

**An Evolving Regional Platform for Higher Agricultural Education:
A Review of RUFORUM**

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List of Acronyms and Abbreviations

ACCI	African Centre for Crop Improvement
ACP	African, Caribbean and Pacific
AERC	African Economic Research Consortium
AET	Agricultural Education and Training
AfSIS	African Soil Information Services
AGM	Annual General Meeting
AGORA	Access to Global Online Research in Agriculture
AGRA	Alliance for a Green Revolution in Africa
AICM	Agricultural Information and Communication Management
AIS	Agricultural innovation system
ANAFE	African Network for Agroforestry Education
ASARECA	Association for Strengthening Agricultural Research in Eastern and Central Africa
BMGF	Bill and Melinda Gates Foundation
CAADP	Comprehensive Africa Agriculture Development Programme
CARP	Community Action Research Program
CGIAR	Consortium of International Agricultural Research Centers
CGR	Crop genetic resources
CGS	Competitive Grant System
CMAAE	Collaborative MSc in Agricultural and Applied Economics
COMESA	Common Market for Eastern and Southern Africa
CTA	Technical Centre for Agricultural and Rural Cooperation
DFID	Department for International Development (UK)
EAAPP	Eastern Africa Agricultural Productivity Project
ECSA	Eastern, Central, and Southern Africa
ERESA	Enhancing Research Skills in Eastern and Southern Africa
ES	Executive Secretary (RUFORUM Secretariat)
ESA	Eastern and Southern Africa
EU	European Union
FAPA	Field Attachment Program Award
FARA	Forum for Agricultural Research in Africa
GRG	Graduate Research Grants

HAE	Higher agricultural education
HEI	Higher education institute
IAP	International Advisory Panel
ICRA	International Center for Development Oriented Research in Agriculture
ICT	Information and Communication Technology
IDRC	International Development Research Centre
IFDC	International Centre for Soil Fertility and Agricultural Development
ILRI	International Livestock Research Institute
JKUAT	Jomo Kenyatta University of Agriculture and Technology
LMS	Learning Management Systems
LUANAR	Lilongwe University of Agriculture and Natural Resources, Malawi
M&E	Monitoring and evaluation
MIS	(web-based) Management information system
MOU	Memorandum of Understanding
NARI	National Agriculture Research Institute
NGO	Non-Governmental Organization
ODA	Official Development Assistance
OER	Open Educational Resources
PAYE	Pay As You Earn (Uganda)
PI	Principal investigator
PME	Project Management Exchange
R&D	Research and development
REC	Regional Economic Community
SCARDA	Strengthening Capacity for Agricultural Research & Development in Africa
SDM/A	Scientific Data Management and Analysis
SRO	Subregional Office
SSA	Sub-Saharan Africa
TEAM-Africa	Tertiary Education for Agriculture Mechanism Africa
TC	Technical Committee (of RUFORUM?)
TEEAL	The Essential Electronic Agricultural Library
TOC	Theory of change
VC	Vice Chancellor
WAAPP	West Africa Agricultural Productivity Programme

PREFACE

This review of RUFORUM was undertaken by a three person team in two stages and was organized around five central questions, namely:

1. How have RUFORUM programs enhanced both directly and indirectly the capacity of faculties of agriculture in East and Southern Africa?
2. What difference has RUFORUM made in enhancing the quality of graduate training in East and Southern Africa and how critical has a regional platform been in achieving this?
3. How has the competitive grants program improved the research capacity and outputs within agricultural faculties and are there avenues to improve both relevance and science leadership?
4. Is the Secretariat appropriately organized and does it have the capacity to grow and deepen the HAE platform in the region?
5. How successful has RUFORUM been in achieving the balanced growth strategy of its business plan and how has it balanced resource mobilization and deepening of its core competencies?

The first stage addressed the first three questions and involved site visits to faculties of agriculture in Malawi, Uganda, Tanzania, Ethiopia, Rwanda, and Kenya. The potential of RUFORUM to enhance the capacity of faculties of agriculture was evaluated by assessing the effect of RUFORUM programs on research, quality of degree programs, and outreach. The overall assessment at the different sites was based on interviews using a standardized checklist. The interview schedule involved an individual interview with the VC, a group interview with the dean and select department chairs, a group interview with select PI's participating in the CGS, and a group interview with select participating MSc and PhD students. Where possible, fieldwork was visited, especially in the case of the CARP program.

The second stage involved an interactive three day meeting with Secretariat staff and key stakeholders at Makerere University, followed by in depth interviews with individual program staff in the Secretariat, with a focus on all five evaluation questions. The meeting was organized around the strategies, activities, and challenges of the four principal program areas and allowed interaction and questions from both the review team and stakeholders.

The program structure of RUFORUM involves a significant number of interacting elements; responsibility for reviewing different program components was allocated across the review team. A first draft was discussed with BMGF staff and Joyce Mook and Howard Elliott, who facilitated the development of the RUFORUM business plan. Based on this feedback a significantly revised final version was produced.

The review team would like to acknowledge the open and frank discussions by RUFORUM program staff with the team. All documents and data files were open to the team and staff played an essential role in some of the analysis and interpretation of the data. The staff led by the Executive Secretary put in substantial staff time in the undertaking of this review on top of their significant other responsibilities. This was always done with a smile and prompt response. Also, the review team would like to acknowledge the warm reception and efficient organization of our site visits at the respective universities. The team was impressed by the vitality and dedication of the staff.

EXECUTIVE SUMMARY

Building the research, policy, service delivery, and private sector capacities that will underlie the transformation of smallholder agriculture in sub-Saharan Africa (SSA) will depend critically on developing the human capital, in essence the technocratic class that is essential for effective agricultural institutions. The need is particularly binding in the supply of agricultural researchers with postgraduate degrees, who are essential for the development of robust programs and institutions in agricultural research, higher agricultural education, agricultural policy, and leadership across the agricultural public and private sectors. The cohort of agricultural scientists that were trained at PhD level in the 1980's and early 1990's are close to retiring and there is a missing generation of postgraduate scientists, due to structural adjustment programs and limits on hiring, the decline in donor support to agriculture in the 1990's and early 2000's, the rising cost and decreasing relevance of higher degree training in the North, and the inability of African universities to fill the gap. This missing generation of agricultural PhD's is set against the expanding demand in the last decade for postgraduates due to the growth in the number of universities, increasing capacity of international agricultural research institutes and international NGO's in SSA and the benefit to staffing with local talent, and an emergent private sector requiring human capital mixing disciplinary depth and practical experience.

Creative, problem solving human capital is central to the foundations of BMGF's agricultural development strategy, particularly innovation and reach to smallholders by an expanding private sector, increasing smallholder productivity through the products of an effective research and development capacity, and achieving impact at scale through expanded capacity in NGO's and their support to the private sector. The additional leverage that BMGF grants will have on these areas is directly related to the quality and skills of the human capital that will plan, lead, manage, and implement agricultural programs in national contexts in Africa. The ability of African countries to meet their human capital requirements for an innovating agricultural sector that will lead the structural transformation of these economies over the next couple decades is a major challenge. These human capacity constraints will also be a direct constraint in the ability to implement many if not most of the projects funded by the Foundation.

Landscape: The past decade has witnessed a significant growth in the number of universities, both public and private, and increased competition between universities for high quality, fee-paying students resulting in significant differentiation across universities in degree programs and branding. This expansion is being led by the previous increase in investment in secondary education, recent economic growth especially in the urban formal sector, and families' investment in their children's education as generating a high return. Most of this expansion focuses on first degrees and postgraduate degree programs remain a lower priority in this competitive environment. At the same time this rapid expansion in tertiary education has generated a "crisis of quality," that particularly impinges on postgraduate training. As student numbers have increased and the supply of teaching staff has not kept pace, teacher-student ratios have increased, teaching loads have increased for lecturers, teaching positions are filled

with increasingly junior staff, often even with first degrees, and research time and funding is highly constrained. Postgraduate training in agriculture is thus constrained by a limited pool of PhD trained staff, limited research funding, an expanding curriculum, and the need to cater to an increasing array of skill sets demanded by a differentiating labor market.

RUFORUM as a Regional Platform: RUFORUM has developed as a member (university)-based regional platform. The regional nature of RUFORUM is a critical design feature of the program. Firstly, regionality allows RUFORUM to overcome many of the supply constraints, particularly PhD talent, facing HAE in the region and achieve significant economies of scope and scale. By drawing on the capacities of the older, elite universities in the region, RUFORUM can address many of the needs of the newer universities that are still building their programs. Secondly, since RUFORUM represents the interests of 33 member universities in East and Southern Africa, the platform serves as a voice for HAE at a regional and continental level in agricultural policy forums. Thirdly, RUFORUM has the independence to address the program quality issue by acting in the interests of member universities but by not being subject to individual university administrations in order to set quality standards. Finally, RUFORUM can be a linkage point to capacities in the North, to innovative programs such as Earth University, and to innovations distance learning and educational resources. RUFORUM's program structure is intimately tied to this regional approach and in effect complements and draws on the university twinning programs in the region supported by many bilateral donors.

RUFORUM Program Structure: The RUFORUM program structure is built around the three principal objectives of a faculty of agriculture, namely teaching, research, and outreach. There is a particular focus on achieving greater balance and integration of these elements at the post-graduate level in order to foster a greater synergy between research, relevance to the smallholder development context, and curricula design. The programmatic structure of regional collaborative degree programs—together with quality assurance—graduate research grants, and community action research programs constitute RUFORUM's core business, complemented by the work on M&E and ICT. **The review team endorses the design of this program structure as central to improving the quality of post-graduate training in East and Southern Africa.** Deepening research capacity in agricultural faculties is essential for effective post-graduate training in HAE, both at the level of teaching staff and research-based degree programs. RUFORUM support to regional MSc programs has focused on improvement of core skill areas, particularly research methods, and innovation in MSc curricula, such as agricultural information and communication and molecular techniques in plant breeding. The development of regional PhD programs is designed to meet strong demand from member universities for quality PhD graduates, and add a comprehensive course component to the research undertaken for a PhD. Finally, the Community Action Research Program (CARP) integrates action learning with smallholder farmers with research that supports rural innovation in these farming systems.

Overall Program Assessment: The BMGF core funding has allowed RUFORUM to develop and deepen its program structure, and has been essential to the positioning of the regional platform in agricultural policy processes in SSA. During the course of the grant period, RUFORUM developed its regional MSc and PhD programs, launched the CARP, developed its M&E system, adapted its competitive graduate research grants program, is near to completing its management information system (MIS), and has positioned itself in the area of open educational resources and distance learning. Except for the graduate research grants program, these are all new program areas that have been designed, implemented, and adapted over the course of the grant period. The review team finds that the design of these programs has been innovative, have met the needs as expressed by member universities, and have shown the potential of a regional approach to strengthening HAE. There is potential for exploiting greater synergies between the principal program areas. However, each of these programs is highly labor intensive and the Secretariat has only a very limited core staff, all essentially supported by the BMGF. This has created implementation problems in several core program areas, which the M&E system has identified and for which there have been program adjustments. RUFORUM is very much a learning organization, and has adapted its programs to identified implementation problems. At the same time, RUFORUM has found it difficult to match project and restricted core funding to core program areas, at least for sufficiently long time periods. Moreover, most of the project funding has not been managed under full cost accounting, putting further strains on staff time and the finances. However, these implementation issues are resolvable and should not detract from the position that RUFORUM has now established in the area of strengthening HAE in East and Southern Africa.

Competitive Graduate Research Grants: The graduate research grants program aims to enhance the quality of research undertaken in faculties of agriculture through a competitive, peer reviewed process and support post-graduate students to obtain their degree and gain field experience through the selected projects. To enhance the relevance of the universities' research, the proposal guidelines call for research that improves the welfare of smallholder farmers and rural communities, with as much engagement with them as possible, and projects are encouraged to be multiagency, engaging with other partners, such as government extension, the private sector, and with researchers from other disciplines. To nurture those whose ideas have scientific merit but may need additional help with writing or project conceptualization, those whose proposals aren't successful receive suggestions, often quite detailed, about how they can be improved. Faculty can attend special workshops for additional skills-based training, particularly in research methods and scientific writing. RUFORUM grants are meant to define a quality standard for research across the member universities.

This is a labor-intensive program, given the peer review process, the skills enhancement, the program monitoring, the reporting, and the management of financial flows. Over the four calls for proposals the participation shifted from older to newer universities, from older to younger faculty, and from traditional crop management topics to areas such as animal production,

climate change and markets, partly as a result of organizing proposal-writing workshops in newer universities. Insuring that MSc students complete their degrees in two years requires a highly calibrated program to school calendars and agricultural seasons. Time lags in regards to the peer review process, funds flow, and reporting often resulted in extension of the period in receiving the degree. Ensuring fiduciary responsibility, particularly in terms of technical and financial reporting, often resulted in delays in funds flow, which were aggravated by strict payment protocols in universities. These implementation problems have been addressed over time and program efficiency has improved, but often with increased work loads in the Secretariat.

Given 32 member universities and the trends toward increased participation by the newer ones, it is clear that the GRG program will not be able to develop the required critical mass in participating faculties to leverage research quality and improved MSc degree programs. An alternative approach to this problem is to build the research grants program around a thematic approach that over time builds a regional research agenda in that theme and associated communities of practice. These might be tied to the regional PhD programs or to thematic areas that link universities into frontier research areas in the region, for example climate change and resilient systems, agroecology and sustainable intensification, or agricultural markets and value chains. Each of these offers scope to integrate disciplines from across agricultural faculties but at the same time focuses and integrates the research, so that the research builds systematically over time. To do this effectively would require a thematic coordinator on the Technical Committee.

The Community Action Research Program (CARP): The CARP program was originally designed to help universities develop capacities for outreach and scaling out successful research outputs from GRG grants, using a value chain or innovations system framework approach. Compared to the GRGs, CARPs put more emphasis on creating and sustaining impact through community and multi-agency engagement that is organized around an Outreach Project. The CARP is designed to develop skill sets in action research and experiential learning that in turn catalyze the development of more relevant research outputs and outreach-related curricula at the participating universities. This is an innovative program with links to Earth University and ICRA.

It's an exciting and innovative program, but the pressure the teams are under to create curriculum and demonstrate impact seems premature and excessive relative to the stage that the projects are at. Given the overall program objectives, number of players and newness of the approach--establishing and maintaining partnerships, iterative testing and adaptation, and achieving impact—a 3-year project timeline is not realistic and requires either longer time frames of say five years or at least two phases. Moreover, community members input/partnership in developing the research agenda appears to need work, particularly achieving a balance between the academic orientation, complex treatments, and generation of technologies for farmers versus co-creation and involving farmers in the decision making

process. Achieving closer linkage between the CARP and the regional PhD program in rural innovation would be particularly valuable to both program areas.

Regional MSc Degree Program: The regional degree programs are designed to capture economies of scale at a regional level, to innovate in curriculum design, to fill crucial gaps in degree offerings in the region, and to ensure a quality standard against which member course offerings can be compared. The MSc regional degree program has developed three courses, namely in research methods, agricultural information and communication management (AICM), and plant breeding and biotechnology. Each of these has developed in a different way, in essence as different models. The regional degree programs are designed to capture economies of scale at a regional level, to innovate in curriculum design, to fill crucial gaps in degree offerings in the region, and to ensure a quality standard against which member course offerings can be compared. The MSc in research methods is a core program for RUFORUM, as modules are used in short courses for lecturers and MSc's in the GRG program. There is potential for extending this capability more broadly through RUFORUM's Moodle platform. The link with the Statistical Services Centre at Reading University should be reestablished to ensure continual refreshment of the course. Experience offers two quite different models for future expansion in this area, namely a franchise approach in which the course is developed regionally and then franchised to member universities or a RUFORUM brand MSc in which the quality of the course meets member needs across the region. The choice of model will depend on funding source and the ability of member universities to mount these courses.

