farmers in a particular sector or cell might begin to intensify and/or diversify their farming methods is to identify innovative farmers who are already successfully producing and marketing different high-value crops, livestock or other products. Once other farmers learn about these different options, they may decide to pursue one or more of these new crop and/or livestock products to increase their farm income. In the process, many of these innovative farmers are willing to help and work with other farmers in producing and marketing these new products. Through this process, the district and sector level extension workers can regularly share these new market opportunities with the District Agricultural Platform (DAP), as well as the Sector Agricultural Platform (SAP) to get their advice and support in pursuing these emerging market opportunities.

5.3.1.4 Farmer institutional/cooperative development

Farmer institutional development is one of four specific objectives of NAES (p.17) and is particularly important given the Government's plans to gradually disengage from extension service delivery in favor of private extension services (NAES p.21). The private extension service providers are mostly farmers' organizations, as well as international and national non-government organizations (NGOs). A key and indispensable factor for the privatization process will be to establish strong and effective farmer organizations that are: motivated and sufficiently independent to effectively represent their interests; able to articulate their needs; contract private advisory services; monitor and evaluate performance of delivery services; articulate and defend members' interests; and lobby for these services. Farmers' organizations will also be expected to: identify their own problems and then to seek ways and means of solving them; take collective actions for the common good of members in their organizations; and, seek ways and means of developing their technical and management knowledge and skills to better plan, implement and evaluate their programs.

The challenges faced by these smallholder farmers, especially women farmers, are very big if they are to enter the cash economy. These challenges range from the provision of services, to the development of business skills to deal with these new circumstances and challenges. This requires that the smallholder farmers forge strong links of cooperation among themselves, using all the means at their disposal, including economic, organisational and lobbying capacity.

Currently, the smallholder farmers in Rwanda are not sufficiently well organized with sufficient resources, technical and management expertise, to express demands for technologies and engage in linkages with research and extension agencies as full partners. Many of these farmers association were created "mainly to benefit from assistance of NGOs and not to share their efforts and capacities to solve common problems" (NAES p.12). Thorough knowledge of farmer institutional building and understanding as to how groups work on the part of field level advisory service providers will greatly enhance extension efficiency.

5.3.1.5 Extension management – including matrix management.

Matrix management is a technique of managing an organization through a series of dual reporting. The way people are managed in complex reporting systems makes the difference between organizational success and the frustration of teams. Reporting to multiple bosses can create challenges for the managers and managed alike.

The move of district agricultural staff to Ministry of Local Administration (MINALOC) has led to an "absence of a functional relationship between MINAGRI and the decentralized agricultural extension services" – especially at district level and below (NAES p.14). Training in matrix management for senior staff in MINAGRI and MINALOC could restore some functional relationship between the extension field staff and the MINAGRI. Hakizimana (2007 p.6) alludes to the need for the MINAGRI "to establish a working relationship with local government authorities to ensure access to information from the farmer and also to advise these farmers on the applied technologies".

It is recommended that relevant management staff within MINAGRI and the MINALOC be given training in matrix management.

5.3.2 Focus of current advisory services

Current advisory services focus on production agriculture. Given that the "agricultural production system in Rwanda is dominated by small-holder farmers with less than one ha of cultivable land" (NAES p.5), farmers need to do all they can to maximize income from their small land holdings. They could greatly enhance their incomes by adding appropriate high-value crop and/or livestock in the process of intensifying and/or diversifying their respective farming systems. This would be sharply in line with the Government's Strategic Plan for the Transformation of Agriculture (PSTA II) global objective of "…maximization of profits for agricultural production…" and the development of entrepreneurship and market linkages (NAES p.7). Prior to the current NAES, Government had already adopted a comprehensive programme which was named the Integrated Development Programme (IDP) with ten pillars, one of which was "*Post-Harvest Processing and Marketing* – to assure food security and promote commercialization of agriculture through support for value addition and an increase in internal and export sales" (NAES p.9).

Part of the reason why field extension workers continue to focus on disseminating production technologies is that the current training at universities and colleges primarily focuses on crop and/or livestock production practices. Therefore, field extension workers do not have the needed skills and knowledge about providing advice beyond the basic production practices. Knowledge and skills about high-value crops, as well as small-scale agro-processing and value addition is critical, given the government's plans to put special focus "on modernization of agriculture, agricultural processing industry and development of the informal sector" (NAES p.6). It should be noted that during interviews with the Minister of Education, he also expressed the need for universities to come up with a more "market-oriented" curricula.

It is recommended that an appropriate faculty be strengthened to provide leadership and training on developing agricultural value chains. Therefore, the faculty would develop modules including the following themes:

Theme 1: Animal products processing (*small scale processing, storage, transportation, grading, packaging, safety, quality assurance*).
Theme 2: Crop products processing (*small scale processing, threshing, storage, transportation, grading, packaging, safety, quality assurance*).
Theme 3: Marketing and market analysis (*analysis of comparative advantages,*

organizing markets, negotiations, linkages, price factors, transportation).
Theme 4: Small agri-business management (*financial management, value chain analysis, principles of value chain, entrepreneurship*).

The above would be based on the country's priority value chains (like maize, beans, dairy), as well as other high-value crop (e.g. RHODA) and livestock value chains, since opportunities, constraints and challenges along all value chains are "commodity specific." Therefore, this faculty should also develop a degree program in agricultural extension, with a value-chain orientation, which could be run as one or more of these approaches:

- A full-time program (face-to-face teaching)
- A weekend program (example of part-time program in Table 1 below)
- A distance education program
- A sandwich program (a mixture of face-to-face teaching and student self-directed learning)

The skills required for working with smallholder farmers are different from those required for working with large-scale commercial farmers. While technical commodity-specific knowledge and skills are as important in smallholder farming as they are in large scale commercial farming systems, those working with smallholder farmers need additional social skills for working with people. Hence the need for an agricultural extension degree program that would include content as outlined and discussed in 5.3.1 above.

It is recommended that the degree program target first those that are already in the field, especially diploma holders, in order to quickly address the current knowledge and skills needs.

In this case there will be need to explore alternative modes of delivery. For example, employers might find it hard to release their staff to go back to university for 2-3 years on a full time basis. There are options that do not take candidates from their work places for long periods of time which include weekend, distance and sandwich (or semi-distance) programs. These allow students to work and study at the same time. Table 2 below outlines the strengths and weaknesses of each.

Table 2. Strengths and Weaknesses of Alternative Delivery Modes

Delivery mode	Description	Strengths	Weaknesses
Full-time programs	100% face-to-face learning and teaching Students have to be on campus on a full-time basis	Most common Students complete on time Easy to monitor quality Learners have easy access to resources Learners easily share experiences	Limited enrollment due to space and other resource limitations Not suitable for students with family and work commitments
Part-time programs (during evenings or long vacations)	Involves limited residential face-to-face teaching with long periods of self-directed study	Easy to control quality Broadens access to university education Suitable for those with family and work commitments Reduces demand on residential accommodation	Requires more preparation of instructional materials than full-time programs Limited access for those living far from universities Takes longer to complete than full time

		Learners have easy access to resources Learners easily share experiences	Requires incentive scheme for teaching staff
Distance learning programs	Instruction is conducted through media other than face-to-face teaching	Broadens access to a university education Ideal for those with family and work commitments Students do not leave their homes and work places Students manage their own pace	Difficult to monitor quality Requires much more preparation of instructional materials than full-time programs Takes longer to complete than full time Limited access to educational resources
On-the-job training	Training takes the form of coaching and mentoring on the job	Learners use their job as a learning opportunity Learning directly related to needs	Only limited numbers can be trained
Short courses	Face-to-face training over short periods of time usually not leading to academic awards	Flexible enough to allow for needs-based training	Lack of academic awards can be a disincentive to learners

The MINAGRI and/or MINALOC, through this faculty and/or CICA, should use these modules to provide short-term in-service training for the field extension workers. Although the NAES envisions a "…gradual disengagement of public services from direct extension service delivery…" (p.8), it is hoped that MINAGRI and MINALOC will both maintain oversight on human resource development to ensure continual availability of appropriately trained human resources, be it in the public or NGO sector. This would be in line with one of PSTA's ten strategic axes which is "Strengthening capacities of service providers, privatization and promotion of private sector" (NAES p.7). However, developing this capacity, especially in the private sector, will take considerable time to develop. If the MINALOC plans to set up a community innovation center (CIC) for each of the 416 sectors (which would be easily feasible, given that there are already good meeting rooms in each sector office), then these centers could provide a focal point for both training farmers as well as cell level extension staff. It is hoped that, through joint planning and matrix management training, both MINAGRI and MINALOC can develop a shared vision regarding extension worker and farmer training, as well as the use of these proposed CICs.

Given the lack of familiarity with agricultural extension degree programs, it is recommended that the awareness creation process includes experience sharing visits to other universities with extension programs within the region like Haramaya University in Ethiopia, Sokoine University in Tanzania, Egerton University in Kenya, Makerere University in Uganda and Bunda College in Malawi. The team to visit these universities would include MINAGRI and MINALOC officials, as well as the Rector and/or Dean of the selected faculty. While the MINEDUC is important and could be included in the visiting team, ministries of education do not normally worry about specific details of individual programs. They usually have no problems with well-articulated needs for new programs coming from universities.

5.3.3 Type of Graduates Needed

Given that all sector-level agronomists function as generalists, irrespective of their training background, it would make sense to come up with a general agricultural degree program. Sector and district agronomists come in with a specialized diploma or degree like animal health, animal production,

crop production, agribusiness, rural development, agricultural mechanization, soil and water management and so forth, but they all must function as general agriculturists.

Therefore, it is recommended that an appropriate faculty be strengthened to develop a strong general agricultural degree program.

To accomplish 5.3.1- 3.3 above, there will be a need for catalyzing dialogue among the main stakeholders involved in agricultural extension delivery - especially MINAGRI, MINALOC and MINEDUC; to develop consensus on the vision and goals of the extension system and setting up priorities for action; analyzing the training needs of extension staff; and helping agricultural universities make their curricula more responsive. Catalyzing dialogue on training might require an external intervener to initiate the process. The dialogue will lead to the development of modalities for implementing the desired training. The custom-made training programs could be run as a partnership between the university and MINAGRI, possibly through the new Training and Capacity Building (TCB) unit within the new Rwanda Agricultural Board (RAB) or CICA. In addition, MINALOC must be included in developing these custom-made training programs for their staff.

5.3.4 Improving the Capacity of Key University Faculty

Generally, agricultural training given at the four universities visited (ISAE, INATEC, NUR, and Umutara) is weak due to:

- Critical shortage of qualified staff (on average the universities have only a third of the critical mass they require)
- Lack of equipment and facilities for practical training.

(Apparently, these are precisely the reasons that have prompted the move to a single state university with different specialized faculties)

The Minister of Education alluded to these weaknesses above and further suggested mentoring programs with experienced universities in the West. Also, the lack of M.Sc. training in the country (apart from Soil Science and Environmental Management) acts as a disincentive for B.Sc. holders in the extension system, like district-level agronomists. They do not see career advancement as a prospect for themselves.

It is recommended that an appropriate faculty be strengthened to provide quality training and to provide M.Sc. level training in order to address the current staff shortages and the need to improve career prospects for those already in the service.

5.3.5 Need for a professional platform (i.e. an agricultural extension workers association)

Rwanda is experiencing multiple approaches to extension involving a wide range of extension service providers using a wide range of strategies and approaches. The effectiveness of these different approaches and service providers in not well known, but some appear to create “farmer dependence” due to the distribution of free or subsidized inputs. Therefore, there is a need for systematic studies to assess the effectiveness of the different approaches and strategies. These studies would yield data and information that would inform planners. Interesting topics would include: *effectiveness of outsourcing training; effectiveness of the model (or lead) farmer approach in extension; the effectiveness of farmer field school approach beyond integrated pest management (IPM); partnerships and linkages in extension service provision; decentralizing extension through local administration; cooperatives and other famer institutions as a vehicle for agricultural extension; role of non-government organizations in agricultural*

extension; frontline extension workers training needs. In additions, *adoption studies* could be conducted on a whole range of commodity value chains being promoted across the country.

An extension professional platform would encourage such studies and sharing of evidence-based best practices. The university agricultural faculties would find this as fertile ground for conducting research and sharing the results as part of their faculty professional growth and also for their teaching. In the absence of a professional platform, extension workers are, on-their-own, struggling to find the best way of making a difference at farmer level. There is no way of harnessing the experiences these extension workers are going through, for purposes of learning and sharing. Therefore, an agricultural extension professional platform would provide practitioners an environment for professional growth through life-long learning as they meet (face-to-face) or otherwise learn from each other, as well as encouraging each other to conduct research and learn from their work. Also, data and information generated through this professional platform (or through specially commissioned studies) would help inform policy formulation and policy change processes.

An extension professional platform would also provide an environment for open debates that enable practitioners to internalize the concepts and policies, while translating these policies into a language that can be understood by rural communities. Establishing and running such an association requires a few 'champions' who initiate and show direction; as well as a volunteer university that would host this platform and act as a focal point.

The extension professional association recommended here is similar to the (American) Association for International Agricultural and Extension Education (AIAEE), the European Society of Extension Education (ESEE) and the South African Society for Agricultural Extension (SASAE). These organizations enhance professional growth by encouraging research studies and sharing of experiences. In both cases leadership (champions) and the initiative to form the associations came from universities but they draw membership from across the extension profession in their countries and beyond. But the initiative could come from anyone interested – including development partners. The Rwanda association could affiliate itself to the African Forum for Agricultural Advisory Services (AFAAS), which is a constituent member of the Global Forum for Rural Advisory Services (GFRAS) to benefit from other experiences in the continent and beyond.

It is recommended that one or more university faculties, with strong support from both MINALOC and MINAGRI, provide leadership in setting up and running this new professional association of extension workers.

The current official platforms initiated by MINALOC and MINAGRI through PASNVA, which are structured from national to village level, are essentially for planning and implementation purposes – and everybody will say what they are doing is working (PASNVA report).

5.4 Extension ICT Recommendations

5.4.1 Utilize New National Core ICT Infrastructure

The main reason that the Government of Rwanda invested heavily in developing a cutting-edge fiber optic backbone was so that that the networking infrastructure could be used to help Rwanda's citizens achieve the development goals spelled out in the Vision 2020 statements. Because modern Extension work (globally) now relies heavily on using a variety of modern communications technologies to convey needed information to end users, it would be inconceivable for Extension in Rwanda not to take advantage of this wonderful new networking infrastructure to conduct both internal and external

communications activities. **Thus, future investment plans for advancing both MINALOC and MINAGRI's agricultural improvement goals should focus, at least in part, on how best to enable Extension (and indeed the whole agricultural production sector) to best utilize this valuable new networking resource**. Such an investment strategy would have several major components:

5.4.1.1 Utilize Current Cellular Data Capacity Immediately for Extension Worker Connectivity in the Field (and in the sector-level offices).

As was demonstrated by Hixson's experience with the iPad2 in farmer's fields in rural areas, MTN's claims of nearly universal cellular data coverage everywhere in the country are true. Yet, as reported, today's sector-level extension workers (who are the ones who have the most direct front-line contact with farmers) are forced to deal with computers that don't have any connectivity in a communications pattern that more closely resembles sending messages via carrier pigeon than it does using modern electronic means of communication to exchange emails or conduct chat or use social media. At a minimum, by using cellular data enabled devices, Extension workers could perform those basic essential communications functions much more efficiently from within sector-level offices, but additionally, they would be able to perform those same functions anywhere in their assigned geographical working area. This would enable both great time-savings and also large productivity increases for each sector-level extension worker.

5.4.1.2 Equip Sector-level Extension Workers with Cutting-edge Tablet Computers (iPad2)

There are good reasons why the new class of "tablet computers" is experiencing such rapid growth in the global IT marketplace. Manufacturers have managed to combine a point and click interface with light weight portability and always-on connectivity in a form factor that users find easy to learn and use for a wide variety of purposes. And, Apple's iPad2 has deservedly established itself as the current front-runner in that class of computing devices. If you can move your fingers and point at what you want to happen next, you're about 70% there in terms of mastering the device. Shooting pictures is literally a matter of pressing the button. The same ease of operations applies to shooting video. While there would still be a need to train staff in how to use such a device, mastering it is well within the capabilities of the typical extension field worker.

Also, since the iPad2 has up to 64GB of onboard RAM storage space, it would be possible to pre-load all the content that's on the CICA portal on the extension worker or association advisor's iPad2, so that they could access all the research and extension bulletins on board -- without having to download anything. If a good programmer with iOS skills was assigned to write a program to search the metadata of the content and display the ranked "hits", then Extension workers would have a library in their backpack -- that's also an Internet connected computer -- that's also a camera -- that's also a video camera -- that's also a GPS device.

One of the reasons that Hixson brought his personal iPad2 with him on this trip was to field test whether (a) this device would work well under Rwanda conditions, and (b) how applicable the on-board "apps" would lend themselves to typical Extension work. The team observed the convoluted path that sector-level agronomists in Rwanda currently have to follow even to receive an email from someone at the district level, then put this information into a report and send it back to their supervisor. This very inefficient situation could easily take up to ½ a day just to answer one email and send back the requested data.

In comparison, now consider what a difference it would make if that same worker (a) had all current publications and resources pre-loaded and with them at all times; (b) had the ability to communicate

with subject matter specialists and others in the organization on the fly (even from a farmer's field); (c) had the on-board ability to record success stories from star innovative farmers, eventually helping build a library of relevant information and (d) could use GPS-enabled software to create geo-spatial data sets of various agricultural practices, disease outbreaks, etc. This would require some investments, time, and expertise in directing the project, but it could make a huge difference in the effectiveness of Extension work.

With all those tools in one easy-to-use device, it's very easy to take a picture in a farmer's field of a diseased plant and in two clicks have the picture inside an email that's addressed to the subject matter specialist. Type a sentence or two describing the problem and push the send button it's sent -- all from the farmer's field. Use that same camera and switch it to video if the farmer is a particularly outstanding example of having adopted a new practice and the association adviser or extension worker can record a 2-3 minute video of the farmer explaining how she adopted the new practice and why it has helped her so much. When the extension worker gets back to the office, s/he can use the video editing software to cut out any awkward parts, and then s/he can post the video to any one of a number of spots - YouTube, Vimeo, or the CICA portal itself. As quick as that, you now are building a library of farmer-to-farmer communications. And, we all know that farmers really listen to fellow farmers; that's the key principle that innovative programs like India's Digital Green are based on.

The only questions we think would require some further consideration would be (a) is the Apple iPad2 the best tool in this class for deploying to sector-level staff, (b) how well would it hold up to long-term field use, and (c) would such an investment be cost-effective?

5.4.1.3 Take Advantage of Aerial "Broadband" Internet Connectivity as soon as it is available for each Sector level office

This is a recommendation that is not dependent on deploying iPad2's to Sector-level Extension workers, at the same time, if such a deployment were carried out, the aerial 802.11 wifi broadband would definitely benefit the iPad2s and provide higher speed connectivity for in-office use at reduced costs.

5.4.1.4 Provide Each Partner Farmer Organization with One Ipad2 for the Organization to Share

Another empowering investment possibility would be to provide one iPad2 to each major farmer partner farmer organization (such as Imbaraga) to help extend the reach of Extension information.

5.4.2 Strengthen CICA

ICT should not be viewed only as an infrastructure issue; equally important is that there be a source of reliable content, and that's one of the key reasons that CICA was established in the first place. CICA needs to be strengthened so it can produce more of the type of extension information that farmers want and need to become economically successful. The number of staff in CICA needs to be expanded to meet the growing needs of the system. In addition, staffing of CICA needs to be both underwritten with more solid funding support and integrated within MINAGRI as a cross-cutting, integrated communications and IT service group.

5.4.2.2 Study and Strengthen the AMIS Portal

Conduct an in-depth study of the AMIS portal to determine the best way to organize and present extension information for farmers. While the current site works well as a library tool, consider restructuring the site more along the lines of an end-user focused learning environment.

Consider migrating away from a pdf-centric approach to web publishing and move to a more standard Cascading Style Sheet (CSS)-based method that would separate the content from the visual style of its original presentation. The way that the site is currently constructed, the original visual form of the printed piece is captured intact and that's the way that the same information is displayed on screen. The problem with this approach is that that the computer screen does not have the same display characteristics as the printed page. What looks great as a 2-page double display in a magazine does not lend itself to being easily read on a standard 19" computer monitor – and it's even less conducive to viewing on a laptop (let along a smartphone). By adopting a CSS-based approach to web design, you have the advantage of being able to fairly easily design multiple visual presentations of the same exact same basic information so that it will always be readable, understandable, and attractive no matter what device it is being viewed on. Following that approach would provide a much more "future proof" electronic publishing system that would work more agilely when new and different e-reading devices are developed in the future.

Along a similar vein, recommendations should be developed and followed for using an h264 compression codec and html5 methods of embedding video content in web pages so that the resulting multimedia files will play on all playback devices (something the current site does not do in several instances). At present, all Apple iOS devices (including iPhones and iPads) will not display Windows media files, Flash, or Real (rts). However, virtually all computing devices (laptops, desktops, smartphone, tablet computers, etc.) will be able to display multimedia content in a modern web browser using html5 standards-based methods.

Given that we are interested in strengthening the pluralistic Extension system in Rwanda, it will be important to remember that the AMIS portal should be structured to address three functions:

- First as a source of information for the public sector extension workers. AMIS currently serves as the central Rwandan Agricultural electronic reference library for all academics as well as all field extension workers.
- The second main audience group of AMIS users is made up of all the other para-extension workers (the NGOs and private sector staff that are delivering information to farmers and doing extension-like work).
- Thirdly, the more basic elements of this same information should be customized in a different way to be accessible to the farmers themselves via SMS phones, using the technology developed by ForgetMeNotAfrica. This information would most probably be organized into a series of sequentially transmitted sms messages on a single concept or practice. These messages could be timed with climatology and calendar specific release times.

5.4.2.3 Improve and expand e-Soko services

One thing we know based on experience in other countries and first-hand interviews with Rwandan farmers on this trip is that farmers want up to date, accurate market information, so they aren't always being taken advantage of by the middlemen. If farmers are going to diversify their production, they need to find a market for their products. This opens up a role for a tool like e-Soko. We previously indicated that e-Soko would benefit from a better understanding of not only what farmers want such a tool to provide, but also how they would best like it to function. Therefore, we recommend that MINAGRI take advantage of the recent field research study conducted by Cornell University's Drs. Cho and Tobias to learn what farmers want from a cell-phone based market information service as the Ministry determines how to improve the current e-Soko service. We see great potential for MINAGRI to contract with MarketMaker's Cho and Tobias (as well as Dar Knipe from University of Illinois) – and with

ForgetMeNotAfrica's staff from UK to work with Wilson and others in MINAGRI to develop a collaborative plan for revising and improving the current e-Soko product.

Such a coalition would (a) bring an incredibly talented team together to oversee the planning and implementation of a much more powerful new e-Soko service; (b) allow MINAGRI to retain all the good parts of the current e-Soko service at the same time that new and innovative features such as social networking techniques and market "match-maker" features were added; (c) add the programming resources of the US National Center for Supercomputing Applications to be brought into the picture (MINAGRI staff do not possess the required technical skills to do the programming/coding work for a version 2 of e-Soko, and NCSA staff currently do all the programming for MarketMaker). MINAGRI couldn't find a more talented programming group than NCSA, and the code for the current e-Soko program currently needs to be rewritten anyway since the previous vendor holds the rights to the earlier code and MINAGRI does not plan to continue with that vendor. Also, as noted earlier, ForgetMeNotAfrica has developed some unique ways to allow an inexpensive sms-based cell phone to perform communication tasks such as email and the textual elements of social networking that would allow e-Soko customers to use the service in ways that the current program never thought possible.

Having been in attendance at the meeting with the MINAGRI PS on May 4th when he stated that he wanted to have a strategic plan for e-Soko's future development before proceeding any further with the current product, and knowing that as of late August, that plan has yet to surface, we believe that the best path forward would be for MINAGRI to contract with both MarketMaker and with ForgetMeNotAfrica to work with current MINAGRI staff to develop that plan and then after review and approval, to proceed with implementation. We strongly believe that with such a collaborative team as this, that there could be a very bright future for the e-Soko service in terms of meeting the needs of Rwanda farmers.

5.4.2.4 Collaborate with AFRRI and Farm Radio International on Radio Production

The team is very impressed with the long-term work of both AFRRI (the African Farm Radio Research Initiative) and Farm Radio International as they work to strengthen the development and production of local radio programming in Sub Saharan Africa. Farm Radio International has a proven track record of coaching and mentoring partner-broadcasters, and teaching them how to produce local documentaries and educational dramas for radio that reinforce the local culture and use local traditions of oral storytelling to convey agricultural information in an engaging way that audiences will respond to. Additional information about the Farm Radio International program (plus a link to 4 samples of work produced by African broadcasting graduates of this mentoring program) will explain more if readers of this report are not familiar with the program:

- http://www.farmradio.org/
- http://www.farmradio.org/english/donors/multi-media/

The additional work of the BMGF funded African Farm Radio Research Initiative (AFRRI) brings to the mix new methods of stimulating participatory audience interaction in radio programming, including organizing farmer listening circles to provide meaningful feedback to the broadcasters. This can, in turn, empower farmers to drive the informal educational process within Extension programming by expressing farmer preferences for which topics they most want help with.

5.4.3 Potential Payoff for ICT Investments

If all the ICT investments listed above were to be pursued as part of an integrated package, the ingredients would be present to totally transform how agricultural extension information is delivered to

farmers in Rwanda. The information brokers from all stakeholder groups would be empowered in ways that they never have been before. All field level extension would have valuable information that they could share with farmers, and those extension workers would be transformed, in essence, into being knowledge brokers. If they don't know the answer to a question, they can pass it on to someone who does know. The flow of information will be much quicker and responsive to end user needs. And, then by strengthening the portal at CICA-AMIS, the content is now available for **everyone** who is engaged in pluralistic extension work. And, finally, by introducing tools that allow farmers to use their own SMS phones, you've really given power to the people.

5.5 Nutrition Extension Recommendations

Agriculture and nutrition are sectors that are closely linked and have an impact on the development of the country. Agriculture in Rwanda is the main pillar for poverty reduction and economic development. To enhance agricultural productivity, improved nutrition is very important to provide enough energy to smallholder farmers to fulfill their tasks. In Rwanda, crop intensification and land consolidation programs explain progress made in household food security. Although food security is important, it is not sufficient for improved nutritional related outcomes. Other social and environmental factors need to be considered including capacity building.