Regional PhD Degree Programs: The development of regional PhD programs was a direct response by RUFORUM to a critical need as expressed by its member universities. The PhD program moved RUFORUM into a program area where it alone operated and the initiative would test the credibility of developing quality PhD programs in the region. RUFORUM has established five of these regional degree programs. The model chosen for these PhD programs is best characterized as a center of excellence model. Four of the five PhD programs are based at member universities that have developed particular expertise in the area over the last couple decades. These are the longer established, elite universities in the region.

In the implementation of the regional PhD programs there was ambiguity in which cost elements would be covered by RUFORUM, the host university, or the student herself. Following on the experience with the regional MSc programs, there was the perception that all costs, including student fellowships for tuition, stipend, and research would be covered by RUFORUM, at least for the first few cohorts. At the same time there were expectations from the board that these programs would be launched as soon as possible. In hindsight this created a number of inadequacies in implementation, particularly (1) over extension of Secretariat capacity in the launch of so many degree programs where a phased implementation would have been more practical, (2) program implementation without having secured funding in place, (3) unrealistic expectations on the part of host universities as to what costs would be covered by RUFORUM,

and (4) over commitment by the Secretariat of cost coverage before funding was secured. These implementation challenges have been slowly ironed out.

In the short to medium term RUFORUM needs to focus on consolidation of the PhD programs and on developing information so that potential donors better understand the potential of the programs. It would be very useful for the Secretariat to develop per student cost estimates for the regional programs compared to costs in northern universities and some of the better southern universities. Another critical feature is an adequate assurance of program quality. The Secretariat is just in the process of finishing the quality assurance guidelines, which has been supported by funding from the EU. The Secretariat's approach to monitoring in this area is to build that capacity within the faculties, supplemented by surveys of student satisfaction and research reporting, particularly published papers in peer-reviewed journals. These systems are still formative and in the process of development in the faculties. What would be useful in terms of monitoring these programs, understanding problems, and adapting implementation and delivery would be to for the Secretariat to undertake a case study evaluation of the quality of some of the longer established PhD programs. A particular focus would be on learning outcomes from the course work and on an evaluation of the quality of the research design and methods in the thesis.

Monitoring and Evaluation: While there are elements of an M&E capacity in each of the program areas, a fully integrated M&E system has only been designed at the end of last year, as this relied first on agreement on RUFORUM's theory of change. The review team appreciates that the M&E system has taken a significant period of time to develop but finds that a robust and appropriate structure is now in place. The next step is to make it fully operational as an integral part of planning, program development, and learning within the RUFORUM platform, with the potential of moving from a principal focus on the needs of the Secretariat to providing a window on faculty and post-graduate student performance across the member universities. Achieving this will in turn rely on the design and operationalization of the management information system (MIS) which is in the development stage. It is expected that a fully function M&E system will be in place by the end of the current year.

Information and Communication Technology: Development of an ICT program at RUFORUM which linked to and supported the evolving ICT capacity in member universities was felt to be a necessary function for a regional platform that could exploit ICT's increasing utilization in university education globally. This is a very large mandate, especially given that member universities were investing in ICT infrastructure but were only at the early stages of effectively utilizing that infrastructure in education, teaching, and research. There is a very large latent demand, particularly at the VC and administration level, to develop and integrate ICT and associated Learning Management Systems (LMS) into student learning and faculty teaching. Given the very small unit and the scope of the tasks being asked of the unit, managing these expectations in terms of services that can be deployed to member universities is an ongoing balancing act. ICT has been responsible for putting in place the intranet for the Secretariat,

designing and maintaining the RUFORUM website, managing the communications strategy, designing and implementing the MIS, and maintaining the knowledge repository. These were essential capacities to get in place for the platform to function effectively. However, the future orientation of the ICT unit will be on developing eLearning and open educational resources in support of the regional degree programs and in a more strategic approach to knowledge management capacity in support of the research supported by RUFORUM, especially if the GRG program shifts to a more thematic structure.

Governance and Management

The Board: RUFORUM legal status is as an international NGO operating under Ugandan law. The Board is made up of 38 members, 32 of which are vice chancellors of the member universities. Because the vice chancellors provide the eventual oversight on faculties of agriculture within their universities, the Board functions as both an oversight body on program implementation and a platform for networking universities in the region in the development of regional programs. The Board ensures the regional character of RUFORUM programs, expresses demand for new program areas, and ensures program implementation in participating universities. However, the size of the Board often results in problems in reaching a quorum and in reaching decisions on key issues. To operate more efficiently the Executive Committee of the Board should be strengthened, meet more regularly, and interact with the Executive Secretary as critical issues arise.

The Committees: RUFORUM has a complex committee structure, reflecting the hierarchal management process in universities, the need for oversight at a regional level, and the guarantee of impartiality in decisions involving resource allocation and program placement. The Deans' Committee, on the one hand, provides program oversight at the point of program implementation and at the same time is the voice of the core constituency of the RUFORUM programs. The Deans' Committee does not have the input into the Board that it should have. The Technical Committee is independent and works directly with program officers in the Secretariat in decisions on the GRG and in technical monitoring of the projects. The Technical Committee is a core resource for the Secretariat and their monitoring should be extended to the regional degree programs. The role of the International Advisory Panel is probably least defined, but has served a key role in providing strategic advice to the Secretariat. The IAP provides an honest broker role in relations with donors and with other international organizations. Although the committees entail management and logistical costs for the Secretariat, they do provide key functions in the ensuring the effectiveness of RUFORUM as a regional platform but as suggested these roles could be further enhanced through either closer integration with other governing bodies or an expansion in scope of work.

The Secretariat: The Secretariat is the engine that runs RUFORUM. It develops the strategy, designs and implements the programs, does the monitoring, evaluation and program planning, leads the resource mobilization, and organizes the range of meetings undertaken by

RUFORUM. Compared to other regional platforms such as ASARECA, FARA, or AGRA and compared to the program demands, the Secretariat is minimally staffed. The Secretariat consists of the executive secretary, four program officers, a finance office, and support staff. The Secretariat is essentially supported by BMGF, in essence as core support. Mike Swift observes in his history of TSBF that, “as seen in many research programs, the value of steady core funding is crucial to success. It both acts as a significant lever for additional funds and allows staff to concentrate on program development.” Nevertheless, given the program structure of RUFORUM and the labor intensity of these programs as well as the demands on the finance office, RUFORUM is minimally staffed in relation to the demands of program implementation. Filling the deputy executive secretary (DES) position would begin to relieve these constraints and better position RUFORUM for brand development and growth. The current structure is something of a hub-and-spoke model of program officers arrayed around the executive secretary. The DES could take the program leadership or the management leadership depending on comparative advantage of the ES and the DES. Additionally, responsibilities for strategic planning and resource mobilization could be divided. The next phase of RUFORUM will need to exploit synergies across the four program areas and a DES would help to guide that process.

Having staff time to invest in resource mobilization is critical for further program development. However, it is essential that project funding be budgeted on the basis of full cost accounting. This is essential for keeping the size of the finance office commensurate with the flow of funds, and could eventually pay for the DES or other staff salaries.

National Forums: The national forums were designed as a platform to provide a collective voice for HAE within national agricultural policy processes, such as CAADP investment plans, and to link more closely to other actors in the sector, especially given the desire to expand faculties’ role in agricultural research in the country, to better facilitate outreach of that research and other services, and to link more closely to an expanding private sector. The driving assumptions in the formation of the national forums were that RUFORUM as a regional network firstly had the organizational ability to bring together the different faculties under one umbrella, secondly had the political weight to convene a forum of principal actors in the agricultural sector, and thirdly could sustain a coherent set of activities over time to demonstrate the benefit of the forum. However, the experience has been that it has been possible to mount a national forum in only selected countries and in virtually all those countries it has been difficult to sustain the activities and the political reach of the forum. While conceptually valid, the lack of effective implementation rests on one or more of the assumptions not holding. RUFORUM needs to align itself with organizations that have greater convening power, as a voice for HAE in policy dialogues. For example, partnership with FANRPAN or its equivalent could lead to hosting a forum aimed at making research and HAE respond to national needs. Moreover, FANRPAN does have national forums and they are variously located with planning, consultative forums or even educational institutions.

End Note: Universities are undergoing a period of rapid change in East and Southern Africa but graduate education is being left behind. Yet postgraduates with disciplinary depth and relevant skills sets are fundamental to building the institutions that will engineer an agricultural growth process in countries in the region. Although still young and developing, RUFORUM has developed a set of interacting programs that address critical needs in HAE across the region. These programs overcome the shortage of PhD academic staff in faculties of agriculture through regional approaches. In turn RUFORUM complements the regional organizations in agricultural research and agricultural extension, even extending to regional seed associations and farmer associations, and unlike many of these organizations does this through capturing regional economies of scale and scope. With its membership base, its linkage role to policy initiatives at a regional and sub-regional level, and its current program structure, RUFORUM is well positioned to guide the increasing interest in HAE, building on an already significant base of experience.

1. MAINTAINING QUALITY IN AN ERA OF UNIVERSITY EXPANSION: THE LANDSCAPE IN WHICH RUFORUM OPERATES

1.1 Human Capital in SSA and BMGF's Agricultural Development Strategy

Achieving transformational change in the smallholder economy of sub-Saharan Africa requires effective institutions, appropriate policies, well-supported R&D, and a vibrant private sector—in effect the translation of knowledge into sustained growth in smallholder productivity within an agricultural innovation system. Creative, problem-solving human capital is central to the foundations of BMGF's agricultural development strategy, particularly innovation and outreach to smallholders by an expanding private sector, increasing smallholder productivity through the products of an effective research and development capacity, and achieving impact at scale through expanded capacity in NGO's and their support to the private sector. The additional leverage that BMGF grants will have on these areas is directly related to the quality and skills of the human capital that will plan, lead, manage, and implement agricultural programs in national contexts in Africa. The ability of African countries to meet their human capital requirements for an innovating agricultural sector that will lead the structural transformation of these economies over the next couple decades is a major challenge. These human capacity constraints will also be a direct constraint in the ability to implement many if not most of the projects funded by the Foundation. This review of the RUFORUM program will provide some insight into how to meet that challenge over the next one to two decades.

RUFORUM operates in an institutional context that is both dynamic and differentiating. Over the last two decades universities operate in a much more competitive environment, as financing has been diversified to more reliance on student fees and private universities focus on degrees that are in higher demand, such as business and ICT. Governance and management systems have improved, quality assurance measures have been put in place, Internet infrastructure and access has vastly improved, and universities are less politicized. At the same time, agriculture is receiving increased policy focus and budgets, partly due to the CAADP process and partly to increased ODA being directed to the sector, including increasing interest in higher agricultural education. There is a sense of positive change in faculties of agriculture that was not there in the 1990's and RUFORUM has positioned itself as a virtually unique regional platform that can foster economies of scope and scale in improving both the relevance and the quality of post-graduate education in member universities. This role is explored in more depth by Mook (2012, p. X):

RUFORUM is the only network...deliberately designed to connect investments in individuals and faculties to improvements in the wider university body. It does so mainly in three ways: (1) focusing on commonalities at the margins of agricultural disciplines and overlapping methodologies (for example, its highly popular network wide research methods courses); (2) working with a wide-ranging committee of university deans; and (3) instituting a board

composed of vice-chancellors of member universities who pay annual membership fees and cover their own travel expenses to meetings. It might be argued that with such layering, RUFORUM operates at too broad a level and that viable networks are best grounded in single professional disciplines with reach to external constituencies that provide essential feedback loops. In the end, however, lasting gains in strengthening institutions and raising professional standards may best be realized if networks put a premium on diffusing new ideas and practices throughout individual universities and across them to a variety of agricultural system stakeholders.

1.2 An Expansionary Phase in University Education

In a globalizing economy, education is key to competitiveness and economic growth. Sub-Saharan Africa is playing catch up (World Bank, 2008) in terms of investing in the human capital needed to participate effectively in the world economy, as is shown in a World Bank chart (Figure 1) explaining the difference between the economic performance of South Korea and that of Ghana since 1960. This period of catch up is reflected in rapid growth in investment in education at all levels, with an increased recognition over the last decade of the need for increased number of graduates at the tertiary level. Rwanda is portraying its economic development as based on a knowledge economy. Moreover, Kenya had only 2 public universities in 1984 and Ethiopia up to 1991. By 2007 Ethiopia had 22 and by 2013 Kenya also had 22, adding 15 public universities in that year. In Kenya in 1983 there was a university enrollment of about 6800 students. This grew to 60,000 by 2002 and to 200,000 by 2012. This extraordinary growth reflects a similar growth in graduates from primary and secondary education institutions, the associated demand that created, and the higher private returns to a degree at the tertiary level (Table 1).

The rapid expansion in the number of universities and student enrollments has led to what many term a crisis of quality in higher education (Ogachi Oanda and Jowi, 2012). Declining quality of educational outcomes is primarily driven by falling expenditure per student, rising student to staff ratios, and reduction in the level of training of teaching staff. In Kenya there are 5,186 lecturers for the 160,000 students in public universities, indicating 1 lecturer for 70 students when the international standard is closer to 1 to 25 or 30. The situation is summarized in the World Bank report on tertiary education in Africa (2008): “The problem of quality is being exacerbated by the rapid expansion of tertiary education without a corresponding increase in resources to universities to accommodate such an increase. This has resulted in higher student-teacher ratios and lower expenditures per student. In addition, training of future faculty members is not keeping pace. Furthermore, equipment used at universities in places like Kenya and Nigeria tends to be outdated, and has often been retired by local firms. The average age of laboratory equipment was reported to be 12 years for basic sciences and 16 years for engineering. This deficiency in resources (coupled with brain drain and low salaries of faculty) is a severe constraint on teaching and research at universities.”

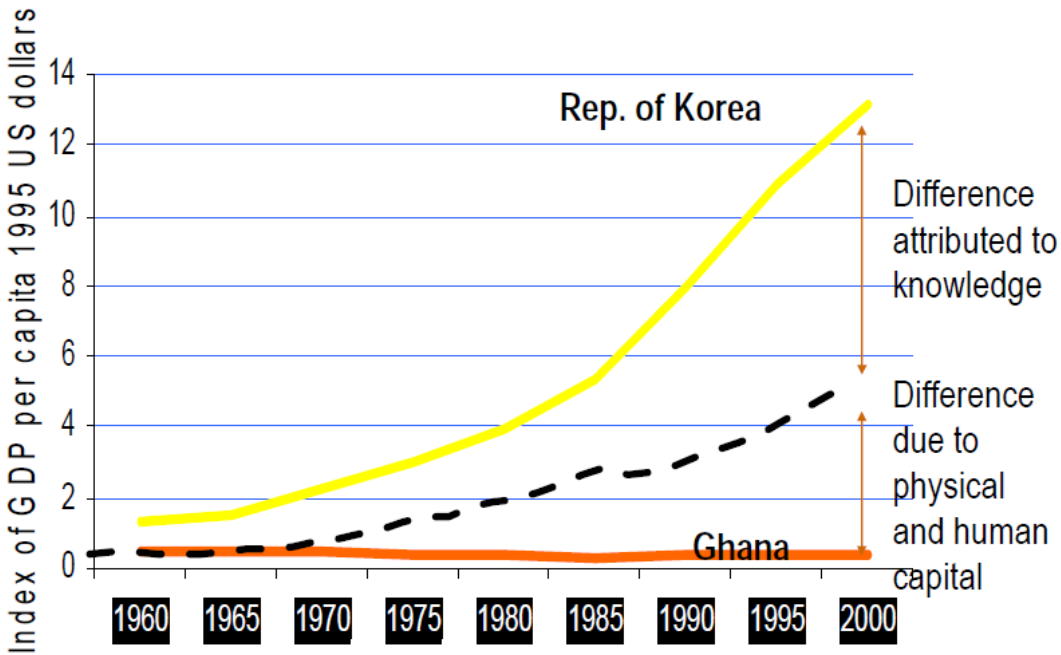


Figure 1: Economic Growth as Determined by Knowledge and Skills
Adapted from: World Bank, 1998

Table 1: Private returns to investing in Primary vs. Tertiary Education

Country/Region	Private Returns to		Authors
	Primary education	Tertiary education	
World	26.6%	19.0%	Psacharopoulos and Patrinos 2004
Papua New Guinea	6.0%	9.2%	Gibson and Fatai 2006
Philippines	9–10%	17.0%	Schady 2003
India	2.4%	10.3%	Dutta 2006
Kenya	7.7%	25.1%	Kimenyi, Mwabu, and Manda 2006
Nigeria	2–3%	10–15%	Aromolaran 2006
Ethiopia	25.0%	27.0%	World Bank 2003

Source: World Bank, 2008

An indicative picture of university staffing is a study of private universities and 10 of the older, public universities in Ethiopia (Table 2). Only about 15% of staff have PhD's in public universities (and this does not include the newer universities) and as in the rest of East and Southern Africa a significant proportion of these are nearing retirement. Even Masters holders

are lower in percentage terms than undergraduate teaching assistants. The low percentage of PhD's in the teaching staff has a number of implications for the overall quality of degree programs. The ability to mount effective post-graduate degree programs is compromised, both in terms of teaching quality but also the ability to stay at the forefront of their disciplines. The latter is also related to the ability to establish international linkages and thus to participate in scientific fora and conferences. As well, it limits the ability of departments to carry out quality research, which in turn is critical to the quality of post-graduate degree programs. Finally, and most critically, because universities and other national research institutes are dependent on elite national universities to produce the postgraduate degree holders that will fill the expanding demand for MSc and PhD's, declining quality in graduates is perpetuated in terms of research and training into the future.

Universities in several countries are also undergoing internal restructuring, in part to compete more effectively for private students whose tuition payments make up an increasing percentage of university budgets. This is being driven by the increasing size of the universities and the need to decentralize decision-making. Thus, many universities are forming constituent colleges, which have much more autonomy and where the principal has assumed many of the responsibilities formerly held by the vice chancellor. This has created another level of management that RUFORUM will have to consider how to incorporate into its programmatic implementation. At the same time, and in response to increasing competition from private universities opening in more rural areas—where a few offer agricultural courses at first degree level, many larger universities are opening branch campuses (see Table 1 in Ogachi Oanda and Jowi,

Table 2: Degrees held by teaching staff in 10 public universities in Ethiopia and all private higher education institutions, 2008

<i>Qualification</i>	<i>Total</i>	<i>Female</i>	<i>Total percentage</i>
<i>Public HEIs^b</i>			
Undergraduate	2,159	243	42.3
Masters'	1,880	135	36.8
MD/DVM ^c	317	14	6.2
Ph.D. or equivalent	749	45	14.7
<i>Total</i>	<i>5,105 (474)^d</i>	<i>437(8.6%)</i>	<i>100.0</i>
<i>Private HEIs</i>			
Undergraduate	624	77	56.5
Graduate	409	44	36.9
Ph.D. or equivalent	75	7	6.8
<i>Total</i>	<i>1,108</i>	<i>128</i>	<i>100.0</i>

Source: Semela, 2011

2012). The increasing reach to more rural communities has improved rural-urban equity in access to university and should be particularly important in increasing access to students interested in studying agriculture. Moreover, the decentralization to more rural areas should expand the potential for closer community outreach and research targeted to the needs of smallholders.

1.3 Meeting Demand for Skills in a Differentiating Labor Market

The overall labor market for MSc and PhD's is changing, with significant shifts away from agriculture, and in turn the labor market for post-graduate degree programs in agriculture is also diversifying. The diversifying labor market thus creates two different challenges for agricultural faculties, namely how to compete more effectively for better students given the growth in more urban-based employment and second, how to better differentiate skills development in postgraduates in relation to a differentiating labor market. The percentage of university students enrolled in agriculture varies significantly across RUFORUM member countries, from 15.4 % in Malawi (although only 490 students) to 8.5% in Ethiopia (17,884 students), 7.4% in Kenya, to 1.6% in Uganda (see Table 2 in Drame-Yaya, et al, 2011). In many ways such enrollments do not match the strategic needs of the country, as the World Bank (2008, p. 82) has recommended, "Within tertiary institutions, strategic focus on strengthening those disciplines deemed most relevant to a country's economy and future growth prospects is recommended." Agriculture remains a critical economic sector in the economy and since market liberalization in the 1990's, it has begun to grow and diversify with increasing private sector investment in input supply firms, agro-processing, food wholesaling and retailing.

The public sector remains the principal employer of agricultural post-graduates and even in this sector supply is not meeting demand. However, there is increasing employment in NGO's as the next employer of agricultural graduates (Blackie, et al, 2009). Finally, the private sector is small but increasing rapidly, with growth in employment in this sector expected to expand significantly in the next decade. This differentiating labor market is creating an expanding need for different disciplinary specializations as well as different skill sets to meet employer needs. A good example of this is the study by Davis, et al (2007), as summarized in Table 3, and perceived weaknesses in postgraduates as reported by Dramé-Yayé, et al (2011): "Insufficient communication skills, insufficient managerial and financial management skills, poor skills in coordinating with other stakeholders, resistance to challenges, insufficient hands-on skills (too theoretical at times), poor reading culture." Disciplinary knowledge is expected, but at the same time the application of that knowledge requires different types of skill sets that are expected to be developed in both the pedagogy and the experience of undertaking the thesis research. The challenge is how to develop those skills within the postgraduate training and how to better target those skill sets within individual degree programs.

Table 3: Key informant perceptions of the backgrounds and skills that employers are looking for in an AET graduate, Ethiopia and Mozambique

Backgrounds that employers are looking for	Skills that employers are looking for
Agriculture and agricultural science	Practical/technical skills in agriculture
Community mobilization and social work	Skills in executing government programs
Agricultural education	Teaching skills
Agricultural business	Training and demonstration skills
Information and communications technology	Communication skills
Agricultural marketing	Agricultural business skills
General management and supervision	Business ethics and manners
Farm management and supervision	Skills in learning independently
	Creativity
	Problem-solving skills
	Ability to support and assist research

^a Perceptions are unranked and based on unweighted responses from key informant interviews held with AET professionals, students, and administrators in Mozambique and Ethiopia in 2006.

1.4 Higher Agricultural Education within an Agricultural Innovation System (AIS)

Tertiary education is increasingly being set within an innovation systems framework, both more generally (World Bank, 2008) and for higher agricultural education (HAE) in particular (Maguire, 2012). Placing higher agricultural education in an AIS attempts to redress “the declining quality of many AET systems, the general failure to articulate a strong policy framework for agricultural education, and the corresponding failure of educational institutions to build a strong and vocal constituency within the agricultural sector” (Maguire, 2012). Reform of HAE attempts to ensure the curriculum meets the demand for graduates, there are better linkages to other actors in the agricultural sector, and skills are better matched to expected employment needs. The reforms implied by placing HAE within an AIS are set out in Table 4. To a significant extent RUFORUM programs track the suggested reforms in Table 4 and the best universities are already reaching many of the future goals suggested in Table 4, thus providing a model for the smaller and younger member universities. Particularly, RUFORUM is thinking through options to better link faculties of agriculture to other principal actors in the agricultural sector and act as a sounding board for human capital needs within the sector. As well, the regional MSc and PhD degree programs focus on moving curricula in all the directions indicated.

What is not as explicit is the role that faculties will play in the development of new knowledge, technology and innovation within the agricultural sector. Currently universities in general and agricultural faculties in particular do not have access to sustained levels of research support (see Table 5). This is primarily because research funding comes mainly through the ministry of agriculture and not the ministry of education. Faculties of agriculture thus depend on periodic outside funding sources and RUFORUM has been one of the most consistent sources of research funding for faculties over the last 2 decades. Expanding research capacity in faculties of agriculture is critical for the effective quality of post-graduate training, as well as ensuring that universities participate in the larger agricultural R&D system, including access to regional and international research networks.

Table 4: Current status and the directions of Integrating HAE into an Agricultural Innovation System

Higher agricultural education now		Future directions	
Weak, unenforced, or absent policies		Clear AET policies with responsibilities defined and enforced	
Weak governance		Strong governance inclusive of stakeholders	
Little autonomy		Autonomy that enables staff decision making, financial control, and standards setting	
Uncertain funding		Steady and regular funding guaranteed	
Isolation (academically and from stakeholders)		Academic, rural community, and stakeholder connections established and maintained	
Programs not accredited		Accreditation the norm	
Curriculum now		Future directions	
Outdated		Updated and current with stakeholders' needs	
No stakeholder input		Stakeholder consultations; input solicited and incorporated in changes; stakeholders participate in governance	
Teaching		Learning	
Theory		Theory and practical application	
No student attachments		Regular, organized, and supervised attachments	
Inappropriate pedagogy		Effective pedagogy tailored to subject matter and learner needs	
Little use of external teaching resources		External resources used in team teaching to expand knowledge and skill pool	
Little use of ICT		Use of appropriate ICT the norm	
Technical training now		Future directions	
Heavily supply driven		Mostly demand driven	
Managed by the public sector		Managed through public-private partnerships	
Poorly qualified and remunerated instructors		Qualified and fairly remunerated instructors	
Qualifications not certified by professional bodies		Certification ensured	
Equipment in short supply and outdated		Equipment/practice areas obtained through public-private partnerships	
Management of human resources now		Future directions	
Weak human resource management leadership		Qualified human resource managers and trainers	
Selection of trainees not based on need		All selection based on need and future tasks	
Training needs assessments are not undertaken		Needs assessments are standard procedure	
Little supervisor/manager involvement		Supervisors/managers consulted and involved	
No evaluation of trainee performance on the job		On-the-job performance measured	
Trainers not trained to instruct/teach		Qualified trainers standard	

Source: Maguire, 2012

Table 5: Higher education research expenditures in five countries in the WEF study, 2007

Country	Total research expenditures (US\$ millions, PPP)	Percent of GDP	Per capita expenditure (US\$ PPP)	Percent performed by higher educational institutions
Botswana	84.91	0.38	46.30	5.80
Ethiopia	106.79	0.17	1.30	14.60
Kenya	n/a	n/a	n/a	n/a
South Africa	3,654.27	0.92	76.20	19.30
Tunisia	660.61	1.02	65.41	38.41

Source: World Economic Forum, 2012

2. RUFORUM AS A REGIONAL PLATFORM FOR HIGHER AGRICULTURAL EDUCATION: THE FOUNDATIONS OF PROGRAM DESIGN

Regionalization in agricultural research and trade through the development of the SRO's and REC's was a response to the "small country" problem during the economic stabilization period of the 1990's. Regionalization was intended to achieve strategic economies of scale through regional approaches and to provide a platform for linkage to international capacities and knowledge. Regional approaches in education had a slower gestation period, but by the beginning of the last decade "The germination of numerous mechanisms for subregional and regional collaboration in tertiary education is one of the visible characteristics of (that) decade" (World Bank, 2008). RUFORUM filled an important gap. Within the agricultural sector (or the agricultural innovation system) faculties of agriculture were marginalized by the larger players, particularly by the NARI's and the ministries of agriculture, but also increasingly by national trade and producer associations. At the same time graduate programs were under stress due to increasing enrollments at bachelors level, constraints on increasing PhD staff levels, and limited numbers of post-graduate students. Individual universities could not achieve the scale economies necessary for developing quality post-graduate degree programs. At the same time the trend toward internationalization in areas like business and communications was limited in agriculture by a growing relevance gap between northern universities and those in the South. The shift away from applied, field level approaches to those integrating molecular biology in the North did not correspond to the needs of intensification in smallholder agriculture in Africa, although more strategic linkages with northern universities was an area to be developed.

2.1 RUFORUM's Development as a Regional Platform

RUFORUM's evolution from the Rockefeller Foundation's FORUM program began with the creation of a governance structure based essentially on vice chancellors of member universities. This structure was intended to link directly to the oversight structure of the university as regards faculties or colleges of agriculture and in turn represent the demand for programs from the universities. The result was a significant broadening in scope of the RUFORUM program in terms of university membership and programs, from the much narrower Foundation foci on priority countries and crop-based thematic areas. The expansion in member universities from the original ten to the 32 currently participating in RUFORUM has, on the one hand, deepened the importance of RUFORUM as a voice for HAE on the continent while, on the other hand, stretching the programs and services that RUFORUM can provide. In this regard RUFORUM is quite different from, for example, FARA, which is an apex and advocacy organization. RUFORUM operates within a strategic program framework. Moreover, RUFORUM has in many ways moved further in conceptualizing how to achieve scale economies at a regional level than for example ASARECA, as faculties with greater capacity provide services, particularly post-graduate degree training, to the region. In this regard RUFORUM serves two distinct roles, namely as a broker for services such as competitive grants provided potentially to all members and as a facilitator of scale economies across member universities.

The expanded membership takes in faculties with quite different capacities and needs. This asymmetry creates different incentives for participating in RUFORUM and thus different benefit streams that are realized from participation in the platform. The stronger, elite faculties are more successful in the competitive grants program and have more capacity to mount regional degree programs, which involve both resource commitments but benefits in terms of increased enrollments. The younger and smaller faculties have the opportunity to expand their range of course offerings, send staff for higher degree training, and to innovate in new courses. There is the potential for mutual benefits, but with the more elite faculties investing staff and resources in the regional effort in order to achieve economies. Nevertheless, as with all regional platforms, the operations require public funds, primarily international public funds. Although each university contributes an annual membership fee, this is not sufficient to fund the operations of the platform.

2.2 Achieving Balance between Teaching, Research, and Outreach

The conditions of service in most faculties involve allocating staff time between the three interconnected areas of teaching, research, and outreach. For example, in Ethiopia it is expected that staff allocate around 75% of their time to teaching, while the other 25% is divided between research or outreach/community service. There is a heavy demand on teaching and limited access to funding for research, especially if staff members do not have a PhD. Yet research and outreach provide a significant part of the skill set being demanded by the labor market. RUFORUM's programmatic structure is built around all three legs of this stool, with a particular focus on achieving greater balance and integration of these elements at the post-graduate level in order to achieve a greater synergy between research, smallholder development context, and curricula. The programmatic structure of regional collaborative degree programs—together with quality assurance, graduate research grants, and community action research programs—constitute RUFORUM's core business, complemented by the work on M&E and ICT. **The review team endorses the design of this program structure as central to improving the quality of post-graduate training in East and Southern Africa.**

2.3 Innovating Curricula and Enhancing Skill Sets

RUFORUM's work on regional degree programs addresses three distinctive needs, namely ensuring that content is relevant to the needs of agricultural development in East and Southern Africa, integrating skill development with course content—what has been termed competence-based learning (see Wals, et al, 2012 for a discussion of this approach), and developing new courses that address emerging areas in the labor market, allowing agriculture to remain competitive for the best students. This is a complex undertaking. The collaborative MSc programs in research methods and agricultural information and communication management (AICM) and the PhD program in rural innovation are examples of RUFORUM's work on innovating curriculum. Particular skill sets are targeted and developed within these courses and the CARP has also focused on developing appropriate interactive skills with farmers in its action

research methodology. However, enhancing skill sets more broadly, particularly for MSc's supported in the graduate research grants remains a challenge.

The relevance of the content of the regional degree programs is ensured through a process of assessing demand before the course structure is developed. The relevance of the course content is further enhanced through development of eLearning modules that focuses on research results from East and Southern Africa. The regional degree programs focus on courses and content not available at most member universities and as such on the production of regional public goods, which are central to the RUFORUM brand.