In addition, community-based programs and processes are very crucial in empowering and mobilizing populations to create sustainable programs to reduce under-nutrition and malnutrition. Nutrition extension provides knowledge based advisory services on nutrition education programs developed based on local agricultural production. It requires skilled people who know community problems and able to build a rapport with community members to work together to find solutions to problems. Therefore, community health workers are important key informants in the community they live in. Their training in nutrition related preventive activities with a clear monitoring and evaluation system is very crucial to build a sustainable community nutrition programs. They know and understand underlying factors that lead to malnutrition, know the community resources and are able to build community support to alleviate malnutrition.

In Rwanda, community health workers are responsible for many health related activities such malaria or tuberculosis preventative measure that nutrition seems to be at the bottom of their list unless in severe cases. They requested incentives and training in nutrition education especially in behavioral change, cooking related skills based on local agricultural production. At some point, nutrition extension and agricultural extension agents working in the same community would be able to put their efforts together since some activities may be overlapping or complement each other. To build a sustainable nutrition program requires access to accurate technical information, financial resources, and gather the support from all government agencies, policy makers, non-governmental agencies and private sectors. Involvement of community members is very important; they need to participate in program design, planning and implementation phase. The knowledge bases for nutrition activities have significant impact and are sustainable. That is what nutrition extension agents are able to provide to communities they are serving. Their training is very critical to move forward toward reducing hunger and malnutrition. Therefore, the following specific recommendations for improving nutrition extension activities across Rwanda:

5.5.1 Strengthening Capacity Building in Nutrition at all Levels

The lack of qualified nutrition personnel at every level to train and disseminate nutrition information is a major challenge. From the ministry of health, district and sector levels, few (or not at all) staff

member may have a formal education in nutrition. The government just approved an undergraduate program in human nutrition at Kigali Health Institute (KHI) to provide formal training to nutritionists. These nutritionists from KHI will be able to conduct research in community nutrition, design, implement and evaluate nutrition programs at all levels. Therefore, to alleviate nutritional problems in Rwanda, capacity building is needed to strengthen nutrition and health programs, to improve food security programs and to disseminate accurate nutrition information to the large population in the country. The number of nutrition extension agents need to be trained to deliver nutrition education and hands-on community nutrition activity at the district and cell levels

5.5.2 Development of Short Training Modules in Human Nutrition for Health Professionals

Basic training modules in human nutrition for health professionals are beneficial to provide basic nutritional knowledge and conduct hands-on community nutrition activities and education to vulnerable populations. These professionals will be able to respond to problems encountered by CHWs.

5.5.3 Empowering Community Health Workers: Key Nutrition Extension Agents

Regular nutrition training for community health workers is very crucial. They are the key informants in nutrition and health status at the village level. It is very important to empower them through a basic nutrition education and knowledge for low risk patients and teach them how to transfer that knowledge to rural communities. Their job description needs to be revisited and well defined. They seem to be overwhelmed with their tasks as CHWs and have less time for their household chores. Though our discussions with CHWs, they requested small incentive to hire somebody who can help out at their family farms and households while they are called to CHW duty. Some days, they do not have time to be at home due to many patients. CHWs are ordinary women and men, members of the village whose main activity is agriculture to sustain the well-being of their households. Therefore, in addition to strengthening CHWs nutritional knowledge, there is a need to create income generating activities to improve their livelihoods and strengthen their savings invested into their cooperatives.

5.5.4 Collaboration between Community Health and Agricultural Extension Workers

These two groups of extension workers have similar responsibilities in terms of providing nutrition and agriculture information to the population. Effective collaboration between CHWs and agricultural extensionists will improve the profits for farmers and improve community nutrition. Most of CHWs encountered are farmers who can learn farming practices or agriculture information from an agricultural extensionist. In turn, CHWs will be able to disseminate the agriculture information related to food and nutrition at the village level. As an example, some CHW mentioned that they do not own a “kitchen garden” and they do not know how to build one. They are ready to learn how to build it and teach other community members. This can be an important collaborative work between CHW and agricultural extension agents to work together on specific community projects related to food and agriculture.

5.5.5 Empowering Women Farmers

Empowering women farmers with improved farming techniques will help to increase production and minimize postharvest losses. Their access to market or other income generating activities will strengthen household nutritional and health status. Women are unselfish and work always towards household good nutrition and health. As an example, Rwandan women farmers can be taught small scale food processing to increase the value of their agricultural production. Other women encountered provided examples of raising small animals such as chickens to provide eggs for their children or to sell at the local market. As women are empowered, it is more likely that the new generation will follow mothers’ footsteps.

5.5.6 Collaboration between Agriculture and Health Ministries

Collaboration between MINAGRI and MoH is very important to link agriculture and nutrition sectors. MINAGRI is working to sustain food security of the population. MoH provides nutrition education using local agricultural production to overcome behavioral and cultural barriers to good nutrition and good health. In addition, improved nutritional status of farmers enhances their agricultural production by providing them good health and strength to fulfill their work. MINAGRI oversees "one cow per family" and "one cup of milk per child" programs to alleviate under-nutrition. A nutrition extension agent trained through the ministry of health can incorporate MINAGRI programs into community nutrition education on dietary patterns and diversification.

Although nutrition cuts across different sectors, it is currently funded through the MoH with a small budget allocation compared with other health or medical related problems. Therefore, there is a need to increase funding for nutrition services. An emphasis should be on increasing interaction between the two ministries including the MIGEPROF promoting women and families and Finance ministry. It is not an easy integration but a creation of food and nutrition council at MoH to oversee funding and budget allocation from different sources for nutrition services and training will be a great start. It may not be an easy task but it will ensure proper nutrition research, program monitoring, delivery and evaluation to measure community impacts.

5.5.7 Additional Assessment Needs

MoH works with its partners such as WFP, UNICEF to conduct some nutrition related programs and workshops. More assessment is needed to understand the role of NGOs in alleviating malnutrition in Rwanda. What are their contributions to MoH whether in funding or providing human capacity for programs and training for community health workers at village level? How NGOs integrate their nutrition programs to national nutrition priorities?

5.6 Gender Recommendations

The government of Rwanda had made major progress in promoting gender equality and equity. However, gender imbalances are embedded in Rwandan culture depicting the patriarchal society. Changes in gender cultural factors may not happen overnight but a consistent sensitization campaign on gender issues is highly recommended. From women farmers, to gender focal point people, and to government officials, there is unanimous consensus that gender sensitization campaign should continue at all sectors of development, from grassroots to national level. Women farmers agreed that there were some improvements between men and women relations, working together as partners toward the same goal of improving their livelihoods. All women farmers used the term "***twarahuguwe***" meaning "***trained***" on issues related to gender equality. The same response were given when asked about decision making process within households, although some recognized that small changes were made in gender relations, however there still a long way to go especially in some rural areas. The other term which was used through our discussions with different people was "***self-confidence***". Rwandan women need to be empowered and feel confident about themselves, so they can perform and achieve a lot by working side by side with men.

With regard to land law, men and women are aware of its existence but in some areas the land registration is still ongoing. Reinforcement and monitoring of this law is well needed across all districts, sectors and cells. More research is needed to assess the impact of this law on gender relations. As far as recommendation, it will be ideal to continue consistently the sensitization campaign on gender issues at all levels of development. It will be important to include monitoring and evaluation of progress made.

The annual meeting organized by MIGEPROF and its partners to assess and evaluate the progress in gender issues, should continue to highlight subsequent steps.

5.6.1 Education, Literacy and Extension Services

"Education for All" and nine years of basic education are policies of Rwandan government to ensure that everybody has access to education especially girls. With regard to agricultural extension, better educated farmers are more likely to contact an extension agent for any problem Education enhances the ability of farmers to access accurate information on their products, agricultural inputs and practices. There are few women who are part of the extension workforce. More men are providing extension services without an understanding of gender issues. Thus, extension staff or agronomists may plan training or meeting for farmers without taking into account women's responsibilities in households. Although most meetings with members of cooperatives, men outnumbered women, nonetheless women were very confident in expressing their thoughts. Rwanda needs to increase their extension staff especially female by providing incentives to more women to join agriculture higher education training. Therefore, recruitment campaign is needed to increase the number of women in agricultural science.

5.6.2 Women Access to Extension Services and Agricultural Training

Many women farmers who met with us are eager to learn new techniques of farming, to access improved agricultural inputs, and to access market to sell their product at a good price. There is an assumption that women who needs extension services are land owners but still do not have access to an extension staff member. Due to many household responsibilities, women do not attend trainings, therefore missing opportunities to learn new farming techniques that may decrease their work load. In addition, participating in agricultural training, improves their knowledge and abilities to make accurate agricultural decisions. Some farmers indicated that they have never met agronomists from the sector or districts. Due to decentralization, women farmers were aware that agronomists have many responsibilities at district level, leaving less time for agricultural extension work. Thus, agronomists do not reach some farmers who may need their expertise, therefore breaking the linkage between research and extension.

Some farmers may have problems which may need research based institutions to solve them. On the other hand, new agricultural research innovation such as new variety of seeds or fertilizers which is ready to be disseminated will not reach many farmers as long as the extension agents are pulled to fulfill other responsibilities. For example, some farmers encountered do not have the kitchen gardens confirming the need for more extension staff members. Therefore, more agricultural extension workers need to be trained to reach as many farmers as possible for training, assistance or testing new farming techniques.

5.6.3 Economic Empowerment and Link to Markets

Same messages were heard from different women from different cooperatives or sector: we want to start a small business to transform or process our products. Post-harvesting techniques are lacking and farmers experience so many losses in the fields. Majority of women encountered are part of cooperatives and complained about access to improved seeds and fertilizers. In some cases, seeds arrive so late during the planting season that interferes with production. The linkage to the market was requested by many farmers encountered and claimed to sell their product for less value due to the distance between their farm and the main market. In addition, access to credit is also a major issue for farmers and it was mentioned by gender focal point people from different districts. Lacking access to credit due to collateral issues put women in difficulties to purchase fertilizers and hire additional labor. Without capital, it will be difficult for women to expand their production, engage into small processing unity or to maintain food security. Therefore, priorities should focus on training rural women to be

entrepreneur, to provide small scale processing unity to overcome post-harvesting issues and provide high value to their crops.

ANNEX A SCOPE OF WORK FINDINGS

Extension Policy and Institutional Assessment (EPIA):

- Identify and briefly describe the strategies, structure, resources, approaches, and relationships between those governmental extension, research and educational programs, POs, NGOs, private sector entities visited, and their client groups. Special emphasis will be put on determining which service providers (e.g. public, private and NGOs) have a comparative advantage in providing specific extension and advisory services (EAS) to limited-resource farmers, especially women.
- Identify serious policy, institutional, management, human and physical resource constraints that limit the effectiveness of each EAS provider in Rwanda and how they might be strengthened to increase the overall effectiveness and impact of the organization;
- Assess the technical focus, process skills and capacities of each EAS service provider;
- Assess each organization's management structure to determine what, if any, changes might be needed; for example, transforming a top-down management structure into a more farmer-driven extension system, including *bottom-up* advisory committees with farmer representation and reduced gender bias;
- Assess extension's linkages with research, universities, private sector firms, farmer organizations, NGOs, etc. to determine how these linkages could be strengthened**. Special emphasis will be placed on the evaluation of the education and research role and capacity development needs.**

Extension Crop/Livestock/Farming Systems (ECLFS):

- Analyze key agricultural production factors, such as the changing demand for agricultural products within the country (and for export), which may require significant changes in farming practices, especially for limited-resource farmers.
- Analyze farming systems within each major agro-ecological zone of the country, as well as natural resource management issues, particularly in terms of current production constraints and whether climate change is expected to directly impact the different areas within the country;
- Assess the number/type of producer groups and their linkage with different value-chains and extension EAS providers (e.g., extension can help expand the number of producer groups/cooperatives and link them to markets for different high-value crops, livestock and other products);
- Describe gender roles in crop and livestock systems (in conjunction with GES)
- Focus on the four major staple crops (maize, beans, cassava, and wheat) that the Government of Rwanda (GOR) has highlighted as the primary focus of most of the programs being implemented the government and by donors (in response to the GOR requests). USAID/Rwanda is actively involved in supporting the value chain for these crops, as well as avocado. Explore how income generated through high value crops and livestock products may enhance the production of staple crops by providing the households with cash flow for purchasing inputs, storage facilities, etc.

Agricultural Education and Extension Training (AEET):

- Assess the current skills and knowledge of the field staff (both technical and process skills), as well as the technical expertise of the subject matter specialists (SMSs) and the management skills of extension officials (i.e., are they top-down or more participatory in decision-making).
- Visit the key universities and/or schools of agriculture to assess both their capacity to provide needed in-service training for the current AES staff, as well as how students are currently being trained and/or should be trained for different types of positions within the EAS system (public, private, NGO);

- Analyze specifically the linkages between extension, agricultural education and research in light of the potential donor commitment to invest in capacity development of Rwanda's agriculture education and research system over the next two years. Also, extension system evaluations conducted over the past 2 years by donors such as the Belgium Technical Committee (BTC) and others have not focused on the education/research link with extension. Furthermore, we are aware of the fact that the GOR is particularly interested in this part of any MEAS analysis.