2.4 Integrating Research and Post-Graduate Degree Training

Quality and relevance of research is central to effective post-graduate degree training, especially in terms of educating the next generation of agricultural scientists in the region. Yet, quality assurance in the research thesis remains a core problem in post-graduate programs. A recent analysis of PhD programs in Kenyan public universities found the following: "Three-quarters (77%) of the PhD candidates and 57% of the supervisors interviewed across the public universities in Kenya identified the following as major sources of problems during the PhD experience: poor research design; lack of focus; and inadequate conceptualization of the research question by both parties. Inadequate research background and lack of training in methodological and writing skills (inadequate bachelors and masters training) were seen by 88% of both the ongoing and graduated students as a major area of difficulty." Inadequate access to research funding, poor problem identification, and inadequate research methods are all areas that the RUFORUM competitive research grants program are designed to improve. The program is structured around a peer review process, integration of 2 to 3 MSc's into the research projects, project monitoring, and support to MSc students in research methods and writing skills. Since the focus is on research quality, the stronger universities tend to dominate in terms of successfully competing for research grants. Maintaining quality standards while broadening access of a larger number of member universities to research funding is a continuing balancing act for this program.

2.5 Regional Scale Economies in PhD Degree Training

In their earlier agricultural and university development, countries such as India, Brazil, and Thailand trained at PhD level in the North. However, increasing costs, changing curriculum away from applied, field-based courses, and limited donor funding have forced sub-Saharan Africa to assess alternative strategies for training the next generation of PhD's, including training in the South, sandwich programs with Northern universities, and improving the quality of PhD programs in African universities. There has been such strong demand from member universities for alternatives for training staff at PhD level, that RUFORUM has initiated course based, regional PhD programs in selected priority disciplines. Ensuring quality of these programs, funding to support regional participation, and strong quantitative and research methods are

essential in mounting such programs and each requires a higher order of design and oversight than is required for the MSc. RUFORUM is still at the early stages of developing these programs and a strategy for design of these programs is still being tested.

2.6 Action Research on Smallholder Outreach

Innovation in smallholder systems, facilitated by service delivery (extension, credit, insurance, etc.), private sector development, and improved market access, involve very different skill sets from those focused on applied research. While the research programs have a number of guidelines that strengthen relevance for smallholder agriculture, RUFORUM has as well developed two programs that focus on improving impact in smallholder systems and the skills needed to do that. These involve a range of soft skills, experiential learning, entrepreneurial talent, action research methods, and participation with farmers. The Community Action Research Program (CARP) is designed to develop such skills in participating faculties and the PhD in Rural Innovation develops research talent and leadership in this emerging area. These are highly innovative programs and increase the prestige of outreach in a university's triangle of teaching, research, and outreach.

3. EVALUATION OF THE IMPLEMENTATION OF RUFORUM'S CORE PROGRAMS

3.1 Evaluation of the Competitive Grant System

RUFORUM's Competitive Grant System encompasses several distinct grant programs. All are designed to further RUFORUM's mission to strengthen the capacities of universities' agriculture faculties to foster innovations responsive to the demands of smallholder farmers and other development stakeholders. The review team focused mainly on the Graduate Research Grants Program (GRG), which awards the largest number of grants. However, some consideration was also given to the Community Action Research Program (CARP) and the Field Attachment Program Award (FAPA).

Although these are distinct grant types, their overall design is based on a common set of strategic goals and interlinked objectives. The programs aim to enhance the quality of research undertaken in faculties of agriculture through a competitive, peer reviewed process and support post-graduate students to obtain their degree and gain field experience through the selected projects. To enhance the relevance of the universities' research, the proposal guidelines call for research that improves the well being of smallholder farmers and rural communities, with as much engagement with them as possible.

To foster more collaborative and synergistic relationships with other key actors, projects are encouraged to be multiagency, engaging with other partners, such as government extension, the private sector, non-governmental organizations and with researchers from other disciplines. To nurture those whose ideas have scientific merit but may need additional help with writing or

project conceptualization, those whose proposals aren't successful receive suggestions, often quite detailed, about how they can be improved. Faculty can attend special workshops for additional skills-based training. RUFORUM grants are meant to define a quality standard for research across the member universities. However, the number of grants is limited in relation to the potential demand and/or need. There is an ongoing attempt to foster spillover into enhanced quality control of post-graduate student research throughout the faculty. This has occurred in a number of faculties, often in response to pressure from students who are not participating in the RUFORUM program. This as well reflects the greater voice that students now have in universities as they seek greater accountability from the tuition fees that they pay.

A competitive grants program with this set of inter-connected objectives is complicated to implement and highly labor intensive given the focus on ensuring quality in individual projects. Not surprisingly, the assessment found that the understaffed RUFORUM experienced some significant implementation challenges. After characterizing the 2009-2012 competitions and grants awarded, the evaluation highlights some of these challenges. The findings underscore the critical role of M&E for identifying problem areas, and catalyzing the learning and program adaptation that need to take place as the program evolves. They also clearly point to the need for continued investment in mentoring the newer member universities and less experienced scientists to strengthen their capacities to compete more effectively in the program.

3.1.1 The Graduate Research Grants (GRG) Program

Each GRG grant has a maximum budget of \$60,000, with the majority of the budget going to support at least 2 MSc students and their research for the project. In countries such as Ethiopia, where the cost of education is lower, up to 3 students can be supported under one grant. Students are embedded in the project as researchers under the supervision of the PI and his/her faculty collaborators; in the process of conducting their research, they gain applied field research and problem solving skills and, often, a more service-oriented research ethic. All students attend at least one of RUFORUM's Biennial Conferences, where they present poster papers or give an oral presentation on their research; most are also offered opportunities during their training to participate in supplementary support courses to improve research and writing skills.

3.1.1.1 *Trends in participation in the GRG Program*

Over four calls for proposal submission over the period 2009 to 2012, 82 projects were funded under the GRG Program, or on average just over 20 projects per year. This is not a large number given potential applications from 32 member universities. Funding constraints permitted selection of 31% of compliant proposals in 2010 compared to 16% in 2012 (Annex 1, Table A1-1). In terms of participation, just over a fifth of proposals were submitted by women, almost all from the older, established universities. Maintaining quality standards while increasing participation from more recently established, member universities continues to be a challenge

for the GRG. New universities constituted less than 5% of proposals submitted in 2009. But this increased to one third in 2012, likely as a result of RUFORUM mounting proposal-writing workshops in these universities; two-thirds of the 2012 submissions were by faculty who had attended these workshops. Similarly, reflecting the value of the peer review process, in 2010 and 2012 30% of proposals were resubmissions.

3.1.1.2 Characterization of the grants awarded

While design elements reflect the overall objectives of the GRG program and allow maximum access within faculties of agriculture to potential research grants, how to achieve critical mass that encourages spillovers and effective targeting are also potential outcomes to consider for the GRG program design. Although 17 out of the 32 universities have received at least one grant, the older elite universities, namely Makerere, Kenyatta University, Nairobi, Sokoine, and University of Zimbabwe, have received the majority of the grants (see Annex 2, Table A2–1). This is not surprising, given that all of these, except Sokoine, previously participated in the Rockefeller-supported FORUM program and thus had more experience developing proposals. As with FORUM, Makerere University was the most competitive, receiving 34% of the overall grants over the past four years. However, the number of grants they've received has declined significantly over the funding period. This may signal that the other universities are becoming more competitive. It also could reflect that one of Makerere's secret weapons—an internal peer review committee that reviewed and strengthened proposals prior to submission—has been inoperative since the restructuring of the university into a semi-autonomous college system in 2011.

An interesting result of the program was that 72% of the awards were given to junior faculty members, that is to say, to those faculty members who are junior to professor or associate professor. This potentially reflects the fact that senior faculty had other sources of funding. However, the review team also found that faculty perceived GRGs as having relatively high transaction costs (more complex and involved student supervision; significant reporting requirements) relative to the grant's modest size. Thus, both these factors may be potential drivers of junior faculty participation in the program. In terms of program design, offering modest sized grants may be a good mechanism for drawing in newer faculty who might not otherwise have access to funds. Streamlining the reporting process is likely to also be important so that it doesn't discourage participation.

At the same time over a third of the awardees were women, well above the 23% that women represented in terms of compliant proposals. Finally, the partnerships developed within the grants tended to be either national research institutes (30% of projects) or government extension services (25%). Only 6% of projects partnered with an NGO and the same percentage applied to partnering with the private sector as well. To a certain extent this reflected the more applied nature of the research being carried out and suggested that the more downstream innovation system linkages required another vehicle, namely the CARP.

3.1.1.3 *Characterization of supported students and students' research*

Over the first three years of BMGF funding, GRG grants supported 136 students from ten Eastern and Southern African countries, with the majority coming from the older universities that won the largest share of grants (Annex 2). Overall, the program achieved near gender parity with 43% female and 57% male students. Uganda and Ethiopia had skewed distributions, with more than twice as many male students. Kenya was unique in having more female students.

Students' thesis topics were categorized according to research area (Annex 2). More than half of all student research focused on research areas that have traditionally been strong focal areas within the FORUM/RUFORUM's Graduate Research Grants programs; natural resource management topics—soils, water and agroforestry research—constituted 21% of all theses, with crop pests and diseases accounting for 18% and crop production for 15%. However, in the past 3 years, there's also been a substantial amount of research in newer research areas; research on livestock (11% of theses), crop improvement/adaptation (8%), issues related to climate change (7%) and agricultural markets (6%) are among the topical areas that have also featured prominently.

In an attempt to get some sense of research quality, we assessed against 6 indicators, a set of 16 poster papers presented by students at Biennial Conferences. There was a maximum of 4 points for each indicator.

1. Research problem of clear relevance to smallholder farmers
2. Clearly stated research objectives
3. Research methods appropriate for study objectives
4. Research engaged smallholder farmers
5. Figures/tables well constructed and present key evidence clearly
6. Conclusions supported by the evidence

Even with such a small sample, there were definite trends for areas of relative strengths and weaknesses. Students generally focused on research problems that were of clear relevance to smallholder farmers (mean: 3.3), stated their research objectives clearly (mean: 3.4) and used research methods that seemed appropriate for the study objective (mean: 3.5). They did less well (means 2.5–2.8) in the other areas. Approximately 38% of students didn't appear to have interacted with smallholders at all during their research. Generally, the tables and figures that students presented needed greater clarity. Many students also drew conclusions that were not supported by the data they presented. While this was far from a rigorous assessment, these are areas that RUFORUM and its member universities should assess in order to see if they need to give them more emphasis in the future.

Some student research has yielded promising technologies already of interest to farmers. Amongst others, these include a macro-propagation technique for bananas that gives growth

rates and yield benefits similar to bananas produced by tissue culture, but at a fraction of the cost (42.50 Kenya shillings/stem for tissue culture compared to 4.20 for macro-propagation); a groundnut inoculant that improves groundnut productivity in strongly acidic soils in Western Kenya; an AI system for pigs in Uganda, made possible by student research that showed that boar semen remains viable for up to four days at room temperature, making artificial insemination feasible without a cold chain.

In terms of scientific publications, only 11 of the 136 GRG students (8%) had produced a journal article by the time this review was being conducted. Given that student publications are normally produced after students successfully defend their thesis, this somewhat underwhelming result may be attributed to the CGS implementation problems that are discussed below. However, an interesting result here is that students who were supervised by more senior faculty members (Professors or Associate Professors) completed their degrees significantly faster and produced significantly more journal publications than their peers who had more junior faculty advisers. Experience helping students navigate the various stages likely matters. Also, senior faculty may have more time to devote to students, where they have lighter teaching loads; senior faculty also are likely to be more active in scientific publishing, having earned their academic titles this way. Given that most grants are awarded to the more junior faculty, there may be a need to devise mechanisms, such as write shops, to help catalyze the writing process.

3.1.1.5 GRG student employment

Tracer information on 49 GRG students who had turned in their theses was available. 92% of them were employed with research organizations, especially national research centers picking up nearly a third of students (Annex 3, Table A3–1). Academia (20%), extension services (16%) and NGOs (10%) were the other major employers. Overall, based on the high percentage employed, graduates appear to be in high demand.

Students' assessment of the skills and capacities they gained from their course was largely positive, according to the results of an online survey that 70 GRG students participated in (Annex 5, Table A5–1). Eighty percent of the surveyed student felt that the course had fostered substantial improvements in the following skills areas: problem solving, academic writing, critical thinking, teamwork, public speaking and leadership and management. More than seventy-five percent of students also felt it had enhanced their abilities to communicate complex ideas, synthesize & integrate ideas/info, plan & execute complex projects, adapt to changing circumstances, work independently, create & interpret new knowledge and conduct valuable/publishable research. Areas where students felt there was room for improvement included opening up a channel for students to communicate directly with RUFORUM if they are experiencing program-related problems and increasing students' practical exposure relative to formal coursework. A subsequent follow-up with employers should validate whether their new employees bring the right skills, knowledge and attitudes to their jobs.

3.1.2 The Community Action Research Program (CARP)

The CARP program was originally designed to help universities develop capacities for outreach and scaling out successful research outputs from GRG grants, using a value chain or innovations system framework approach. Compared to the GRGs, CARPs have more emphasis on creating and sustaining impact through community and multi-agency engagement; each CARP project also supports at least three students (1 PhD and 2 MSc degrees) and is encouraged to provide opportunities for undergraduate attachments. There's also an expectation that the CARP projects will—through the linkages with the Outreach Project discussed below—pioneer action research and experiential learning models that catalyze the development of more relevant research outputs and outreach-related curricula at the participating universities. The projects have a 3-year timeline and a budget ceiling of \$300,000 per project.

To date, three CARP grants have been awarded, one to LUANAR, formerly Bunda College of Agriculture, (Enhancing Fish Production and Marketing for Food Security and Rural Incomes of Small-scale Producers in Malawi), another to University of Eldoret, formerly Moi University (University Outreach Support to Farmer Associations in Western Kenya) and a third to Makerere (Developing an Outreach Framework for Strengthening University-Farming Community Engagement for Improved and Sustainable Livelihoods). Makerere CARP had a much later start than the other two, which were in their final year of implementation by the time this review was being conducted.

Generally, the larger CARP program has received significant follow-up support. This appears to have been made possible with funds from the African Caribbean and Pacific Science and Technology Program's (ACP) Outreach Project, which is also managed by RUFORUM. ACP support has enabled RUFORUM to bring in the International Center for Development Oriented Research in Agriculture (ICRA), Wageningen University faculty and a private consultant. All of these have shared their expertise in action research and experiential learning. There was a very useful Gap Analysis conducted by ICRA's Richard Hawkins in 2010, before the projects were launched. This took a systematic look at experiential learning vis-à-vis the current teaching and learning approaches and staff capacities at the partner universities; it made practical recommendations for addressing gaps and challenges and taking advantage of perceived opportunities and strengths at the partner universities. The review appears to have laid the foundation for the workshops on experiential learning and action research, which focused on developing the skills and capacities the CARP teams (and other students and faculty) need to incorporate action research and experiential learning approaches into their projects and into university curricula.

The CARPs have also benefited from another crosscutting activity that has strengthened the projects' students. CARP students traveled to Earth University in Costa Rica to observe an innovative educational approach that focuses on developing "agricultural leaders who have

social consciousness, have values and ethics, are concerned with the environment, have scientific and technical bases, are generalists; are lifelong learners and leaders” (Banda, 2012). Based on the review team’s conversations with the Malawian and Ugandan CARP students, it was clear that the trip made a deep impression on them and instilled in them a genuine desire to be an Earth-style leader.

Each CARP also received a support visit from M. Kapiri, a private consultant; the Kenyan CARP team also benefited from Professor Rubahaiyo, a member of the Technical Committee, being part of the follow-up. During these visits CARP teams were challenged to analyze their activities and progress against the objectives they’d described in their original CARP proposals and make concrete plans to institute any self-corrections that project teams agreed were needed.

The review team had the opportunity to meet with both the Malawi and Uganda CARP teams. The main impressions that arose from these meetings:

- Students seem to be the major beneficiaries of the projects (exceptional motivation & commitment, experience, exposure).
- Given the overall program objectives, numbers of players and newness of the approach, a 3 year project timeline is not realistic (establishing and maintaining partnerships, iterative testing and adaptation, achieving impact requires more time than is currently allocated)
- Community members input/partnership in developing the research agenda appears to need work (academic orientation, complex treatments, generating technologies for farmers, rather than co-creation and involving them in decision making process)
- It’s an exciting and innovative program. But the pressure the teams are being subjected (to create curriculum, widespread impact, etc., seems premature and excessive relative to the stage that the projects are at).

3.1.3 The Field Attachment Program Award (FAPA)

This is a small grants award that students apply for directly. It is for students who have already submitted their thesis and want more time to promote some promising result from their research or gain experience (and possibly a job offer) working for their field partner organization. FAPA students have done some interesting work (mycorrhizal inoculation of sugarcane, etc.) and the program appears to add a lot of value for them, based on the write-ups provided to the review team.

The total funding of \$2000 is for a stipend for a 3-month attachment. Students receive half of the money up front and half upon completion of the program. The grants team reports that this program has very high transaction costs and it has been problematic finding an appropriate way

to get the money to students. Given the workloads of the grants team, it is not surprising that this program has not been widely publicized recently and there is little knowledge of the program among MSc students. To date, only 18 FAPAs have been awarded; students from Makerere (44%), Sokoine (28%), Egerton (22%) and University of Nairobi (6%) have been the recipients.

3.1.4 Main challenges of the Competitive Grants Programs

The review team found that RUFORUM's competitive grant program has experienced several implementation challenges, with the most significant being management of the peer review process, delays in the flow of funds, and insufficient monitoring and evaluation of the GRG grants. The rest of this section focuses on these.

3.1.4.1 *Peer review process*

According to Elliott and others (Elliott, 2000; The World Bank, 2010), credible peer review is paramount to the success of any competitive grants program. The process needs to be "rigorous, transparent, anonymous and autonomous" (Elliot, 2000). The review team found there had been process management challenges, which may have influenced peoples' perceptions of fairness.

RUFORUM's proposal guidelines manual outlines several major steps in the peer review process. Prior to official submission, all proposals should pass through an internal peer review at the submitting university; the faculty review board/committee provides feedback that helps to strengthen the proposals. Once the proposal reaches RUFORUM, it goes through an internal compliance check; all proposals that pass this are to be sent out to at least 2 qualified external reviewers. Using clearly defined review criteria for evaluating the proposal, the reviewers give detailed feedback on how the proposal could be strengthened. Submitting scientists are given time to prepare and submit the revised version. Finally, there is ranking and selection of proposals by the Technical Committee.

The review team found that faculty and students at some other member universities felt that Makerere's notable success in grant competitions was the result of preferential treatment by the Secretariat. However, the Technical Committee, who reviewed every proposal received, stressed that the proposals from Makerere were of noticeably higher quality than the others. They attributed this to that fact that Makerere, unlike the vast majority of other member universities, had an internal review board that vetted and improved the proposals prior to their submission.

Finding sufficient numbers of qualified and motivated external reviewers to do a timely and thorough review also has been a challenge. A key issue appears to be the remuneration factor, although having a broader range of research areas also adds complexity to the process. Reviewers are paid \$50 per proposal. But, doing a thorough proposal review takes a

tremendous amount of time and the payment does not seem commensurate with the effort, particularly for experienced scientists who are busy with their own research, teaching, and consultancies. Additionally, getting the payments to reviewers once the job has been completed has also been problematic as there is currently no suitable mechanism for paying reviewers a small sum of money, especially given the workload in the finance department. Several reviewers from outside Uganda complained of having never been paid at all. RUFORUM staff say they mostly resort to carrying money to the Biennial Conferences, where the money can be passed to a reviewer in person.

There have been other spillover effects of not having a large enough pool of reviewers. Initially, the shortage of reviewers prompted RUFORUM staff members to sometimes serve as reviewers. Also, the records showed at least one instance of an external reviewer reviewing a proposal for a call that he was competing in. More recently, during the 3rd and 4th call, the Secretariat has contracted two individual reviewers—one considered to be a science expert and the other, a development expert—to review the full set of compliant proposals. They also try and identify at least one disciplinary expert to review each proposal. Although those close to the process say that having the two consistent reviewers has improved the overall review quality, outsiders might feel that this could disadvantage proposals outside of the reviewers' personal disciplinary expertise.

3.1.4.2 Fund flow problems

The review team found that students supported under RUFORUM grants had been adversely impacted by fund flow problems. The major problems highlighted by Makerere students were:

- **Late registration for their degree program.** Students were not able to enroll when expected because the money was not available in time to pay fees. Faculty complained that they lost some top students this way. For students, it could mean they were out of sync with the academic or seasonal project calendar.
- **Delays in receiving their stipend payment.** Students complained they were not receiving their stipend payments regularly or as expected in either year 1 or year 2 of their program. In the first year, stipend payments continued to delay, even after the funds were received by the project. In the second year, apparent delays in PI reporting delayed disbursement of student stipends. Most students said they took up jobs to survive, leading to part-time studentship. Although these issues appear to be under the control of the PI, it would be good if RUFORUM could help to minimize student hardships due to late payments.
- **Research fund delays in year 2.** As above, delays in receiving 1st year PI reports created delays in the release of 2nd year funds disbursement. This had negative impacts on the timeliness of students' research activities. Students whose research revolved around seasonally sensitive rainfed agriculture activities were particularly affected.

- **Delayed completion of degree program.** The delays in program onset, stipends and 2nd year funds disbursement meant that most students degree program exceeded the 24 month allotted for completion of the MSc program. Publications of research results are delayed as well, as was observed in the students' output record. In the case of Makerere, the university imposes a fine for every month over 24 months until the student's thesis is submitted. Delays in the marking of theses were also a common experience; students requested that RUFORUM put in place a policy regarding timeframes for thesis marking, revisions and defense.

Although fund flow problems were mentioned in every country the review team visited, the team did an in-depth analysis to determine the extent of the problem for the GRG program in general. An analysis of variance (on the numbers of days that elapsed between specific milestone dates during the different grant years) was used to (i) assess if certain key stages experienced more serious bottlenecks than others and to (ii) evaluate whether there was evidence that the grants team was learning to improve the process with time (i.e., reduce delays). The analysis showed the problems were systemic. There were no significant differences in delays at different key stages; all stages showed substantial delays (overall mean delay /stage > 80 days). There were however highly significant differences ($p < 0.000$) between years for each of the four delays assessed. (Graphs for the 95% confidence intervals are presented in the Annex 6, Tables A6–1 and A6–2). Furthermore, the data showed that by 2011 the grants team had managed to bring about substantial reductions in the delays.

A variety of factors contributing to the fund flow problems emerged but the principal ones were: (1) an overly complicated process, (2) delays in PI reporting, (3) the wrong balance in funds allocation between the two years of a project, and (4) lack of clear communication. These are discussed in turn below.

Although the grants unit developed a clear process flow, the potential for coordination failures contributing to delays was high due to too many process steps and the action/reactions required from many different parties. For example, prior to the first disbursement of funds, there's a letter to the VC officially announcing the award. This requires the VC to sign and send back an official acknowledgement and endorsement letter. There's also a pre-grant inquiry certification from an accountant, attesting that the department has the capacity to manage the funds before the project bank account is set up and before the PI can submit the formal request for funds. The latter request needs to be signed by the Dean and provide the correct bank details to initiate the funds transfer. The funds transfer process involves banks, which bring additional complications (especially in Ethiopia, Mozambique and Botswana). Although the whole process may have originally been designed with the best of intentions—to create awareness in the University leadership and among PIs, and to ensure financial accountability and flow of information needed for reporting and monitoring—it's too cumbersome and needs redesign so that delays do not end up disadvantaging students and research quality.

Delays in PI reporting were likewise a big problem. But, the data show the delays are diminishing. The grants team has taken measures to get PIs to submit their reports in a more timely fashion, using a combination of tactics. These include redesigning the grant award letter to include a table with the specific project milestone dates shown, sending out email reminders one month before the reports were due, and, most effective of all, sending out a list, after the report due date, showing who has submitted their reports vs. who has not.

Another factor contributing to the delay in 2nd year funds disbursement is low burn rate of first year funds. Projects receive 50% of the total budget up front. But this is too much relative to the project trajectory, because more expenditure comes with the research in the 2nd year. However, the finance unit cannot release 2nd year funds until a project has used at least 70% of the first year funds. This problem has been recognized and RUFORUM is working out how to reallocate funds across the project to eliminate delays caused by the burn rate issue. The significant reduction in delays in recent years provides evidence that the grants team has been pro-actively trying to address the issues. While there is still a need to reduce the delays much further, it is clear that the grants team has been learning and becoming more efficient.

Across countries, the review team found that communication issues loomed large. Faculty, students and university administrations felt the Secretariat did not communicate clearly, particularly to clarify problem areas such as funds flow. Students, who were especially impacted by the problems, found themselves with no channel for communication as they were told the Secretariat would not communicate with them directly.

3.1.4.3 Monitoring and Evaluation

Key people who have been closest to the Competitive Grants programs recognize that insufficient attention to M&E has been a significant shortcoming of the Competitive Grants Programs. The insufficiency of funds relative to the scale of ambition (addressing as many systemic bottlenecks as possible in African higher agricultural education/ research), left the small complement of staff stretched and stressed. The insufficiency of funds for the PhD programs, in particular, loomed large and diverted a lot of staff time away from the core CGS business. In an effort to mobilize resources and make good on commitments, the Secretariat staff started going after grants opportunistically rather than strategically. The grants involved activities that were not well linked to the business plan, did not include overheads, and diverted more staff time away from the core. The minutes of the TC meetings show that they recognized the M&E deficiency for the grants programs and stepped in to undertake field-based monitoring of the projects. These field visits appears to have been the only effective mechanism in place for monitoring the progress of PIs and students on the ground.

3.1.4.4 Recommendations regarding the Competitive Grants Programs

The Secretariat made a good faith attempt to put in place best practices and procedures for their competitive grants programs, as described in various reviews of competitive grant

programs (World Bank, 2010; competitive grants in the new millennium). The four calls for proposals supported by BMGF funding have clearly articulated the funding priority areas, as well as the guidelines for competing for funding and the different criteria that enter into the review process. They have developed a grants manual that lays out the same.

The conceptualization and overall design of the RUFORUM GRG program is excellent; the program is clearly motivating students and making converts of them; most are eager and excited to do research that is relevant for their country's smallholder farming populations. Overall, the supported students value the training they're getting; they acknowledge it is enhancing their skills and abilities to contribute to their country's agricultural development. But the GRG program has not been without its implementation challenges, particularly with regards to the peer review process, funds flow, communication, and M&E. The recommendations focus on these.

Program Design Recommendations:

- a. Right now there are two RUFORUMs. One is aimed at addressing the systemic bottlenecks for HAE and the other is an experiential learning program whose aim is to train young scientists to do good research in service of their country's smallholder farming populations. The Secretariat needs to clearly define what it is and isn't; what is in its purview and what isn't. If the competitive grants program will continue to be the core, the universities will have to be more fully engaged. The Secretariat has a critical role to play in strengthening their key capacities—for internal peer review, proposal writing, relevant research, developing their own internal monitoring system to make sure faculty and students are on track. But then the Secretariat needs to pass the stick to give their work a chance of being sustainable.
- b. The Board should deliberate about potential trade-offs involved in instituting a policy to cap the number of proposals (or combined \$ value of all competitive grants) that any one institution can be awarded.
- c. It is not likely that the program will be able to achieve a critical mass of high quality graduates if a member university only receives 1 or 2 grants over the lifetime of the program. There's a need to consider additional mechanisms to help achieve this goal.
- d. The program need to identify and institute appropriate mechanisms for giving Deans greater involvement and power in decision-making, design and implementation of RUFORUM programs.
- e. The Biennial Conferences are the young scientists' capstone event. Some of the value of these conferences has clearly been lost when PIs and students are not fully at the center of it. Thus, mixing in other high level activities at these events is something that needs to be weighed carefully and deliberately.
- f. The Secretariat should allow the CARP projects a longer project timeline. Five years is

more realistic than three.

Program Implementation Recommendations:

- a. The Technical Committee should reach out and provide guidance, where needed, to the Deans at all member universities to facilitate the establishment of their university's own internal peer review committee. Clearly, just mentioning it in the grant guidelines is insufficient.
- b. The Secretariat should continue to offer proposal-/technical writing workshops, especially at new universities. These seem to be effective at enhancing their ability to compete.
- c. The grants program should avoid contracting any reviewer whose current or former institutional affiliation might create a perception of a conflict of interest.
- d. It's important to invest the money needed to ensure that each proposal can be reviewed by at least 2 well-respected external reviewers with disciplinary knowledge and the willingness to do a thorough and timely job, providing quality feedback. Iterative development of a high quality proposal has been a hallmark of FORUM/RUFORUM from the beginning; it is certainly one of the program's overall best practices for strengthening the capacities and commitments of young scientists. Providing substantive quality peer feedback that aids one in winning grants has helped to jump-start the careers of many young, newly-minted scientists who go on to become leaders at their university and beyond.
- e. Members need to be educated/reminded about the TC's authority to balance the proposal portfolio. Although the majority of proposals are awarded on the basis of the average score of reviewers, the TC has been given the authority to select proposals that have scientific merit but are less well-written than higher ranked proposals, in order to balance the grants portfolio on the basis of gender or other important criteria that might otherwise not be well represented.
- f. The grants program and finance office need to improve funds flow by streamlining steps and reducing delays. If more lead-time is required (between approving a grant and enrolling students) then let that be built-in, even if it means beginning the process a year before the projects will commence.
- g. Sufficient funds need to be availed to support the TC as the program moves into its next phase. The review team recognizes their central role in ensuring research relevance and quality. This must continue. But, the review team believes the TC also needs to be enabled to continue to play a key oversight role, which would include field-based monitoring of the grants, undertaken in concert with at least 1 member of the grants team. Although these are expensive, the review team believes them to be a worthwhile investment; the insights that grow out of these visits will feed directly back into the

structural improvement of RUFORUM's competitive grants programs.

- h. The recruitment of new TC members needs to continue to be strategic, as in the recent addition of a gender specialist. Looking to the future, strategic recruitment might target semi-retired or retired individuals from each region to serve as core TC members. These individuals would be experienced scientists who have demonstrated a strong commitment, throughout their careers, to young people and the development of African smallholder farming and still want to remain relevant in retirement. With both the time and passion to devote to establishing closer relationships and more regular mentoring sessions with RUFORUM's young scientists (junior faculty and MSc students), the TC could help bring back some of the critical personalized attention that has been lost as FORUM has grown into RUFORUM. The review team met many members of university faculties who had been a part of FORUM. To a person, they reminisced fondly about the strong mentoring relationship that Barati and her team established with them when they were young scientists supported by FORUM; the small group interactions and flow of quality feedback were some of the most memorable and enriching parts of their FORUM experience.
- i. The Secretariat should offer internships to post-graduate students studying management and business administration to do research on improving management processes and engagement with grantees of RUFORUM programs.

3.2 Evaluation of the Regional Degree Programs

The regional degree programs are designed to capture economies of scale at a regional level, to innovate in curriculum design, to fill crucial gaps in degree offerings in the region, and to ensure a quality standard against which member course offerings can be compared. Regional degree programs build on the experience of the African Economic Research Consortium and the Collaborative MSc in Agricultural and Applied Economics (CMAAE), but rather than developing regional degree programs in a particular discipline, RUFORUM had the more difficult task of deciding which degree programs to target. Regional degree programs were a particular innovation possible with the core funding provided by BMGF and are thus still in a process of evaluation, learning and adaptation. The BMGF provided funding for the design and implementation of the MSc in research methods. The regional MSc's focus on bridging to other disciplines and skills not currently found in the region, such as to applied statistics, communication, and molecular biology.