Extension Information and Communication Technology (EICT): Paul Hixson

- Assess the current ICT capacity within the country and among each EAS provider. For example: What types and forms of technical and market information are currently available to the field extension staff versus what is needed; can two-way communications and remote information links be easily and inexpensively established using suitable ICT technology (e.g., would a smart phone work best or could an advanced "learning tablet" be pilot tested).
- Assess the current knowledge creation and sharing practices within each EAS provider and between extension and their key information partners (i.e., universities, agricultural research institutions, NGOs, private sector firms, wholesale markets, etc.).
- Identify how new ICT technologies could help facilitate the extension reform process ahead further and faster.
- Consider the potential of making market information more readily available to small scale farmers.

We are aware of the fact that the GOR is already implementing investments in ICT based on the recommendations of a recent BTC/GOR in-depth multiyear ICT study. This will be fully taken into consideration to develop complementary recommendations.

Nutrition Extension Specialist (GES):

- Assess how agricultural production on the farm is related to household and community nutrition and food security;
- Study how the food that has been produced is stored, distributed, sold, shared. What are the knowledge gaps in this regard? What are the opinions of farmers with regard to whether their agricultural production can sustain the nutritional needs of the family and community? Objectively, what might be the nutritional needs to supplement agricultural production in the community?
- Analyze in particular what the opportunities and constraints might be to empower the community health works to become nutrition extension agents, how the agricultural extension program and the community health worker program might be linked in order to improve the livelihood of Rwandan families in rural areas
- Assess the current nutrition capacity needs and nutrition training for community health workers, their supervisors, and other potential agents in a future nutrition extension system.

Gender Extension Specialist (GES):

- Look at opportunities to engage and enhance the role of limited-resource women farmers (especially those with limited access to land) in playing a significant role in increasing farm household production and income;
- Assess the current level and future prospects for developing groups of farm women and then in building gender-led producer associations and other women's organizations,
- Assess the extent to which micro-credit facilities are available and being utilized by women farmers and landless rural women
- Assess the inherent gender bias in EAS programming and EAS management structures, and identify barriers that may exist for women EAS professionals. The lack of women extension agents is something that has already been highlighted as a concern by the Ministry of Agriculture (MINAGRI).

- Outline specific procedures that might be followed to more fully increase extension and advisory services to women farmers and landless rural women.

ANNEX B DAILY SCHEDULE: ASSESSMENT OF AGRICULTURAL ADVISORY SERVICES IN RWANDA, MAY 1-14, 2011

Overview of Week 1: Appointments and Meetings Organized (May 2—May 7)

MONDAY, May 2nd	TUESDAY, May 3rd	WEDNESDAY, May 4th	THURSDAY, May 5th	FRIDAY, May 6th	SATURDAY, May 7th
USAID, Permanent Secretary MINAGRI, RSSPII &PAPSTA projects, Post-Harvest program RADA,	PAPSTA, AFSR	One Cow One Family, Rwanda Coffee/The, IFDC, CARE, WORLD VISION, Duhamic Adri, SINA, IPM project, ICT Minister, MTN, e-Soko stakeholders	Imbaraga, Farmer federation, ISAE,	KOAMIVU, COVAFGA Cooperative, District and Sector Agronomist in Musanze, Rulindo and Gakenke districts	Farmer groups in Muhanga and Rwamagana district

Overview of Week 2: Appointments and Meetings Organized (May 9—13)

MONDAY, 9th	TUESDAY, 10th	WEDNESDAY, 11th	THURSDAY, 12th	FRIDAY, 13th
National University of Rwanda, ARDI, Impuhwe women association, District Agronomist in Huye district, Huye District TeleCenter	Mubuga Health Center, Young Women Christian Association (YWCA), District Sector Agronomist in Gisagara district	Harvest plus, Gihara Health Center, Kubuye Hospital, INATEC	Crop Intensification Program, ARUPA, One Acre fund, CRS. Rwanda Development Board	USAID, MINAGRI Minister

Detailed Meetings for the Assessment of the Extension System in Rwanda

Date	Location	Purpose and people met	Team members
Sunday 1 May	Kigali	Orientation from USAID Dr. Gary Cramer, 250-782496125, **gcramer@usaid.gov** Dr. Dennis Weller, Director, USAID/Rwanda	Burt Swanson Paul Hixson Pascasie Adedze Tom Remington Jeff Mutimba
Monday 2 May	Kigali	USAID offices for briefing Dr. Gary Cramer + USAID team	5 team members above Jennifer Smith Nazaire & Sylvain Hakizimana, CRS
		Interview RADA Norbert Sendege, Director, 250 788 521 320, **senorbert@yahoo.fr**	Burt Swanson Paul Hixson Pascasie Adedze Tom Remington Jeff Mutimba Sylvain Hakizimana, CRS
		Interview MINAGRI Dr. Ernest Ruzindaza, PS, 250 788 300 765. **ruzindazaernest@yahoo.fr** Violet Nyirasangwa, Program II Manager, 250 788 469 101, **sangwa.viola@gmail.com** Mary Rucibigango, CICA Coordinator, 250 788 300 037, **rucimkt@yahoo.ca**	All 6 above
Tuesday 3 May	Kigali	Interview Post-Harvest Handling & Storage Task Force Francois Nsengiyumva, Chairman, 250 788 306 812	All 6 above
		Interview, Rural Sector Support Project (PSST II) Esdras Byiringiro, M&E Officer, **besdr@rssp.gov.rw**	Tom Remington Jeff Mutimba
		One Cow/One Family Project Program Coordinator	Burt Swanson Paul Hixson Pascasie Adedze Tom Remington Jeff Mutimba Sylvain Hakizimana, CRS
		Interview World Vision George Gitau, National Director	Burt Swanson Paul Hixson Jeff Mutimba
		Interview Rwanda Coffee Authority 3 staff	Burt Swanson Paul Hixson Pascasie Adedze Jeff Mutimba Sylvain Hakizimana, CRS

Date	Location	Purpose and people met	Team members
		Interview with Dr. Ignace Gatare, Minister ICT, **igatare@presidency.gov.rw** 250 78 830 0083 (cell), Kigali Rwanda	Paul Hixson, David Rurangirwa, USAID Pascasie Adedze
		Interview Rwanda Tea Authority Anthony Butera, Director General, 250 788 300 701, **a.butera@rwandatea.com**	Pascasie Adedze Jeff Mutimba Sylvain Hakizimana, CRS
Wednesday 4 May	Kigali	Interview ISAR Dr. Daphrose Gahakwa, Director General, 250 788 308 304, **daphrose.gahakwa@gmail.com** Plus the Deputy Director General and Research/Extension Liaison	Burt Swanson Paul Hixson Pascasie Adedze Jeff Mutimba Sylvain Hakizimana, CRS Gary Cramer, USAID
		Interview with Dr. Charles Murigande, Minister of Education, 250 788 304 545, **cmurigande@mineduc.gov.rw** and Emmanuel Kavaziya, Advisor to Minister, 250 783 681 305, **ekaviziya@mineduc.gov.rw**	Burt Swanson Pascasie Adedze Jeff Mutimba Sylvain Hakizimana, CRS Gary Cramer, USAID Molly Broston, USAID
		Interview with Wilson Musonera, MIS coordinator and eSoko System Administrator, Kigali Rwanda	Paul Hixson
		Interview with Andrew Rugege, Chief Operations Officer, **andrwru@mtn.co.rw**, and Yvonne Manzi Makolo, Senior Manager, **yvonnema@mtn.co.rw**, MTN Rwanda, Kigali Rwanda	Paul Hixson, Pascasie Adedze
		Discussion with eSoko stakeholders, Wilson Musonera, and Permanent Secretary Ernest Ruzindaza	Paul Hixson, David Rurangirwa USAID
		Interview with Harvest Plus, CIAT Jean dÁmour Manirere, Country Manager, **j.c.rubyogo@cgiar.org** and Lister Katsvairo: **t.l.katsvairo@cgiar.org**	Tom Remington Jeff Mutimba Sylvain Hakizimana, CRS
		Interview farmer entrepreneur Manager of Gerald Sina, 250 788 302 299, **owner@sinarwanda.com**	Jeff Mutimba Pascasie Adedze
		Interview FAO Laurent Gashugi, Representative Assistant 788 304 125, Laurant.Gashugi@fao.org Jeanne d'Arc Matuje, Programme Assistant, 250 084 615 45, **dArc.matujemukamwiza@fao.org**	Burt Swanson Pascasie Adedze Jeff Mutimba Sylvain Hakizimana, CRS
Thursday 5 May	ISAE, Musanze	Interview at ISAE, including: Fred Mugisha, Vice-Rector of Finance and Administration Affairs Alphonsine Mukamuhirwa, Academic Registrar Caroline Karungi, Director of Planning	Jeff Mutimba

Date	Location	Purpose and people met	Team members
		Eric Rwasamanzi, Director Of Continuing Education Eric Hatungimana, Animal Husbandry Department (Academic) Secretary Senyanzobe Jean-Marie-Vianney, Head of Department, Forest and Nature Conservation Alois Fashao, Forest and Nature Conservation Department (Academic) Secretary Edward Mutandwa, Head Department of Rural Development and Agribusiness Dr. Richard Kanyarukiga, Director of Research, Technology Transfer and Consultancy, 250 785 437 335, jrnkanyarukiga@isae.ac.rw Paul Heremimana Nzabamwita, Lecturer of Communication and Extension course. Cell: 250 788 464 038, **nzabapaul@yahoo.fr**	
Friday 6 May	INATEK, Kibungo	Interview INATEK Dr. Fr Dominique Karekezi, Rector 250 788 302 240, **dkarekezi@gmail.com** Théophile Mubayimana, Partnership and Public Relations Officer, 250 788 622 587, **gatoreyacu@yahoo.fr** Fausca Uwiapabire, Deputy Director of Research 250 788 539 662, **uwifausca@yahoo.fr**	Jeff Mutimba
Saturday 7 May	Gitarama	Interview with the Abatangana Farmers Group 28farmers (8 men + 20 women) The women included an animator	Paul Hixson Jeff Mutimba Sylvain Hakizimana, CRS
Sunday 8 May			
Monday 9 May	Butare	Interview at the National University of Rwanda, with Prof Daniel Rukazambuga, Dean, Faculty of Agriculture, 250 788 470 945, **drukazambuga@nur.ac.rw**	Burt Swanson Paul Hixson Pascasie Adedze Tom Remington Jeff Mutimba Sylvain Hakizimana, CRS
		Interview at NUR GIS center, Prof. Jean Nduwamungu, Director, Butare, Rwanda, jnduwamungu@nur.ac.rw	Paul Hixson
		Interview Huye Business Development Center, Eric Nshimiyimana, BDC Manager, Huye, Rwanda, ceric2fr@yahooo.fr	Paul Hixson
		Interview National University of Rwanda Dr. Cletos Mapiye, Senior Lecturer, 250 782 119 385	Jeff Mutimba
		Interview Gisagara District Agronomist Gabriel, Agronomist, 250 788 890 096	Jeff Mutimba
Tuesday	Butare	Interview at the National University of Rwanda	Burt Swanson

Date	Location	Purpose and people met	Team members
10 May		Prof Silas Lwakabamba, Rector, **rector@nur.ac.rw** Prof Herman Musahara, Acting Vice Rector, 250 788 468 607, **hmusahara@nur.ac.rw** Prof Daniel Rukazambuga, Dean, Faculty of Agriculture, 250 788 470 945, **drukazambuga@nur.ac.rw**	Paul Hixson Jeff Mutimba
	Gisagara	Interview Sector Agronomist Etienne Ndindiliyimana, Sector Agronomist, **stevenor3@yahoo.fr**	Burt Swanson Paul Hixson Jeff Mutimba
Wednesday 11 May	Nyagatare	Interview Umutara Polytechnic Prof Stanley Makuza, Dean Faculty of Agriculture **profstanleymarshallmakuza@yahoo.com** Prof Arnold Bay Mashingaidze, Head, Agronomy Department, 250 788 545 771, **abmash@yahoo.com**	Jeff Mutimba
	Kigali	Telephone interview AYEVE Kabatare Agricultural and Veterinary School, Butare Philemon, Head of Academic Studies, 250 788 478 598	Jeff Mutimba
		Telephone Interview USAID Dairy Competitive Project, Nyagatare; Dr. Humphrey Hamudikuwanda	Jeff Mutimba
		Interview with CICA staff, MINAGRI; Sam Barigye, ICT expert and Angelique Uwimana, MIS specialist, Clare Gatayire, Kigali Rwanda	Paul Hixson
		Interview with Mary Rucibigango, CICA Coordinator, MINAGRI, Kigali Rwanda, **rucimkt@yahoo.ca**	Burt Swanson Paul Hixson
		Interview with Violet Nyirasangwa, Program II Manager, MINAGRI, Kigali Rwanda, sangwa.viola@gmail.com	Burt Swanson Paul Hixson
Thursday 12 May	Kigali	Interview BTC Chistelle Jocquet	Burt Swanson Paul Hixson Jeff Mutimba Tom Remington Gary Cramer, USAID
		Interview Rwanda Development Board, Gilbert Kayinamura, Grace Mutzinzi, Eddy Kayihura, Tony Sebera; Kigali, Rwanda	Paul Hixson
		Interview CRS Sylvain Hakizimana, **sylvain.hakizimana@crs.org** Janvier Afrika, Agronomist Zacharie Maninarora, Agronomist	Jeff Mutimba
Friday 13 May	Kigali	Presentation of preliminary observations to USAID USAID team	Burt Swanson Paul Hixson Pascasie Adedze Tom Remington Jeff Mutimba
		Courtesy call on the Minister of Agriculture	Burt Swanson Paul Hixson