The regional PhD program was a direct response by the Secretariat to member VC requests on the board. PhD programs are relative orphans in universities across the region and essentially are an occasional research program carried out under a professor. Yet, the member universities recognized the critical shortage of PhD's to fill both their expanding faculty needs as well as the needs of the national agricultural research system, whose senior staff were retiring. These regional degree programs would be course based, draw on disciplinary standards in the North

and the best practice in the South, have effective quality assurance provisions, pool the best teaching talent in the region and would establish a standard for PhD's across member universities. These programs would build on scale economies across the region. However, such programs rely on both resources coming from host universities as well as financial support from development partners. Building a sustainable financial base for these programs has been an ongoing challenge in mounting these programs.

Since 2008 RUFORUM has been implementing three MSc and five PhD programs that are hosted at different member universities. The MSc programs include Research Methods at Jomo Kenyatta University of Agriculture and Technology (JKUAT) – Kenya; Agricultural Information and Communication Management Programme (AICM) at Egerton University – Kenya, University of Nairobi – Kenya, and Haramaya University – Ethiopia; and Plant Breeding and Seed Systems at Makerere University – Uganda and the University of Zambia.

The PhD programs include Agricultural and Rural Innovation Systems at Makerere University; Aquaculture and Fisheries at Lilongwe University of Agriculture and Natural Resources, Bunda College, University of Malawi; Dryland Resource Management at the University of Nairobi – Kenya; Plant Breeding and Biotechnology at Makerere University; and, Soil and Water Management at Sokoine University of Agriculture –Tanzania. This evaluation seeks to review RUFORUM's regional MSc and PhD programs in an effort to establishing the impact of these programs on faculty research and training in agriculture, identifying the innovations made and skills built, revealing the effectiveness of the programs and their role in improving access to high quality post-graduate programs.

3.2.1 The Regional Approach

The question arises: What makes a degree program regional? The regionality of a program can be gauged by three key elements. First, the curriculum is developed jointly, which requires that the member universities develop a coordinated process of designing the course curriculum to ensure there is uniformity across the universities offering the same course. Second, there must be joint implementation of standards across universities with regard to teaching, setting of examinations, grading and evaluation of courses. This also raises the quality of the programs at each university. Third, there must be the capacity for students and faculty to move across universities in different countries. There should be representation of students and faculty from the various countries where these universities are located. Optimally the programs rely on faculty exchange of the best expertise across the region, while students must be encouraged to take up courses in foreign countries.

The following section provides a closer analysis of the 3 MSc and 5 PhD programs that are currently under implementation by RUFORUM. The review focuses on one university per degree course for a hopefully deeper and more informative inquiry. The rationale for the

program, program design, outputs and outcomes are reviewed to facilitate a more detailed analysis of each program.

3.2.2 MSc Program Structure

3.2.2.1 *MSc in Research Methods*

The program is hosted at the Jomo Kenyatta University of Agriculture and Technology (JKUAT) in Kenya. It was launched in 2009 with subsequent cohorts of students admitted in 2010 and 2012.

Program Rationale: Research methods, including statistics and biometry underlie effective applied science, and yet there is a decline in the number of professionals in these areas. Studies done by the Forum for Agricultural Research in Africa (FARA) in 2005 and the Technical Centre for Agricultural and Rural Cooperation (CTA) in 2004 pointed out that this was a major gap area in most African National Agricultural Research System, with the majority including universities, not having any Biometrician/Research methodology specialist in place to guide research, leading to poor quality of research outputs in Africa. The lack of biometrician support was repeatedly mentioned by graduate students under FORUM (RUFORUM predecessor program managed by the Rockefeller Foundation) as a major weakness in their training. Other recent evaluations also point to rapid changes in research methodology. Thus, following regional consultations with stakeholders in the ECSA region, RUFORUM decided in 2006 to launch a regional program to train a pool of research methods specialists that would be piloted initially in two Universities—Jomo Kenyatta University of Agriculture and Technology, and the then Bunda College of Agriculture (University of Malawi).

The program's two main innovative features are that it is a professional training that links methods to the context of research. The quality and reach of this initiative is enhanced through linkage to research systems in the region and use of experts from across the region. The program focuses on development of the skills and attitudes required to support research, orient students to think creatively and value teamwork and partnerships, and prepare them for the leadership roles that will be expected of them on completion of their studies.

Program Design: This is a two-year program that is structured into six bridging courses for those requiring upgrading, eight core courses and electives. All candidates are required to take and pass all core courses and at least two electives to proceed to their internship/research work.

The program has one year of modular taught course work and one year of attachment /research and thesis. The attachment /research phase is oriented towards practical and problem-solving training and experience. During the attachment period, the student works with an established, on-going research team as a trainee 'research method professional' and provides research methods support to one or more research projects. Each student is attached to an ongoing

research project in a university or a research organization within the region for a period of three semesters.

The method of assessment for this program is coursework and thesis. Students sit coursework examinations on semester basis, and are expected to pass all end-of-semester examinations in core courses and respective elective courses, to qualify and proceed to do their attachment and research (in Year 2). External examiners evaluate the assessment aspect of the program and students evaluate the courses offered as part of quality assurance. Each student conducts a research project, during the internship/attachment period, with a strong component of applied statistics and teamwork, as partial fulfillment of the requirements for the award of the MSc degree.

Program Outputs: The program has developed a model platform for students and lecturers for course delivery, discussions and communication. Other outputs include the publication of 35 theses and 35 abstracts; program guide books such as Statistics Made Simple (SMS), Graduate Environment and Agricultural Research (GEAR) book, Guide to developing and teaching research methods modules, and a Field Attachment Guide; and a journal article titled: Research Methods: Breaking Down the Silos within Academe through interdisciplinary research have also been completed.

Program Outcomes: Graduates of the program are expected to have the capacity to engage and network at local, regional and international conferences to present their research findings and training experiences. At local level, the students organized an internal conference at the university in May 2011 where they prepared, presented and peer reviewed the papers. As a result of the enhanced skills, graduates of the program are appreciated as being competent and hands-on professionals who have been quickly absorbed into the job market, especially in the areas of research and methods and evaluation. Table A7–1 (in Annex 7) provides details on the work placement of some graduates of the program.

The program has also stimulated partnerships between the host university and international research organizations such as the World Agroforestry Centre and the Statistical Services Centre of the University of Reading.

The capacity of faculty has also been built as reflected in the increased staff competency including capacity and skills for content digitization and online course facilitation. The staff exchange program has also played a part with 8 nationals having participated as external resource persons, while 5 regional (ECSA) and 3 international staff have also benefited from the exchange program.

Program Challenges: Having enrolled the first cohort of students in 2009, a review of the student data in the program reveals that at the initial stages of implementation began as a regional program. However, over the years, the program has taken on a national character with less representation of students from the region. As Table 6 indicates, there was a drastic

decline in the number of students in cohort 3 compared to the first two cohorts. In addition, the number of students enrolled into the program is far much less than the number of applicants – with 44% enrolment in 2009, 55% in 2010 and 21% in 2012; and the number of enrolled students steadily declined each year as the program progressed. These trends essentially reflect funding constraints, particularly in supporting students from across the region. The table also indicates that at least about a quarter of the students in each cohort are female. This is a fairly good representation, considering that the number of female students in graduate schools are often less than in lower levels of education. However, this number can be increased by encouraging female students through targeted scholarships for women. This is an area that RUFORUM needs to continue to emphasize.

Table 6: Student numbers in the MSc. Research Methods Program (2009-2013)

Year of Intake	No. of applicants	Numbers (% females in brackets)	Status of Students	Countries of origin of the students
Cohort 1 (2009)	65	29 (34%)	28 graduated by end of 2012; 1 abandoned course	Kenya, Uganda, Tanzania, Zambia, Ethiopia, Burundi, Malawi, Zimbabwe
Cohort 2 (2010)	59	33 (24%)	Final Stages towards graduation	Kenya, Tanzania, Uganda, Rwanda, Burundi
Cohort 3 (2012)	19	4 (25%) + 12	The 4 students are currently starting the 3 rd trimester of course work. The program expects to admit 12 students sponsored by an Intra-ACP Academic Mobility Project coordinated by Makerere University	Kenya, Uganda

Source: RUFORUM MSc. Research Methods Program documents

Program Way Forward: The research methods MSc fills a critical gap across agricultural faculties in the region and at the same time provides modules and short courses for students and principal investigators participating the competitive grants program. The program in a sense produces critical regional public goods and at the same time is central to ensuring quality research in RUFORUM's other core program. Given that the program is a core activity of RUFORUM, the issues going forward revolve around maintaining the regionality of the program, continuing to evolve the curriculum by drawing on innovation in the field, franchising the course to other member universities, and exploring the potential of eLearning in better preparing post-

graduate students in the competitive grants program. There is potential to continue to innovate in the design of this program.

The regionality of the program can only be maintained through sustained funding. This covers not only student stipends but also such activities as interchange of teaching staff for particular modules, continued development of the curriculum and course modules, and continued development of educational materials focused on examples from smallholder agriculture in the region. As with the PhD programs, it has been difficult for the Secretariat to develop proposals that attract longer term funding for individual courses. Creative means of resource mobilization in the core area of regional degree programs is a critical area to develop for the Secretariat over the short to medium term—discussed in more detail below.

The research methods course has lost its link to the Research Methods group at ILRI and to the Statistical Services Centre at Reading University. These two groups provided much of the inspiration for the initial curriculum development and the applied work of both groups continues to evolve, with a particular focus on sub-Saharan Africa. Their work on managing data flows and integrating heterogeneity and spatial analysis into research methods builds off of smallholder research problems. This link was lost due again to funding constraints and yet targeted links to these two groups would help in ensuring that the course stays abreast of the best practice in applied research methods.

Access to the research methods course, however, remains limited in relation to the demand, either due to the limits on student numbers or the very short course offerings to RUFORUM students in the competitive grants program. The course has been put up on the Moodle platform at JKUAT, but it does not provide the interactive potential that is needed in designing research for a student's thesis. This would require an experienced research methods lecturer to facilitate course modules or research design through the Moodle platform, probably best through the RUFORUM website. Continuing to produce open educational resources—drawing on approaches to agricultural research problems in the region—could enhance all of this.

3.2.2.2 MSc in Agricultural Information and Communication Management (AICM)

The program was launched in 2008 at Egerton University and the University of Nairobi, both in Kenya, with subsequent cohorts of students reporting in 2009, 2010, 2011 and 2012. The Haramaya University in Ethiopia implemented the program in 2010 and has had subsequent cohorts in 2011 and 2012. It is expected that the program will be launched at Makerere University in Uganda in 2014.

Program Rationale: The development of this program at postgraduate level was strongly supported by the findings of a training needs assessment undertaken by RAIN in 2005. First, it was established that agricultural professionals of all cadres in the ASARECA region with AICM skills are few or lacking. More specifically, agricultural researchers, educators and technologists in national agricultural research institutes, universities and extension services lack skills in

communicating research results to farmers and extension agents. Secondly, agricultural research results are not known or effectively transmitted to the international research community. As a result, African concerns are not taken into account in setting the international research agenda. African research is not easily published and does not feature in international research abstracts. Thirdly, later studies established that existing university programs did not have adequate ICT/ICM content, explaining the low ICT/ICM competency among graduates. Fourthly, programs focusing on AICM training at university level did not exist in the ECSA region.

Program Design: The RUFORUM Secretariat and selected member universities participated in the training needs analysis and the development of the MSc AICM curriculum. The program takes 18 to 36 months to complete and consists of coursework and thesis or project. The thesis option consists of 24 credit hours of core course work and a thesis. The non-thesis option consists of an expanded course work of 24 credit hours of core, 9 credit hours of specialization courses, and elective courses totaling 6 credit hours, and a project. The curriculum is delivered face to face at all the universities on a semester basis. With 15 AICM courses having been developed as e-courses, the program is delivered using a blended approach. The University of Nairobi has expressed an interest to implement MSc AICM using the distance learning approach combined with eLearning. All candidates are required to pass all core courses and at least 2 electives to proceed to their research work.

Program Outputs: The three universities where the program has been launched have trained just over 100 AICM professionals. Some of these have graduated and others are at the research phase of their academic work. Capacity building for the universities has been in the area of e-learning and e-content development. To date 15 AICM modules have been converted to e-format and 8 have been uploaded on the RUFORUM module system. CABI and RUFORUM are collaborating in an internship opportunity targeting AICM alumni.

Program Outcomes: The program has produced graduates whose skills have been enhanced in various areas that are in demand in the labor market: (i) identification and application of ICT tools, media and techniques in collecting, organizing and disseminating agricultural information products and services; (ii) design and development, management and evaluation of computer-based agricultural information and knowledge systems; (iii) packaging and repackaging agricultural information content for different audiences; (iv) development, selection and use of appropriate media, ICT tools and techniques to communicate agricultural information and technologies to suit different audiences; (v) assisting with scientific editing and publishing; and, (vi) facilitating sharing agricultural knowledge, including indigenous knowledge. Another key aspect that is worth mention is the demand of the program, which has spread to West Africa.

Program Challenges and Way Forward: The development of the AICM regional MSc has followed a different path to that of research methods. The course was developed regionally and one cohort of students from the region (supported by the SCARDA program) attended the first

course offered at Egerton University. Since then the course as given at Egerton, the University of Nairobi, and Haramaya University draws essentially on students from that country. Students at the Kenyan universities are essentially self-sponsored, reflecting the demand for the course and students at the Haramaya University have benefited from sponsorship of the Ethiopian Government. Some students have received supplemental funding for their research from RUFORUM. The Ethiopian example provides an opportunity that RUFORUM could pursue in conjunction with the representation on the Board, namely developing partnerships with African governments to provide student scholarships to nationals in RUFORUM member universities.

The advantage of this franchise approach to mounting the AICM MSc in the region is that each university becomes responsible for sustaining the course. An indication of the perceived value of the course is the fact that Makerere University and Mekele University are preparing to mount the course. The one missing element that is provided in a regional course is the ability to draw regionally on expertise to teach particular modules that is not available in individual universities. Looking forward, the implementation of distant learning combined with e-learning would be one means of filling this gap and again individual modules could be taught using the Moodle platform and allowing interaction with the lecturer. The University of Nairobi has experimented with this approach, which suggests good potential. The requirement would be for a coordination mechanism at the Secretariat to match available expertise with teaching needs at the different universities. Finally, the program offers introductory or remedial course units for students without an agricultural or an ICT background, which opens up opportunities for many BSc graduates interested in the program. It also broadens the pool of applicants for admission into the program.

3.2.2.3 MSc. In Plant Breeding and Seeds Systems

The MSc. program in Plant Breeding and Seed Systems is offered at Makerere University in Uganda and at the University of Zambia. This review focuses on the Makerere-hosted regional program, which was launched in 2008. Subsequent cohorts of students reported in 2009, 2010, 2011 and 2012. A call for applications for the year 2014 has been issued, targeting students from 10 African countries.

Rationale: Plant breeding, relying on judicious use of plant genetic resources for food and agriculture, has supplied adapted crop varieties to many countries across the globe and ensured food security. But because of limited capacity in Sub-Saharan Africa, among other factors, the impact is still limited in the region. Thus, strengthening plant breeding and seed systems has been identified as a priority area for increasing agricultural productivity and attaining the 6% growth in the agricultural sector as envisioned in the Comprehensive African Agricultural Development Program agreed by African heads of state and governments. The process of producing improved varieties however requires a strong human resource base backed by long-term commitment to plant breeding and functional seed systems. This process can be made even more efficient through the application of biotechnology, as for example with

marker-assisted selection. The proposed MSc program therefore aims at integrating traditional plant breeding, biotechnology and seed system approaches to increase the rate of developing new varieties and access to improved seed. It aims at training a pool of middle career professionals (MSc graduates) able to initiate and manage plant breeding programs and with a business orientation to ensure that their products (improved seed) reach the market.

Program Design: The program covers a period of two years made up of four semesters with the minimum completion period of 18 months and a maximum of 3 years. The study program consists of one-year course work and one year research leading to writing a thesis. To build on their skills and for exposure, students are required to attend Faculty of Agriculture seminars and participate in scientific activities. As part of quality assurance and building competencies beyond the technical, students in the program undergo short skill enhancement courses (5–7 days): proposal writing, journal publishing, scientific data management, commercialization of seed, and project management.

Program Outcomes: Statistics provided on student numbers in the first three cohorts (shown in Table 7) indicate that the majority of the students manage to complete their studies and graduate. This may be due to the lower number of students in the program, which is occasioned by the limited ability to accommodate more than 20 students, despite receipt of an average of 45-50 applications.

Because of the quality of training the program offers and the fact that majority of students complete their studies within the 2-year time frame, this program is currently considered one of the best MSc programs in Africa. In 2012, the university received an award for the program by AGRA, which was presented by H.E. Dr. Koffi Annan, the former United Nations Secretary General. From then, the program has attracted funding from AGRA and BMGF with expected students' support in 2013 from the Cornell University led Cassava Project.

Table A7–3 (Annex A7) shows the current employment or advanced study of 20 graduates of the program from the first cohort. It is commendable that all the students in that class met the requirements of the program within the given time and graduated. From the table, 7 out of the 20 graduates have already been admitted for PhD studies, with only one returning to Makerere University and the other 6 admitted in universities in Australia (1), Germany (1) South Africa (2) and USA (1). This reflects favorably on the quality of the preparation that the students are receiving. The other 13 graduates are working with agricultural institutions in Burundi (2), Rwanda (7) and Uganda (4).

Lecturers are drawn from a number of universities in the region, NARS scientists (especially NARO) and CGIAR (especially CIAT, IITA, CIMMYT and CIP) and private seed companies. And, in what is seen as efforts to encourage regional representation and improved quality assurance, the program has invited visiting experts for teaching and/or supervision. Cohort 1 had a total of 16 members of external faculties (7 from other local universities, 8 regional and 1 international), while Cohort 2 had a total of 14 members of external faculties (6 from other local

Table 7: Student numbers in the MSc. Plant Breeding and Seed Systems Program (2008–2013)

Year of Intake	Student Numbers (% females in Brackets)	Status of Students	Countries of origin of Students
Cohort 1 (2008)	20 (38%)	All graduated	Rwanda, Uganda, South Sudan, Burundi
Cohort 2 (2010)	19 (37%)	12 have submitted their thesis; 7 are finalizing writing	Uganda, Rwanda, Mozambique, Tanzania, Kenya, Uganda, Malawi, Ethiopia
Cohort 3 (2012)	21 (48%)	Currently Undertaking Course-work	Uganda, Mozambique, South Sudan, Rwanda, Kenya, Tanzania

Source: RUFORUM MSc. Plant Breeding and Seed Systems Program documents

universities, 8 regional and 1 international). However, it is important to note that the commitment and personalized attention to students brought by three course champions who provide the spark to the program.

Students take their internship with seed companies in Uganda, while their research is conducted with the local national plant breeding programs and with the CGIAR centers. An annual review of the program, including proposal defense, is held and involves the participation of a wide range of experts, and as much as possible, representatives from students' host countries. Students in the program also provide feedback on the courses and attachment. The program also follows up on progress of students and reports the same in the RUFORUM Monthly Newsletter (see www.ruforum.org) and the program website.

Program Assessment: The Makerere University MSc. Plant Breeding program is a very different program from the other two. It targets a core discipline rather than pushing the boundaries of agricultural faculties into synergies with other disciplines such as communication. Moreover, the program builds on funding priorities in the region, particularly from AGRA and BMGF. With funding not a limiting factor, the program was able to exploit the full potential of a regional program. The approach built on an experienced team at the host university, where the development of the biotech labs had been supported over the last decade by a series of donors. Moreover, Uganda provided an appropriate environment to link to other actors in the national research system, the CGIAR, and private sector seed companies. There are plans to develop a video conferencing facility so as to link to other knowledge centers, such as Cornell University. The program could and is already providing a useful vehicle for bringing synergy among different BMGF programs in the region and is especially providing the breeding capacity embodied in well-trained scientists for the region.

3.2.2.4 *Overall Assessment of the Regional MSc. Programs*

As a new program area for RUFORUM in 2008, the three regional MSc degree programs have in their different ways succeeded beyond the original expectations. What was not planned for is the fact that each of the three MSc courses evolved quite differently over the 4 year period, primarily as an adaptation to different funding contexts. The three “models” provide a useful framework to evaluate the question of where does RUFORUM go from here in respect to regional MSc programs. The assessment of that question is closely linked to funding opportunities, on the one hand, and to the establishment of an RUFORUM brand in this core area of its business plan.

The more strategic choice that RUFORUM has to make is whether to maintain a limited stable of MSc degree courses under the RUFORUM brand or to act as more of an incubator and designer of innovative MSc degree courses that are then franchised to interested member universities. This decision problem is a reflection of the wide range of courses that potentially come under a faculty or college of agriculture and how a particular university chooses to brand its program in a competitive market for well-qualified students. Moreover, this is quite a different decision problem to the establishment of regional PhD programs, which is discussed in the next section. This review does not have a recommendation on this question, but rather will frame some of issues that go into such a decision.

The experience with the AICM course offers a perspective on the incubation and franchising model. If continuity of funding is uncertain or if a particular donor has an interest in funding a course for a limited period of time, for example AGRA in soil health or agribusiness, then there is a strong argument for the AICM model, and where RUFORUM could continue to provide a supporting role through a eLearning capability through the Moodle platform and where facilitated courses could also be made available. RUFORUM would also act as a bridge to international expertise in course design in the prospective area, a role that has not been maximized in curriculum design. The experience with AICM and to a certain extent with research methods suggests that the course should add an innovative degree offering to a faculty’s overall program in order to ensure sufficient uptake. There are a range of courses that could potentially meet such a standard, for example MSc’s in agroecology, farming systems, food based nutrition, adaptation to climate change, or rural innovation, as examples of current areas of investment by development partners. The RUFORUM brand would then rest on course design, course innovation, and quality of open educational resources (OER).

The plant-breeding model moves RUFORUM more to a center of excellence model, which is also an approach to PhD training. The argument here is that there is an infrastructure constraint, e.g. a fully functioning biotechnology laboratory, or a cadre of faculty that limit the development of the course at other member universities. Moreover, there is the expectation of sustained funding for the course. It is not out of the question that such MSc courses could be developed at those universities hosting the RUFORUM PhD programs. However, it is probable that these

conditions would hold for only a very limited number of courses, which would encompass then the RUFORUM brand.

The research methods MSc is in many ways relatively unique because of the role it plays in supporting all the other core program areas of RUFORUM and in insuring the quality of those program areas and, in essence, the RUFORUM brand. The challenge in this MSc is to expand access and utilization of its core modules, to link to other sources of knowledge and innovation, and to test eLearning capability in expanding access. Thus, RUFORUM needs to maintain the regionality of the program but at the same time explore the potential of franchising the course to other member universities.

One other model, which would tend to overstretch the limited capacity in the Secretariat and move the program away from its regionality principle, is to support national initiatives in strengthening HAE. For example, in Rwanda, the capacity to teach and research is under developed with a severe shortage of trained agricultural scientists and researchers. In realizing the crucial strategic importance of developing and maintaining a robust agricultural system, the government has prioritized agricultural research for growth and development. A newly founded organization, the Rwanda Agricultural Board (RAB) has benefitted from hiring MSc graduates trained through RUFORUM member universities in Kenya and Uganda and short courses run by RUFORUM. Despite these gains, RAB only has a third of the scientists it needs to achieve maximum effectiveness (Lindow, 2012). In response to the need to build local capacity, the National University of Rwanda plans to implement three MSc programs in 2014 and three PhD programs in 2016, namely in Animal Science, Plant Protection and Phytosanitation, and Plant Breeding and Seed Technology. In the design of these courses the National University can exploit the RUFORUM network in assessing course design across member universities, including RUFORUM's regional MSc course in plant breeding.

in some courses students have taken four years to complete courses whose time frame is 18 months to 3 years. Out of the four years, the students have taken two years for course work and thesis preparation and another two years to defend the thesis. RUFORUM will need to ensure there is regular reporting on student progress with reasons provided for delays in the course of their studies. Suggestions on how to ensure that students who lag behind can effectively be enabled to complete within the maximum time frame, without compromising on quality, should be provided and pursued with the necessary support of RUFORUM.

It is critical to maintain high standards and assure quality of the graduates coming out of the programs. The "RUFORUM Brand" depends on such quality standards. The membership strategy, focus of activities, and quick response to solve problems are all parts of doing this. A "brand" should also guide individual behaviors within RUFORUM Secretariat and Networks. Further, as one of RUFORUM's regional programs, it carries RUFORUM's "DNA" and therefore the Secretariat must have an oversight role in quality assurance, either directly—e.g., facilitating skill enhancement for staff and students, facilitating shared lesson learning and communication,

tracer studies—or indirectly by providing a regional platform for the host universities and other partners to mobilize resources for the programs. The oversight, quality assurance role becomes more critical as different universities roll out the program using the same curriculum.

3.2.3 An Assessment of the PhD programs

The mounting of regional PhD programs represented a jump step in the ambitions of RUFORUM. The regional MSc programs were an effort to innovate, to gap fill, and to set a standard across the MSc programs offered by member universities. The development of regional PhD programs represented a RUFORUM-led effort to mount quality PhD programs in the region. Few other programs had attempted such a goal, basically AERC's PhD program in economics and the plant-breeding program at the African Centre for Crop Improvement at the University of Kwa Zulu in South Africa. The PhD program was a direct response to demand from the Board but it moved RUFORUM into a program area where it alone operated and would effectively establish the credibility of developing PhD programs. RUFORUM has established five of these regional degree programs, namely dryland resource management at the University of Nairobi, plant breeding and biotechnology at Makerere University, soil and water management at Sokoine University, aquaculture and fisheries at University of Malawi, and agriculture and rural innovation managed jointly between Makerere, Egerton, and Sokoine.

The model chosen for these PhD programs is best characterized as a center of excellence model. Four of the five PhD programs are based at member universities that have developed particular expertise in the area over the last couple decades. These are the longer established, elite universities in the region. The agriculture and rural innovation PhD was designed as a joint program between the three universities, with design features of the European Erasmus Mundus Model. This follows a more regional model, where some courses are taught at the home university and others are taught only at one of the designated universities with that expertise. This approach is similar to the AERC model, which has a joint teaching facility for the more specialized courses.

The fundamental change from current PhD degrees in the region is that RUFORUM has a one-year course component followed by a two to three year research based thesis. The curriculum is designed at a regional level, in many cases with input from northern universities. There is faculty interchange in the delivery of the courses, in many cases involving lecturers from participating northern universities. A good example is the participation of Wageningen University in both the agriculture and rural innovation PhD and the soil and water management PhD. The courses are designed to provide both disciplinary depth and relevance to the problems of African agricultural systems. Field based skills in the context of rainfed production systems with multiple constraints, variability over time, and significant spatial heterogeneity are critical to producing effective scientists. In this regard a review of several of the course curricula would suggest that the significant body of research in East and Southern Africa has not been integrated as effectively into the course modules as is necessary to provide an understanding of

the research frontier in the region. Moreover, field based research methods are fundamental to developing the essential skill sets for PhD scientists. Quality assurance in this area remains under developed and the integration of the research methods modules has no coordination or focal point. The development of an interactive Moodle platform would add an important option for PhD students in the development of their thesis research.

Regional programs require consistent funding, where critical cost components include faculty exchange, peer review, student stipends, and student research costs. In the implementation of the regional PhD programs there was ambiguity in which cost elements would be covered by RUFORUM, the host university, or the student herself. Following on the experience with the regional MSc programs, there was the perception that all costs, including student fellowships for tuition, stipend, and research would be covered by RUFORUM, at least for the first few cohorts. At the same time there were expectations from the board that these programs would be launched. In hindsight this created a number of inadequacies in implementation, particularly (1) over extension of Secretariat capacity in the launch of so many degree programs where a phased implementation would have been more practical, (2) program implementation without having secured funding in place, (3) unrealistic expectations on the part of host universities as to what costs would be covered by RUFORUM, and (4) over commitment by the Secretariat of cost coverage before funding was secured. After a bumpy start for several of the degree programs, some level of funding has been secured for four of the five programs, with the aquaculture and fisheries program has been scaled way back due to funding constraints. At the same time, the dryland resource management PhD, which was funded by the Rockefeller Foundation, is now without funding. Moreover, funding often only covers certain components and support for student research often remains a difficult area to finance.

The focus in the short term needs to be on consolidation of these programs and achieving clarity on the relative responsibilities of the Secretariat and the host university. Funding is a key issue in deciding how to go forward. Currently funding comes in bits and pieces of support for particular elements, primarily student fellowships, which are piecemeal and one off. This results in significant program management costs at the Secretariat, particularly for the finance department. AGRA's funding of the soil health program provides the broadest support but such funding has been difficult to secure. Funding in this area appears to break down into sources for student fellowships, which are labor intensive, European university development programs usually twinned to a northern university, and occasional regional capacity building programs, such as DFID's RAIN and SCARDA programs administered by FARA. The TEAM Africa initiative (discussed in more detail below) is in part designed to bring more coherence to donor funding in HAE in Africa. Although still very much in a planning stage, the initiative may be a vehicle for developing sustained funding for the PhD programs, with the potential of developing twinning arrangements with northern universities. However, this requires some level of mix and match with particular donor programs, unless funding sources at a regional level can be developed, as for example with the CAADP trust fund for capacity strengthening.

Two primary features of the regional PhD programs will attract funding and allow them to grow. The first is cost in relation to other alternatives. It would be very useful for the Secretariat to develop per student cost estimates for the regional programs compared to costs in northern universities and some of the better southern universities. The other feature is an adequate assurance of program quality. The Secretariat is just in the process of finishing the quality assurance guidelines, which has been supported by funding from the EU. A proposal for a second phase to institutionalize and operationalize these guidelines has been submitted. The Secretariat's approach to monitoring in this area is to build that capacity within the faculties, supplemented by surveys of student satisfaction and research reporting, particularly published papers in peer-reviewed journals. These systems are still formative and in the process of development in the faculties. What would be useful in terms of monitoring these programs, understanding problems, and adapting implementation and delivery would be for the Secretariat to undertake a case study evaluation of the quality of some of the longer established PhD programs. A particular focus would be on learning outcomes from the course work and on an evaluation of the quality of the research design and methods in the thesis.

The requirements for RUFORUM initiated PhD programs include completion of course work and research with two publications in peer-reviewed journals. Delays in supervision of students have been experienced in some universities resulting in delays in completion of studies. In order to eliminate delays, RUFORUM should consider introducing a system that creates incentives for timely completion of the thesis, as with the competitive grants program. Publication of theses and avenues for dissemination of these research outputs should also be diversified to ensure wide outreach of scientific findings to the various categories of stakeholders.

The regional PhD programs bring into sharper focus the issue of how to define what RUFORUM is accountable for and for what the universities are accountable. This issue is critical for reporting on funding, on defining roles and responsibilities between faculties and the Secretariat, on structuring the M&E system and in the end on the branding of RUFORUM activities. Thus, for the PhD programs is the Secretariat responsible for the organizing the course design and organizing the initial cohort of students, then delegating future operation of the program to the host university or does the Secretariat assume responsibility for the continued management and funding of the course. In the former there is thus an exit strategy, albeit with criteria to be met before handing over the continued management of a degree program. This would allow the Secretariat to develop a continuing array of degree programs and could as well provide a continuing service for certifying the programs. Thus, at the University of Nairobi and Makerere University, the PhD programs are charging competitive tuition fees with a percentage (such as 30% for University of Nairobi) being retained by the university to run the programs. The latter model would limit the Secretariat to the management of a stable of core PhD programs under the RUFORUM brand. AERC or ACCI do not face such a question, as their brand rests on the ongoing operation of their PhD programs. Once the current programs

have been consolidated, RUFORUM could usefully assess how to position the organization in relation to regional PhD programs.