Date	Location	Purpose and people met	Team members
			Pascasie Adedze Tom Remington Jeff Mutimba Gary Cramer, USAID
Monday 29 August	Kigali	Presentation of summary findings to Minister of State in Charge of Primary & Secondary Education, Dr Mathias Harebamungu, Cell: +250 252 584 234, mharebamungu@minedc.gov.rw	Paul Hixson Jeff Mutimba Gary Cramer, USAID Jennifer Smith Nazaire & Sylvain Hakizimana, CRS
Tuesday 30 August	Kigali	Interview JICA, SUZUKI Fumihiko, Program Manager, 250 788 304 704, Suzuki.Fumihiko@jica.go.jp	Paul Hixson Jeff Mutimba Sylvain Hakizimana, CRS
		Interview BTC, Ahmad Parsa, Program Officer, 250 788 301 896, **AHMAD.PARSA@BTCCTB.ORG** Jean Pierre Busogoro	Paul Hixson Jeff Mutimba Sylvain Hakizimana, CRS
		Presentation of summary findings to MINAGRI, Violet Nyirasangwa, Program II Manager, Mary Rucibigango, CICA Coordinator, MUSABYIMANA innocent, 250 788 512 355, innocent.musabyimana@gmail.com	Paul Hixson Jeff Mutimba Sylvain Hakizimana, CRS
31 August	Kigali	Prof NDABIKUNZE Martin Shem, Director General, RAB, 250 788 389 880, **martinshem@gmail.com** Christine Kanyandekwe, Deputy Director General in charge of Animal Resources, RAB, **K_CHRIS2005@yahoo.fr**	Paul Hixson Jeff Mutimba Sylvain Hakizimana, CRS
		Cyrille Turatsinze, Permanent Secretary, MINALOC 250 788 309 370, **cyrille.turatsinze@minaloc.gov.rw** Egide Rugamba, Director General in Charge of Planning and Monitoring & Evaluation, MINALOC 250 788 306 757 Franncine Tumushime, Director General, Community Development & Social Affairs, MINALOC Mujijima Abu Bernard, Public Relations & Communications Officer, MINALOC Uwase Charlotte, ICT Officer, MINALOC	Paul Hixson Jeff Mutimba Gary Cramer, USAID Jennifer Smith Nazaire & Sylvain Hakizimana, CRS
	Kamunyi District (MINALOC)	Jaques Rutsinga, Mayor, MINALCO, 250 788 353 233 Claudine Uweneza, Vice-Mayor in charge of Economic & Development Affairs, 750 595 929, **uwinezaclaudine@yahoo.fr** Justin Mukiza, District Agronomist, **mukizajuste@yahoo.fr** Solauge Muhimpungu, Sector Agronomist, 250 788 643 741 Emmanuel Rukimbira, Executive Secretary, Umurenge Sector	Paul Hixson Jeff Mutimba Sylvain Hakizimana, CRS

Date	Location	Purpose and people met	Team members
		Jean de Dieu Gasigwa, Sector Agronomist, Umurenge Sector	
1 Sept	Rwamagana District (MINALOC)	Néhémie Uwimana, Mayor, 250 788 525 443, uwimananehemie@yahoo.Fr	Paul Hixson Jeff Mutimba Gary Cramer, USAID Sylvain Hakizimana, CRS
		Pierre Célestin Mukeshimana, District Agricultural Officer, Volens Uwingeni, Agronomist, Kigabiro Sector	
		John Baptiste Mutabazi, Executive Secretary, Mukazi Sector Volens Sibomana, Sector Agronomist, 250 788 228 348	
2 Sept	Kigali	Presentation of findings to Minister of Agriculture	Paul Hixson Jeff Mutimba Gary Cramer, USAID Jennifer Smith Nazaire & Sylvain Hakizimana, CRS
		Presentation of findings to USAID S07 team and Director Dennis Weller, USAID/Rwanda	Paul Hixson Jeff Mutimba Jennifer Smith Nazaire & Sylvain Hakizimana, CRS

ANNEX C LIST OF CONTACTS

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Dr. Ignace Gatare – ICT Minister
Chantal Kayihura – Assistant to the ICT Minister

Ministry of Agriculture and Animal Resources (MINAGRI)
Dr. Agnes M. Kalibata, Minister of Agriculture and Animal Resources, MINAGRI, B.P. 621, Kigali-Rwanda
Mr. Ernest Ruzindaza, Permanent Secretary, MINAGRI, B.P. 621, Kigali, Rwanda
Mr. Raphael Rurangwa, Director of Planning, MINAGRI, BP 621, Rwanda
Violet Nyirasangwa, Program II Manager, Support to Producers Professionalization Program 2/ PSTA II, MINAGRI, B.P. 621, Kigali, Rwanda
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Ministry of Local Government (MINALOC)
Ezekiel Buntu – Vice Mayor of Economic Affairs – District of Rubavu
Olivier Munyaneza Nyamagabe, District Officer
Plus sector-level agronomists who were interviewed in the following districts

- Musanze district
- Rulindo district
- Gakenke district
- Huye district
- Gisagara district

National Agricultural Research Institute (ISAR)
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Dr Mathias Harebamungu, Minister of State in Charge of Primary & Secondary Education

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Pierre Célestin Mukeshimana, District Agricultural Officer,
Volens Uwingeni, Agronomist, Kigabiro Sector
John Baptiste Mutabazi, Executive Secretary, Mukazi Sector
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Prof. Daniel N. Rukazambuga, Dean, Faculty of Agriculture, NUR, B.P. 117, Butare, Rwanda
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Fred Mugisha, Vice-Rector of Finance and Administration Affairs
Alphonsine Mukamuhirwa, Academic Registrar
Caroline Karungi, Director of Planning
Eric Rwasamanzi, Director of Continuing Education

Eric Hatungimana, Animal Husbandry Department (Academic) Secretary
Senyanzobe Jean-Marie-Vianney, Head of Department, Forest and Nature Conservation
Alois Fashao, Forest and Nature Conservation Department (Academic) Secretary
Edward Mutandwa, Head Department of Rural Development and Agribusiness
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KAIGA cooperative (Irish Potatoes) – Rubavu District
BAIR – Local NGO – Rubavu District
COAMVU cooperative (Maize) – Burera District
MURUGO cooperative (livestock) – Burera District
Abatangana Farmers Group - Gitarama
Nyiramageni cooperative (rice production) - Gisagara District
Impuhwe z'Imana Women Cooperative - Gisagara District
Young Women Christian Association – Muhanga
KOAKAKA Cooperative (Cooperative de Café - culture de Karaba) – Huye District

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Community Health Workers (CHW)
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Gihara health center CHW
Burera district CHW
Rwamagana area CHW

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Ms. Christelle Jocquet, Senior Program Officer, Belgian Development Agency (BTC Rwanda), B.P. 6089, Kigali, Rwanda

Ahmad Parsa, Program Officer, BTU, Rwanda
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Daya Bragante, Economic Affairs Officer, United Nations Economic Commission for Africa, Kigali, Rwanda DBragante@uneca.org

ANNEX D AVAILABLE DOCUMENTS REVIEWED

Strategic Plan for the Transformation of Agriculture in Rwanda—Phase II (PSTA II), MINAGRI

National Agricultural Extension Strategy, Ministry of Agriculture and Animal Resources (MINAGRI), April 2009

Decentralized Agricultural Extension Road Map, MINAGRI, December 2010

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Stryker, J. Dirck (August, 2010). Rwanda Rice Commodity Chain Strategic Options to Maximize Growth and Poverty Reduction Final Report. Rural Sector Support Project (RSSP II) Republic of Rwanda

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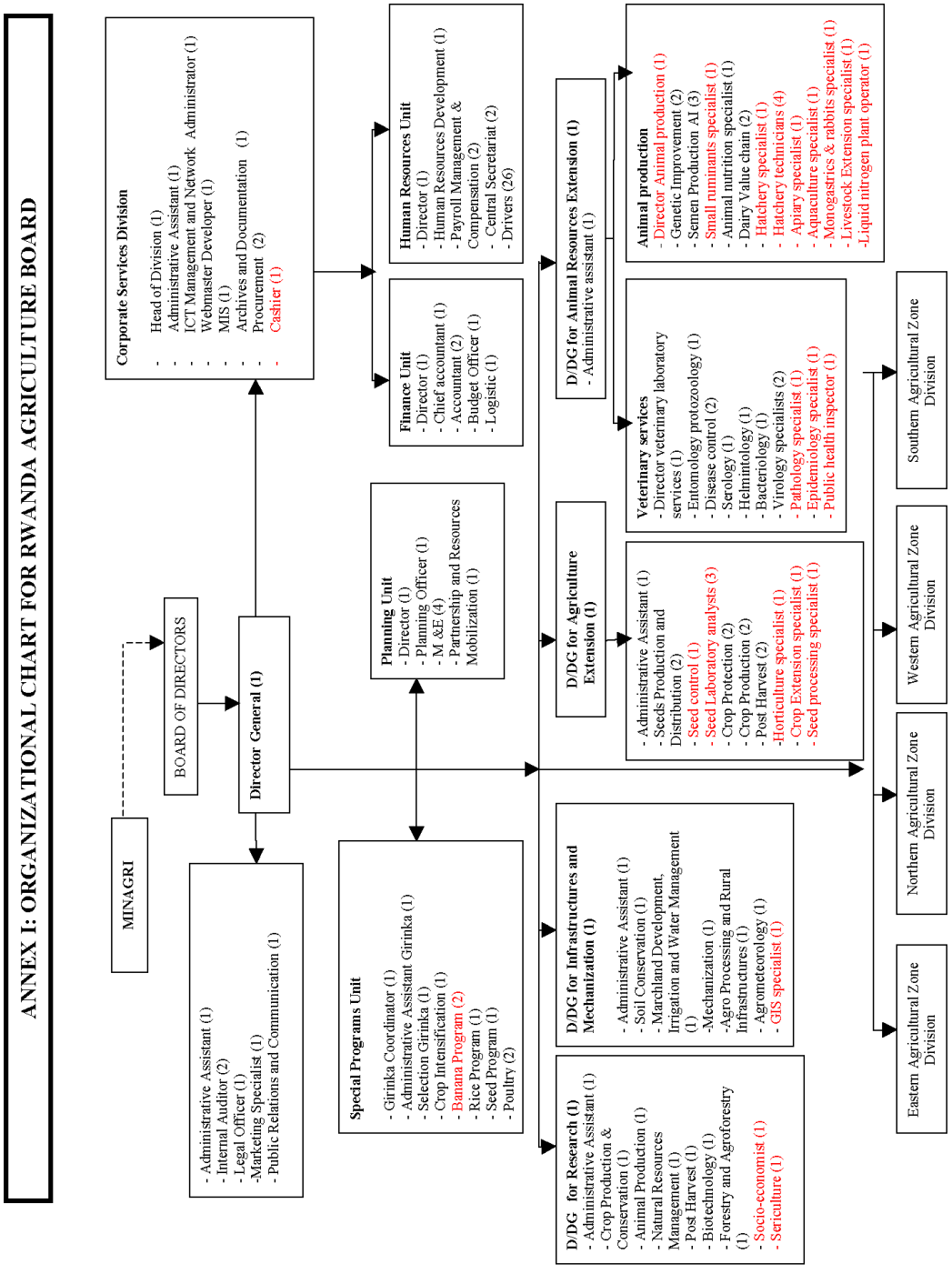
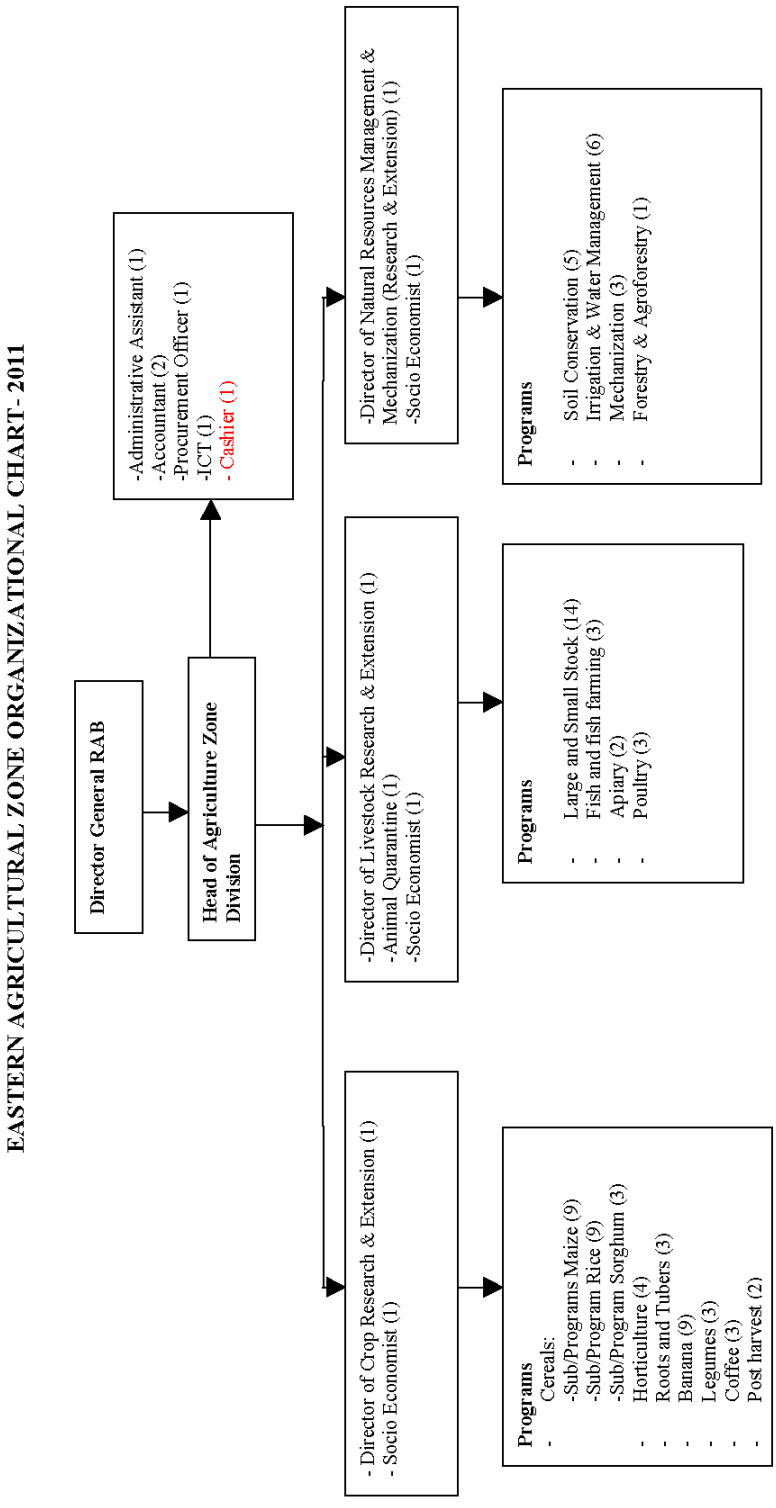
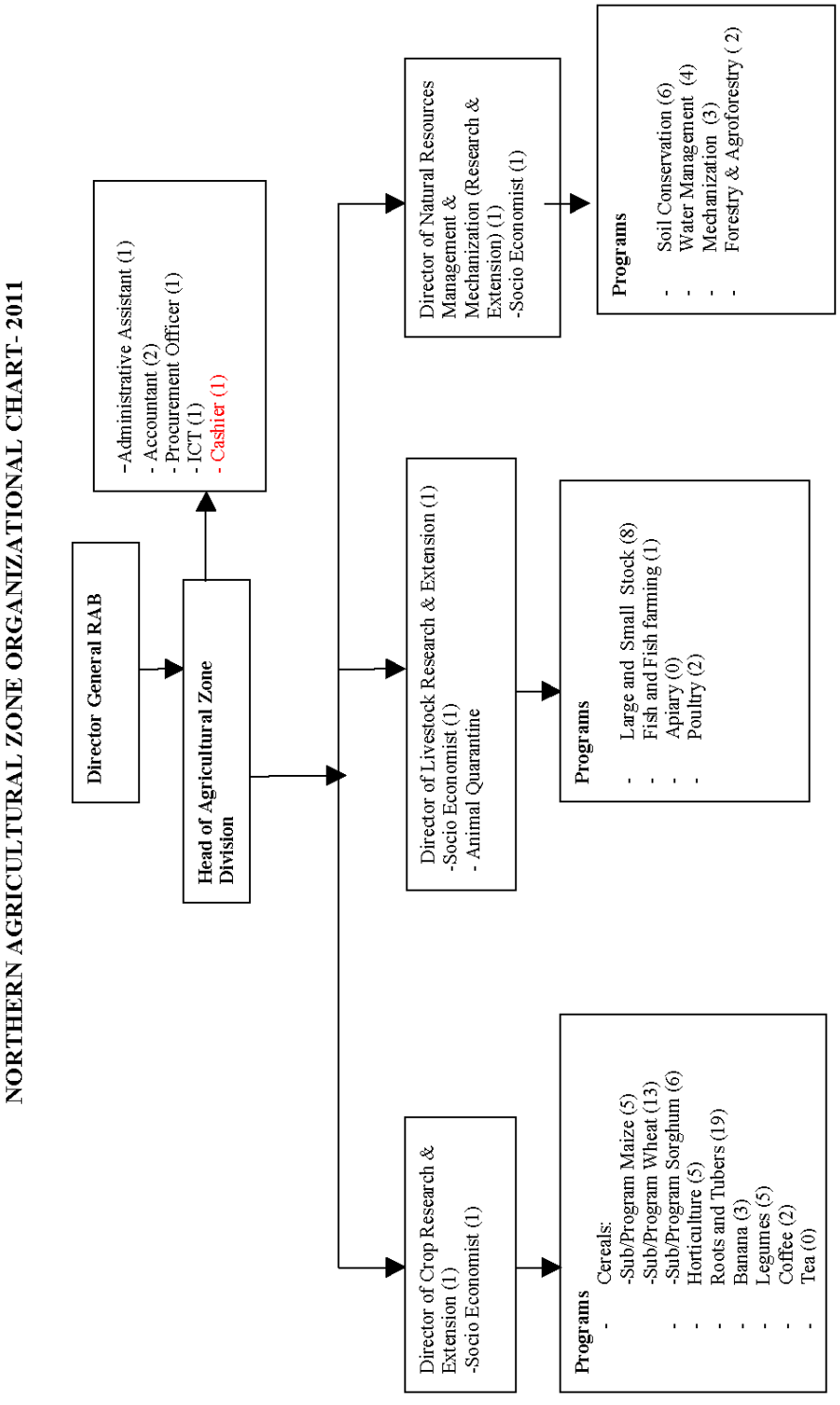
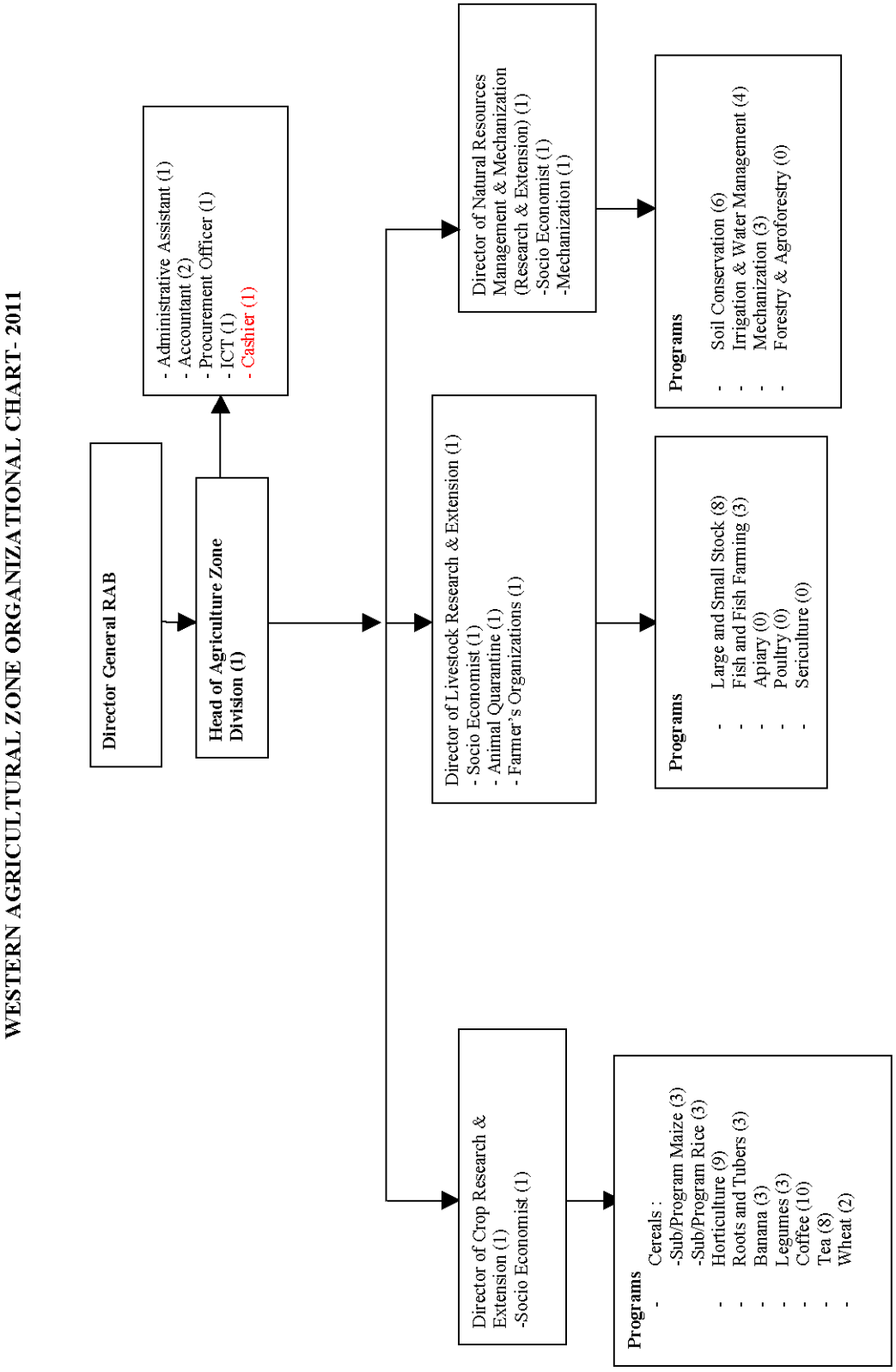
ANNEX E ORGANIZATIONAL CHART FOR RWANDA AGRICULTURE BOARD

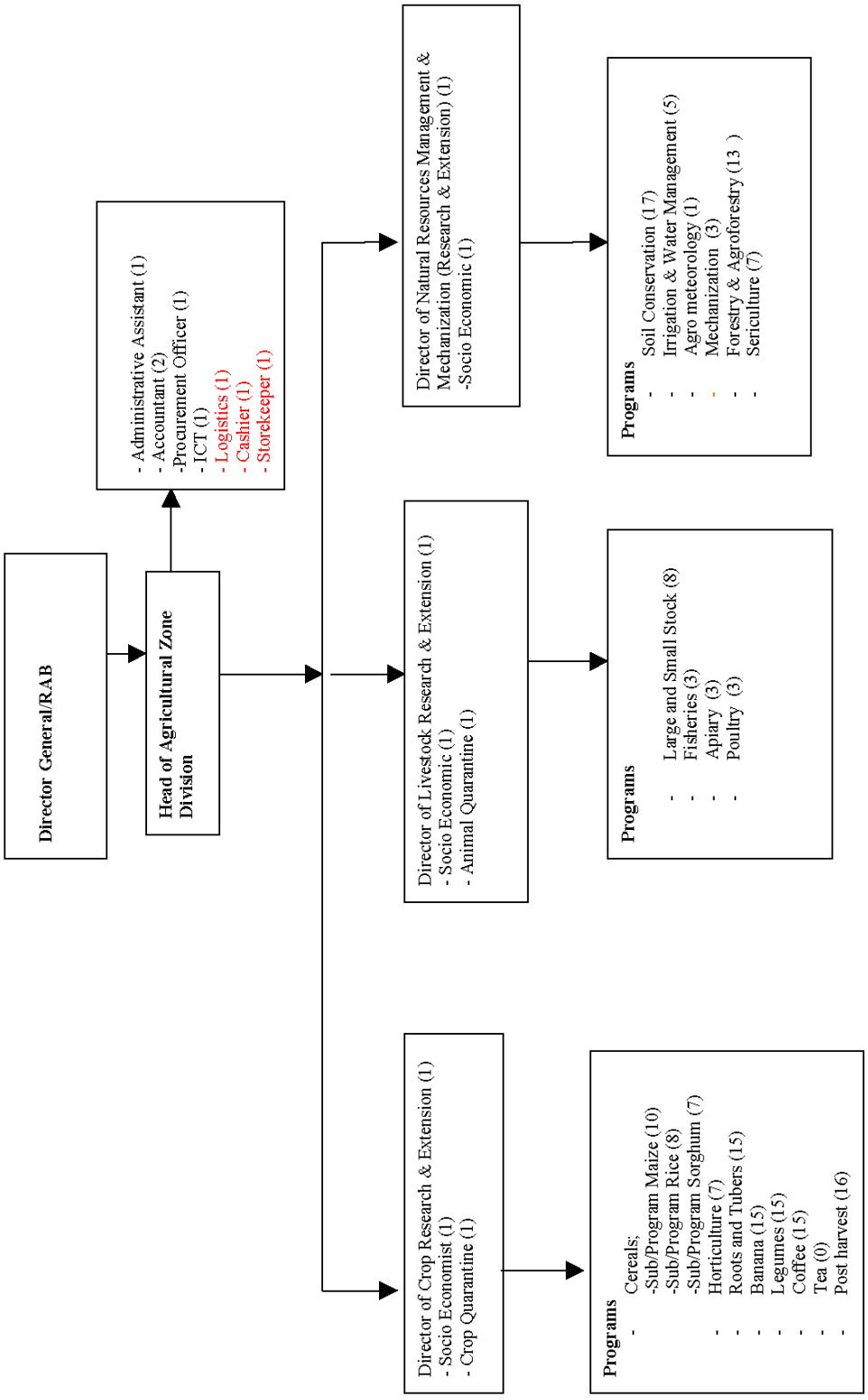



EASTERN AGRICULTURAL ZONE ORGANIZATIONAL CHART- 2011
Director General RAB
Head of Agriculture Zone Division
-Administrative Assistant (1)
-Accountant (2)
-Procurement Officer (1)
-ICT (1)
- Cashier (1)
- Director of Crop Research & Extension (1)
- Socio Economist (1)
Programs
- Cereals:
-Sub/Programs Maize (9)
-Sub/Program Rice (9)
-Sub/Program Sorghum (3)
- Horticulture (4)
- Roots and Tubers (3)
- Banana (9)
- Legumes (3)
- Coffee (3)
- Post harvest (2)
-Director of Livestock Research & Extension (1)
-Animal Quarantine (1)
-Socio Economist (1)
Programs
- Large and Small Stock (14)
- Fish and fish farming (3)
- Apiary (2)
- Poultry (3)
-Director of Natural Resources Management & Mechanization (Research & Extension) (1)
-Socio Economist (1)
Programs
- Soil Conservation (5)
- Irrigation & Water Management (6)
- Mechanization (3)
- Forestry & Agroforestry (1)

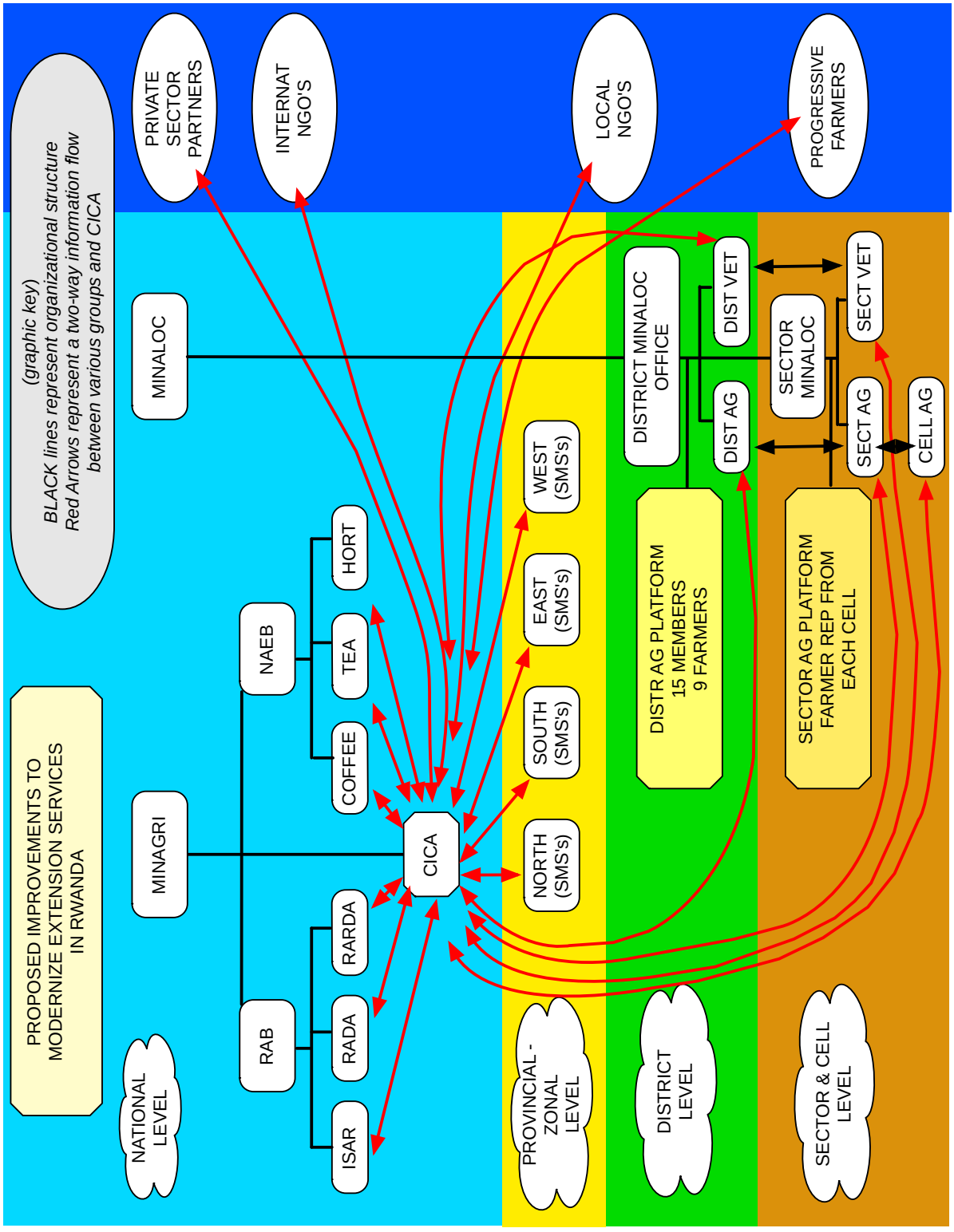

NORTHERN AGRICULTURAL ZONE ORGANIZATIONAL CHART- 2011
Director General RAB
Head of Agricultural Zone Division
-Administrative Assistant (1)
- Accountant (2)
- Procurement Officer (1)
- ICT (1)
- Cashier (1)
Director of Crop Research & Extension (1)
-Socio Economist (1)
Programs
- Cereals:
-Sub/Program Maize (5)
-Sub/Program Wheat (13)
- -Sub/Program Sorghum (6)
- Horticulture (5)
- Roots and Tubers (19)
- Banana (3)
- Legumes (5)
- Coffee (2)
- Tea (0)
Director of Livestock Research & Extension (1)
-Socio Economist (1)
- Animal Quarantine
Programs
- Large and Small Stock (8)
- Fish and Fish farming (1)
- Apiary (0)
- Poultry (2)
Director of Natural Resources Management & Mechanization (Research & Extension) (1)
-Socio Economist (1)
Programs
- Soil Conservation (6)
- Water Management (4)
- Mechanization (3)
- Forestry & Agroforestry (2)


WESTERN AGRICULTURAL ZONE ORGANIZATIONAL CHART- 2011
Director General RAB
Head of Agriculture Zone Division (1)
- Administrative Assistant (1)
- Accountant (2)
- Procurement Officer (1)
- ICT (1)
- Cashier (1)
Director of Crop Research & Extension (1)
-Socio Economist (1)
Programs
- Cereals :
-Sub/Program Maize (3)
-Sub/Program Rice (3)
- Horticulture (9)
- Roots and Tubers (3)
- Banana (3)
- Legumes (3)
- Coffee (10)
- Tea (8)
- Wheat (2)
Director of Livestock Research & Extension (1)
- Socio Economist (1)
- Animal Quarantine (1)
- Farmer's Organizations (1)
Programs
- Large and Small Stock (8)
- Fish and Fish Farming (3)
- Apiary (0)
- Poultry (0)
- Sericulture (0)
Director of Natural Resources Management & Mechanization (Research & Extension) (1)
-Socio Economist (1)
-Mechanization (1)
Programs
- Soil Conservation (6)
- Irrigation & Water Management (4)
- Mechanization (3)
- Forestry & Agroforestry (0)

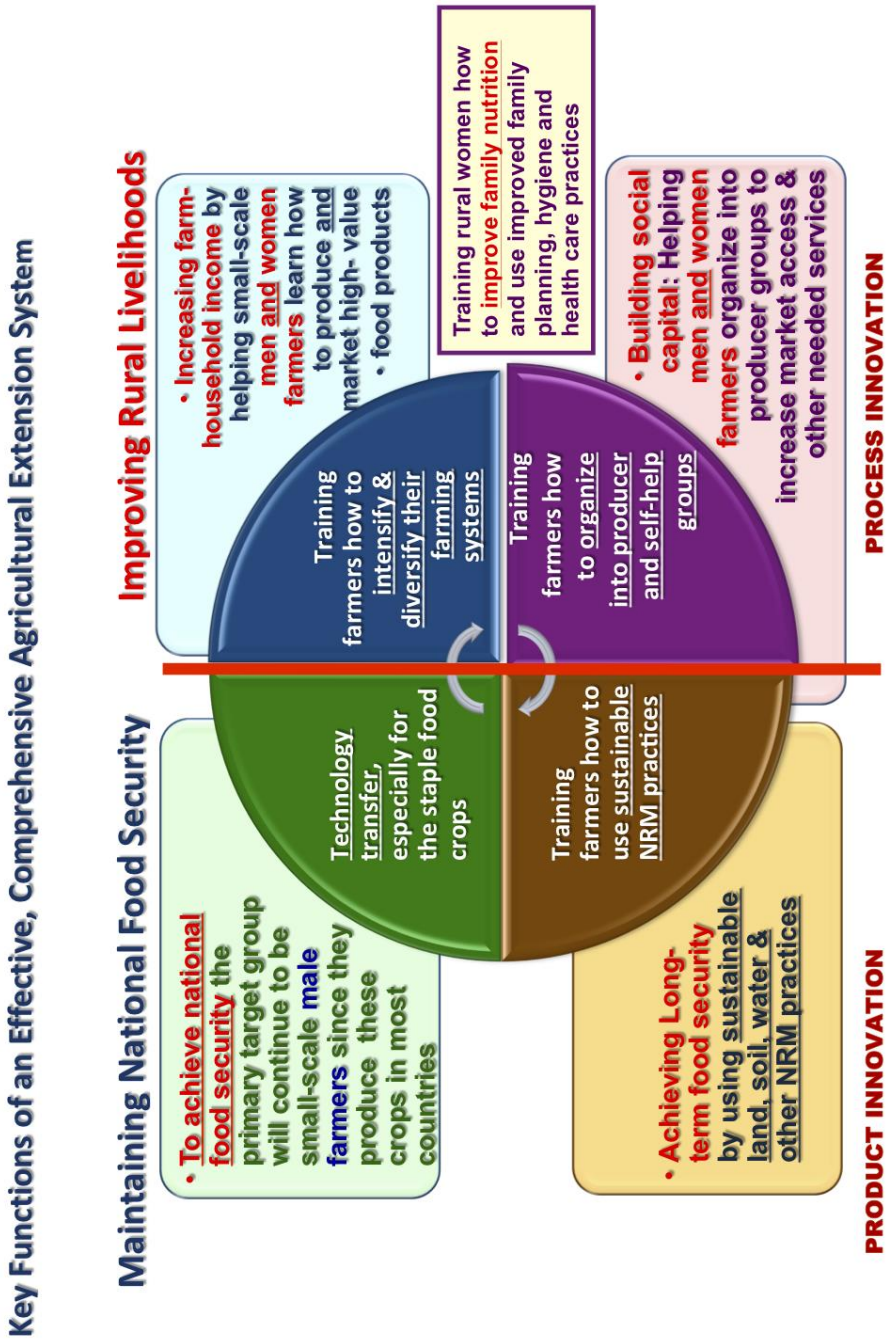
SOUTHERN AGRICULTURAL ZONE ORGANIZATIONAL CHART- 2011



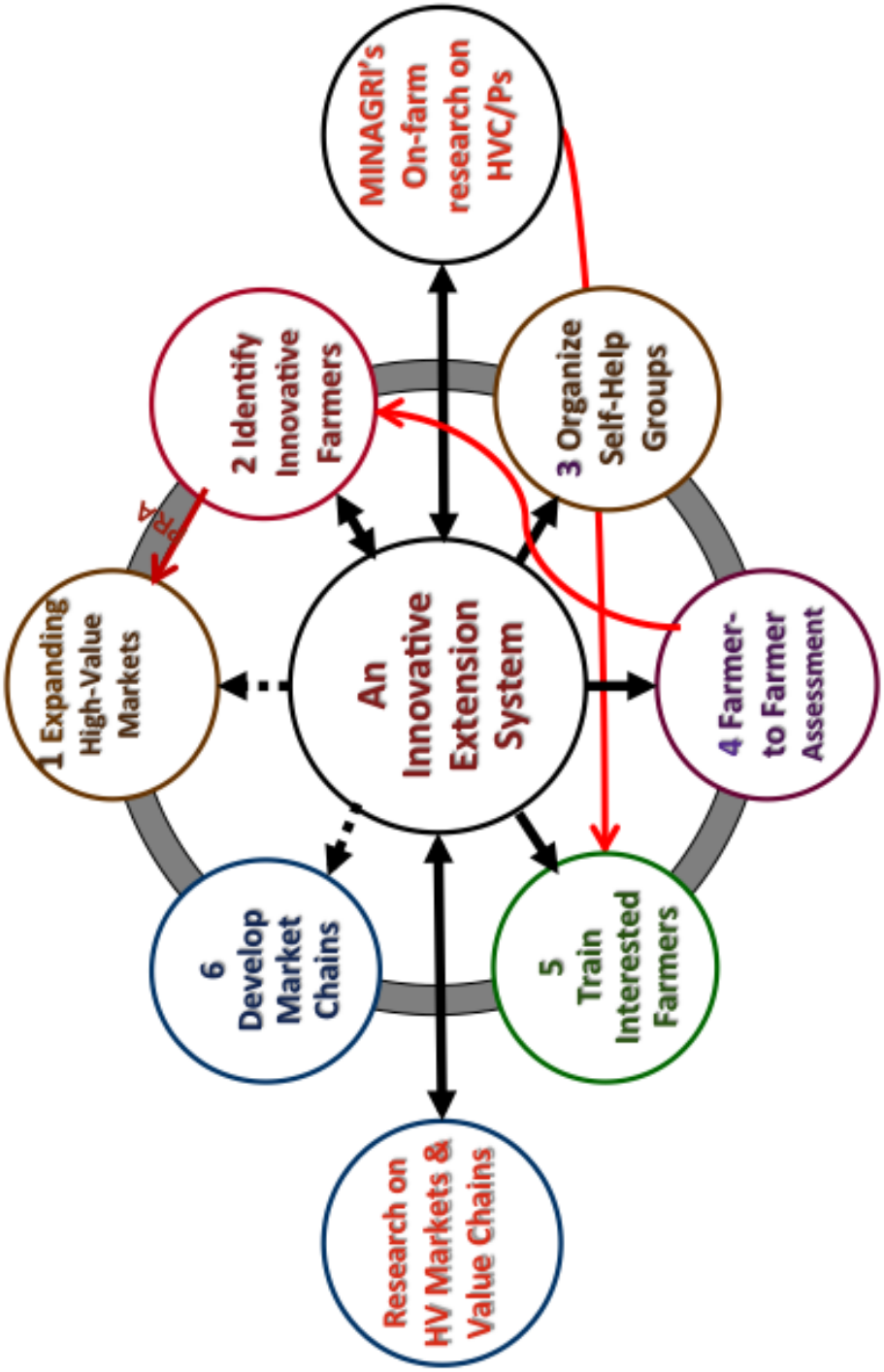
ANNEX F PROPOSED IMPROVEMENTS TO MODERNIZE EXTENSION SERVICES IN RWANDA



ANNEX G KEY FUNCTIONS OF AGRICULTURAL EXTENSION SYSTEMS AND INNOVATIVE EXTENSION SYSTEMS



Key Functions of an Innovative, Market-Driven Extension System in Helping Small-Scale Farmers Increase their Farm Income



ANNEX H TERMS OF REFERENCE AND SCOPE OF WORK: MEAS COMPREHENSIVE ASSESSMENT OF EXTENSION SERVICES IN RWANDA

In response to a request by the USAID/Rwanda mission, MEAS Project Director, Dr. Burton Swanson (ILLINOIS), will lead a Comprehensive Assessment of Extension Services (CEAS) in RWANDA. Other members of the Comprehensive Extension Assessment Team (CEAT) include Paul Hixson (ILLINOIS), Pascasie Adedze (ILLINOIS), Jeff Mutimba (WI/SAFE), Tom Remington (CRS) and Sylvain Hakizimana (CRS/Rwanda). Also, USAID/Rwanda program officer Gary Cramer will advise, participate in and assist with all facets of the mission.

Dates for the CEAS: Given that April is a month of mourning in Rwanda and that the Easter Holidays are in late April, the team will arrive at the end of April. The team will work together in Rwanda from May 1 to 15, 2011. The Team Leader, Dr. Burton Swanson or Paul Hixson will return for a weeklong follow up visit, tentatively planned for early July 2011.

Prior to arrival, the team shall have collected and reviewed as much background information as possible, identified specific institutions and individuals to be contacted, and shall have appointments set. CRS/Rwanda and Pascasie Adedze have started compiling a list of key contacts and setting up appointments.

Statement of Work / Roles and Responsibilities of each CEAS Team Member

Country and institutional situations differ and analytical and design work will have to respond to such different conditions, including the funding limitations that may prevail. The following reflects a tentative integrated and comprehensive plan for design and reform work for EAS systems in Rwanda.

The team members selected to carry out the CEAS in Rwanda were selected on the basis of their breadth of professional expertise, language skills and previous experience in Rwanda. The CEAT will conduct an assessment of the strengths and weaknesses of the overall pluralistic extension system in Rwanda, with the objective of developing a preliminary MEAS investment plan for Rwanda, and identification of one or more pilot activities that would test key recommendations.

Extension Policy and Institutional Assessment (EPIA): Burton Swanson and Jeff Mutimba
As EPIA specialists, they will determine the following potential constraints/issues, including:

- Identify, collect background documentation, and to the extent possible, visit with representatives of key institutions, organizations, programs, projects and private sector actors implementing significant extension and advisory service efforts, including, but not limited to: Public sector service providers; NGOs; Private Sector service providers, farmers, and others to be identified in collaboration with the USAID/Rwanda;
- Identify and briefly describe the strategies, structure, resources, approaches, and relationships between those governmental extension, research and educational programs, POs, NGOs, private sector entities visited, and their client groups. Special emphasis will be put on determining which service providers (e.g. public, private and NGOs) have a comparative advantage in providing specific extension and advisory services (EAS) to limited-resource farmers, especially women.
- Identify serious policy, institutional, management, human and physical resource constraints that limit the effectiveness of each EAS provider in Rwanda and how they might be strengthened to increase the overall effectiveness and impact of the organization;
- Assess the technical focus, process skills and capacities of each EAS service provider;

- Assess each organization's management structure to determine what, if any, changes might be needed; for example, transforming a top-down management structure into a more farmer-driven extension system, including *bottom-up* advisory committees with farmer representation and reduced gender bias;
- Assess extension's linkages with research, universities, private sector firms, farmer organizations, NGOs, etc. to determine how these linkages could be strengthened**.** Special emphasis will be placed on the evaluation of the education and research role and capacity development needs.

Extension Crop/Livestock/Farming Systems (ECLFS): Tom Remington
As the ECLFS specialists, he will:

- Analyze key agricultural production factors, such as the changing demand for agricultural products within the country (and for export), which may require significant changes in farming practices, especially for limited-resource farmers.
- Analyze farming systems within each major agro-ecological zone of the country, as well as natural resource management issues, particularly in terms of current production constraints and whether climate change is expected to directly impact the different areas within the country;
- Assess the number/type of producer groups and their linkage with different value-chains and extension EAS providers (e.g., extension can help expand the number of producer groups/cooperatives and link them to markets for different high-value crops, livestock and other products);
- Describe gender roles in crop and livestock systems (in conjunction with GES)
- Focus on the four major staple crops (maize, beans, cassava, and wheat) that the Government of Rwanda (GOR) has highlighted as the primary focus of most of the programs being implemented the government and by donors (in response to the GOR requests). USAID/Rwanda is actively involved in supporting the value chain for these crops, as well as avocado. Explore how income generated through high value crops and livestock products may enhance the production of staple crops by providing the households with cash flow for purchasing inputs, storage facilities, etc.

Agricultural Education and Extension Training (AEET): Jeff Mutimba and Burt Swanson
As the AEET specialists they will:

- Assess the current skills and knowledge of the field staff (both technical and process skills), as well as the technical expertise of the subject matter specialists (SMSs) and the management skills of extension officials (i.e., are they top-down or more participatory in decision-making).
- Visit the key universities and/or schools of agriculture to assess both their capacity to provide needed in-service training for the current AES staff, as well as how students are currently being trained and/or should be trained for different types of positions within the EAS system (public, private, NGO);
- Analyze specifically the linkages between extension, agricultural education and research in light of the commitment by some donors to invest in capacity development of Rwanda's agriculture education and research system over the next two years. Also, extension system evaluations conducted over the past 2 years by donors such as the Belgium Technical Committee (BTC) and others have not focused on the education/research link with extension. Furthermore, we are aware of the fact that the GOR is particularly interested in this part of any MEAS analysis.

Extension Information and Communication Technology (EICT): Paul Hixson
As EICT specialist he will:

- Assess the current ICT capacity within the country and among each EAS provider. For example: What types and forms of technical and market information are currently available to the field extension staff versus what is needed; can two-way communications and remote information links be easily and inexpensively established using suitable ICT technology (e.g., would a smart phone work best or could an advanced "learning tablet" be pilot tested).
- Assess the current knowledge creation and sharing practices within each EAS provider and between extension and their key information partners (i.e., universities, agricultural research institutions, NGOs, private sector firms, wholesale markets, etc.).
- Identify how new ICT technologies could help facilitate the extension reform process ahead further and faster.
- Consider the potential of making market information more readily available to small scale farmers.

We are aware of the fact that the GOR is already implementing investments in ICT based on the recommendations of a recent BTC/GOR in-depth multiyear ICT study. This will be fully taken into consideration to develop complementary recommendations.

Nutrition Extension Specialist (NES): Pascasie Adedze
As NE specialist, she will

- Assess how agricultural production on the farm is related to household and community nutrition and food security;
- Study how the food that has been produced is stored, distributed, sold, shared. What are the knowledge gaps in this regard? What are the opinions of farmers with regard to whether their agricultural production can sustain the nutritional needs of the family and community? Objectively, what might be the nutritional needs to supplement agricultural production in the community?
- Analyze in particular what the opportunities and constraints might be to empower the community health works to become nutrition extension agents, how the agricultural extension program and the community health worker program might be linked in order to improve the livelihood of Rwandan families in rural areas
- Assess the current nutrition capacity needs and nutrition training for community health workers, their supervisors, and other potential agents in a future nutrition extension system.

Gender Extension Specialist (GES): Pascasie Adedze
As GE specialist, using an assessment tool developed by Deborah Rubin and Cristina Manfre of Cultural Practice, they will:

- Look at opportunities to engage and enhance the role of limited-resource women farmers (especially those with limited access to land) in playing a significant role in increasing farm household production and income;
- Assess the current level and future prospects for developing groups of farm women and then in building gender-led producer associations and other women's organizations,
- Assess the extent to which micro-credit facilities are available and being utilized by women farmers and landless rural women
- Assess the inherent gender bias in EAS programming and EAS management structures, and identify barriers that may exist for women EAS professionals. The lack of women extension agents is something that has already been highlighted as a concern by the Ministry of Agriculture (MINAGRI).
- Outline specific procedures that might be followed to more fully increase extension and advisory services to women farmers and landless rural women.

The intent is to ensure that planning would ensure that gender is not an "add-on" to current extension and advisory services programs, but rather that addressing the needs of rural women and women farmers is fully integrated into the programs and institutions from the start.

Planning and Backstopping Support: Sylvain Hakizimana (with Jacqueline Nyirahabimana and Fortune Agboton) and Pascasie Adedze
Prior to the team's arrival, they will:

- Help collect background information on extension and advisory services in Rwanda. USAID/Rwanda is committed to providing the team with information from several studies on extension in Rwanda conducted in recent years.
- Identifying and mapping institutions, organizations or individuals to meet with.
- Set up the travel itinerary for the team members accordingly;
- Arrange accommodations and local transportation, and make arrangements for meals as needed.

Prior to the team's arrival, they will:

- Help collect background information on extension and advisory services in Rwanda;
- Identifying institutions and individuals to meet with;
- Set up the travel itinerary for the team members accordingly;
- Arrange accommodations and local transportation, and make arrangements for meals as needed.

During the team's stay in Rwanda, they will:

- Confirm visits, accommodations, transportation and make adjustments as needed
- Assist with communication (phone, cell phone, internet access)
- Assist should emergencies, e.g., medical, arise
- Share their insights on assessing the various aspects of EAS as warranted and in that sense contribute meaningfully to the mission of this CEAS.

Briefing/In-country Validation Workshop on Initial Observations and Findings

Prior to their departure, the entire team will brief USAID/Rwanda Mission as well as representatives from the Government of Rwanda and MINAGRI in particular on initial observations and findings. A first draft report following the proposed outline below will be completed before departure.

Preliminary Report: Contributions from entire team, submission responsibility: Burton Swanson

No more than two weeks following the return to the U.S., i.e., by the end of May, each team member will forward revised their findings and recommendation to Dr. Swanson, who will then prepare and deliver a summary trip report, which will outline the general organization and functioning of extension and advisory services within Rwanda, with special attention to identifying the specific areas needing investment and that will lead to transformative impact on the extension system in Rwanda, including guidance notes on issues and questions that may require further attention.

Based on the assessment carried out by the CEA team, they will determine which EAS providers are best suited to serve the needs of target EAS clients, such as limited-resource farmers in specific geographic and technical domains, and will craft a set of recommendations to strengthen the appropriate areas of the pluralistic EAS system (e.g., managerial, human resources, technical, etc.). These recommendations will be prepared and budgeted in the form of a comprehensive implementation plan, along with the identification of potential pilot activities to test key ideas.

Follow-Up Visit: Burton Swanson or Paul Hixson (the soonest would be mid-July)

Upon arrival, initial debriefing sessions will be held with the GOR to fine tune the recommendations. The findings of the assessment study will then be presented in a validation workshop involving all major stakeholders, and then discussed in detail, along with the draft MEAS investment plan with the agricultural team at USAID/Rwanda and involving key government officials and other extension service providers who might be engaged in future project implementation.

It is critical that key stakeholders, often including national, provincial and local levels of government, be engaged in the review and vetting of recommendations, and stand fully behind them. Identified EAS partner organizations will be asked to make feasible investments and take ownership in helping implement the proposed plan. Establishing a sense of ownership by the target organizations is critical to increasing the prospects of successful implementation within the target country, and will enhance the likelihood that the new extension practices can be scaled-up to the national level in subsequent years, and sustained through additional government and donor support.

It must be clear to those participating that the overall goal is to develop a sustainable, pluralistic extension system that will continue to function effectively after donor financing has ended.

Final Report: Contributions from entire team, submission responsibility: Burton Swanson (by the second half of July). The preliminary report will be revised based on the outcomes of the validation workshop and submitted to USAID/Rwanda for further action on the part of the Mission.

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