4. CROSSCUTTING PROGRAM SUPPORT TO RESEARCH AND POST-GRADUATE DEGREE TRAINING

As part of BMGF's core support to RUFORUM, crosscuttings programs in monitoring and evaluation and in ICT were funded. Both are seen as integral to developing high quality research and postgraduate training in member universities in the region. Both are seen as central to RUFORUM's role as a regional platform and to supporting the work of the Secretariat. However, increasingly both programs also provide services to member faculties of agriculture in the region. Much of the work to date in both areas has focused on system design and initial implementation. With the system design in place and tested the work going forward will involve much more interaction with core programs and member universities. A central issue in the future development of cross-cutting program support is whether these programs will evolve into a more integrated knowledge management capacity within RUFORUM to support research and training in the region.

4.1 Monitoring and Evaluation and Program Learning

There has been a quite lengthy gestation period in the development of a fully integrated M&E system. This is not surprising given that outcomes are institutional, involve a significant quality component, and embody skill enhancement of postgraduate students. These are difficult to measure and to monitor performance and much of the early M&E focused on assessing outputs in the two core program areas. A fully integrated M&E system could only be developed after a well-structured theory of change was articulated and this took some time to achieve both clarity and consensus. With the theory of change in place emphasis has shifted to developing the indicators, data templates, and finally a management information system. This has helped to systematize what is already an evaluative culture within RUFORUM, driven in part by the focus on maintaining quality and feeding information back to program recipients. In turn, having the monitoring and data systems in place will allow an increased focus on evaluation questions within RUFORUM programs.

4.1.1 RUFORUM's Theory of Change

A theory of change (TOC) requires an organization to be very explicit about its eventual impact, the outcomes that are critical to achieving that impact, and how the organizational program structure and outputs contribute to those outcomes working through principal clients, namely the universities and faculties of agriculture. The theory of change provides the causal links between outputs, outcomes and impact and in turn the structure of the M&E system. Only in 2012 was a theory of change finalized, building on an initial theory of change in the proposal to BMGF (see **Figure 3**) and in part with consultancy support from ALIne. A key issue in the transition from the

original TOC to the current version was where impacts on smallholder agriculture would feature in the TOC. Smallholder agriculture features prominently in the approaches to skill development of graduates, in research methods as applied in the research grants, and in the action research done through the CARP. However, the core outcomes that RUFORUM focuses on involve the performance of universities and the quality of graduates that they produce. These are critical to the development of the smallholder sector, but equally critical to a robust private sector, effective policy making, the development of a science infrastructure, and the development of a knowledge economy. In terms of evaluating the impacts of RUFORUM programs, the TOC limited the causal chain to the impacts on institutional effectiveness of universities and the enhanced capacities of its graduates. Moreover, the TOC laid out the policy and linkage role of RUFORUM as a regional platform, the outcomes expected within the member universities and the program structure responsible for generating those outcomes. It was then possible to populate the TOC with indicators that monitored progress in all three of these domains.

The review team feels the TOC is an appropriate framework around which to further develop the M&E system, evaluate performance, focus learning, and adapt programs. The direct impacts on smallholders can be measured in programs such as the CARP, as demonstration of the potential benefits from wide spread adoption of such programs. What the TOC also highlights is that achieving many of RUFORUM's outcomes depends on demonstration effects, spillovers, and leveraging, all associated with the quality standards associated with the RUFORUM brand. These effects extend to universities who are not members of RUFORUM, to staff and faculty not participating in RUFORUM programs, and to MSc and PhD students outside of RUFORUM programs. This is difficult territory, as it requires mechanisms to optimize these effects while at the same time not alienating non-participants in RUFORUM programs. It is partly a matter of being seen to be fair in the allocation of scarce programmatic resources, to be clear and transparent in the rules by which participation can take place, and to ensuring that quality is the standard by which participation and resources are allocated. There is an equity dimension but it cannot come at the expense of program quality. How to monitor and then manage this crucial aspect of RUFORUM programs will be in many ways a principal test of the M&E system.

4.1.2 Operationalizing the M&E System

The M&E system has made rapid progress since the finalization of the TOC in specifying indicators, developing data templates, and assigning responsibilities for data collection. The latter is particularly important since the responsibility for the M&E system becomes a joint responsibility, including both staff within the Secretariat and participating faculty and students. The M&E system is not yet at the stage of developing periodic reports and providing feedback, apart from the monitoring and feedback to faculty of the competitive research grants. Such feedback is essential to demonstrating the benefits to providing data into the M&E system and in turn provides updates on progress in key program areas. All of this is laid out in the RUFORUM monitoring plan of November 2012, which succinctly charts the ambitious nature of the system and a road map for its implementation. The review team appreciates that the M&E

system has taken a significant period of time to develop but finds that a robust and appropriate structure is now in place. The next step is to make it fully operational as an integral part of planning, program development, and learning within the RUFORUM platform, with the potential of moving from a principal focus on the needs of the Secretariat to providing a window on faculty and postgraduate student performance across the member universities.

The M&E system is structured around the core strategic programs areas as identified in both the business plan and the TOC. In addition to the BMGF grant, RUFORUM currently manages 17 other grants, which require reporting and tracking progress. To be most efficient these projects should nest within the TOC and M&E indicators. To the extent that projects do not nest within the TOC, this would be an indication that the project falls outside the core program areas as outlined in the business plan. This issue is discussed in greater detail below in Section 5. However, one indicator of whether a project fits within the core area is whether its progress can be tracked within the existing M&E system, rather than having to be tracked independently.

4.1.3 Management Information System

The two core programs have each generated a set of processes and tracking systems resulting in databases. As an example, the competitive research program has a grants tracking system that is used to organize and monitor the grants process. In turn, this forms part of the overall M&E system. At the same time as the faculties and universities are more fully integrated into the M&E system, a more efficient means of inputting and accessing the data is needed. A web-based management information system (MIS) has been discussed at various points in the past but the completion of the design of the M&E system now highlights the need for the MIS. This is under development, as the MIS has been designed, there is a procurement process underway, prototype databases have been developed, there is a search for a reliable server to host the MIS, and each unit has a work flow chart. The MIS will form the basis for web-based reporting and data entry, as well as the development of the periodic reports prepared by the M&E unit. Management dashboards will be developed to feed into board and deans meetings, as well as input to program units and central management. The task will be to have complete databases back to 2009 and in some cases back to 2004. The MIS comes as an additional demand on the ICT unit, which will strain existing capacity in that unit.

4.1.4 Evaluation and Learning

The monitoring system is virtually to the point of being routine and the PME unit can begin to plan on carrying out evaluations of key programs and activities. One evaluation is planned this year and it will probably be a tracer study of RUFORUM graduates. It is an interesting question which areas, themes, or programs would benefit most from an evaluation. Currently there is not yet a process or priority setting that will lead to development of an evaluation plan. What is clear is that most evaluations will focus on educational outcomes and this will require developing a network of expertise in this area. Such outcomes will especially include learning outcomes,

quality standards, and skill enhancement. Moreover, there are two quite different tracks to achieving such outcomes within RUFORUM's program structure, namely postgraduate students coming through the collaborative degree programs and those coming through the research grants. Each track has a quite different approach to skills enhancement and to assuring quality. Thus, the research track focuses relevance and design of the project, augmentation of research methods, and presentation of results at the biannual meeting. But are these the key points to intervene in improving quality of the research done within the MSc or PhD thesis? How are critical research skills enhanced and at what critical points in the process from student selection, through problem conceptualization and research design, to data analysis and write up. With the MIS in place PME can shift its staff time to evaluations that address issues related to program design and enhanced outcomes.

4.2 Information and Communication Technology

Development of an ICT program at RUFORUM which linked to and supported the evolving ICT capacity in member universities was felt to be a necessary function for a regional platform that could exploit ICT's increasing utilization in university education globally. This is a very large mandate, especially given that member universities were investing in ICT infrastructure but were only at the early stages of effectively utilizing that infrastructure in education, teaching, and research. There is a very large latent demand, particularly at the VC and administration level, to develop and integrate ICT and associated Learning Management Systems (LMS) into student learning and faculty teaching. Given the very small unit and the scope of the tasks being asked of the unit, managing these expectations in terms of services that can be deployed to member universities is an ongoing balancing act. As with all program units within the RUFORUM Secretariat, there are real constraints on capacity in relation to potential demand and there is a need to set realistic priorities as a guide to managing work flows.

ICT is responsible for a number of quite different activities. It has assumed responsibility for designing and implementing the MIS. This is a high priority for this year, but once completed should shift over to management by M&E and Finance. ICT also manages Internet connectivity within the Secretariat, with plans for developing an intranet. Also, ICT manages the RUFORUM website and the knowledge repository. ICT has recently been reviewed in some depth in both these two areas and the reader is referred to this excellent report (Levey, 2013). However, the ICT program large core activities remain outreach to member universities to integrate ICT into teaching, student learning, and research and in improving communications and knowledge management within the network.

4.2.1 Increasing Access and Utilization of eLearning and OER

Electronic learning has the potential to compensate for differential constraints on teaching capacity in graduate programs in member universities. However, RUFORUM's role in the development of such capacity is in part tied to the ICT infrastructure available within member

universities and the institutional commitment to developing eLearning and learning management systems. The focus of RUFORUM to date has been in supporting eLearning development in member faculties, but an option of the Secretariat developing a targeted eLearning capability is explored at the end of this section. Electronic learning support to the competitive grants program focuses on complementing needed skills to undertake quality research. In contrast, support to the collaborative regional degree programs focuses on improving the teaching and expanding access to the courses as Open Educational Resources (OER), which are maintained on the RUFORUM web site.

A situational analysis of ICT in the then 25 member universities in 2009 (CGNET, 2009) found that “In most (member universities), commitments (to eLearning) are fairly recent, usually within the last three years. Electronic learning can thus be said to be just beginning at most RUFORUM universities. This is particularly true in terms of agricultural content, where only one school of agriculture reported any eLearning materials.” The latter university was Africa University in Zimbabwe, which as a private university was well advanced in the application of ICT and eLearning. Six of the 25 had established LMS, with Moodle being the most common platform. However, even with an LMS in place and access to the web and computers, utilization of eLearning still remains limited. The research-methods MSc has recently been installed on Moodle at JKUAT and Egerton, and this is seen as leading the application of eLearning at the university. This increases access of students to course materials but it does not provide an interactive capacity with MSc students in resolving research problems that occur during their thesis research. Such an eLearning course in research methods has recently been mounted at Maseno University in Kenya, which is not a member university. However, this course draws on the experience of the RUFORUM collaborative MSc and extends it to an eLearning platform. Tracking the experience of this program would be useful in development of eLearning capacity in RUFORUM faculties.

The ICT unit in the Secretariat has organized an ICT working group across the member universities. This is a useful platform to share experiences and learning in the application of ICT and eLearning across the universities. Moreover, it becomes a pool of expertise that can be deployed in the unit’s outreach activities, given adequate budgetary resources. The working group also becomes a vehicle for monitoring application of ICT within agricultural faculties and RUFORUM programs.

OER has been a particular focus of the ICT unit and 26 e-courses have been developed, primarily out of the AICM, aquaculture and the research methods degree programs. The focus has been learning how to produce these resources, which has integrated a subject matter specialist and an instructional designer. The emerging issue is quality of these resources and their use in improved teaching in the agricultural faculties. Levey (2013) suggests that research of regional relevance is not sufficiently integrated into the course material. This reviewer’s evaluation of the econometrics OER found the same. There was no use whatsoever of the extensive application of econometrics on smallholder agriculture in East and Southern Africa.

Rather the material relied on pure econometrics texts, with hardly a reference to their application in agriculture, much less African agriculture. Improving relevance in teaching in post-graduate programs would appear to be a key issue and one that RUFORUM is well positioned to address. The ICT unit is now working closely with the BMGF supported AgShare program in their second phase. AgShare produces case study material in support of improved teaching, but there has not been a close linkage to particular courses and little peer review. RUFORUM and AgShare will be working on developing OER for the soil and water PhD at Sokoine. Given the extensive research in the region by the Tropical Soil Biology and Fertility program, IFDC, the BMGF-funded N2Africa, and AfSIS, there is no lack of research on smallholder agriculture to support course development. This next generation of OER development will be critical to establishing quality standards for OER and their potential application more globally.

The other major future area of application of eLearning is in support to RUFORUM students undertaking their thesis research in the competitive grants program. Various modules of the research methods course are used in short courses for upgrading student skills in research methods, but this does not correct the variable supervision in experimental design, data management and scientific writing. Building on the eLearning course at Maseno, RUFORUM could utilize Moodle through the RUFORUM web site to provide interactive support to grantee students. However, this would require facilitation by an experienced practitioner in research methods. Such a capacity would extend the reach of the research methods course beyond just the students in that course and would ensure a higher level of quality control in the various stages of the research thesis. Potentially this capability could then be extended to mounting the eLearning course on research methods through a RUFORUM LMS.

4.2.2 Knowledge Management

RUFORUM's ICT unit plays a principal role in knowledge management within the platform. The unit facilitates access to current scientific journals through databases such as AGORA and TEEAL (including short courses on database use), is developing a web based repository of all documents produced within RUFORUM, and produces the monthly newsletter as the principal communication vehicle. With the development of the MIS and the back filling of data for the M&E system a major tool for faculties to benchmark and compare their performance will be available. However, given all these efforts the effective utilization of regional agricultural knowledge and in turn the production of quality research in peer reviewed journals remains limited across agricultural faculties in the region, particularly as reflected in the small number of publications coming from the competitive research grants program. Can RUFORUM play a larger role in improving the quantity and quality of research output through a more strategic approach to knowledge management across the network?

Agricultural sciences are very broad in scope and getting broader with new areas such as innovation systems or information and communication. Moreover, much of the research is done in isolation from scientists working in similar areas and does not draw on relevant research in

the East and Southern Africa region, although with little participation by agricultural faculty. Yet, most of the agricultural research networks that facilitated such research have terminated due to lack of funding support. There is thus a space for agricultural faculties to improve their research productivity through first the development of thematic or topical communities of practice where RUFORUM developed more of a thematic structure to its research grants, it developed clear research methods support in these areas, it potentially linked it to the collaborative degree programs and it could structure a knowledge management system based on research already done in the region to support the community of practice. Mendeley is a web-based, knowledge management platform that supports such research collaboration. It can be used to assemble a library, collaborate on projects, manage curriculum, and even be used for sharing dissertations. This search for synergies across competitive grants, regional degree programs, and web based knowledge management could provide collaboration and competition needed to improve the relevance and quality of research from agricultural faculties in the region.

5. MANAGEMENT AND GOVERNANCE

The management and governance of RUFORUM has to balance a number of competing interests in an attempt to be shown to be fair and transparent and at the same time achieve a high level of efficiency in decision-making and management costs. On the one hand, RUFORUM must garner buy in from participating universities in the implementation of its regional programs. Such buy in is done within a nested decision making process within the universities involving vice chancellors, principals, and deans. In this regard the vice chancellors provide the overall governance of RUFORUM programs, while the deans committee ensure effective implementation. At the same time the allocation of limited resources, such as with the competitive grants, must appear to be transparent and independent, which results in independent committee structures, such as the technical committee. RUFORUM has been evolving its management and governance structures and at the same time has changed its legal status from a company limited by guarantee to an international NGO, which has allowed further adaptation of the governance system.

5.1 Legal status

RUFORUM is a non-political, non-profit making organization. RUFORUM at its initiation was registered as a company limited by guarantee—under British law, a non-profit. This required RUFORUM to meet the requirements of the Companies Act, which included an annual general meeting of "shareholders." However, the organization was registered on 29 July 2011 under the NGO Registration Statute of 1989 in Uganda as an international NGO. Through this registration, RUFORUM has the following mandate: (i) to carry out its activities in the field of coordinating funding for research and postgraduate training by donors, initiate research and disseminate findings of research; (ii) operate countrywide; and (iii) ensure staffing of the organization conforms to the NGO registration regulation of 2009.

In order to operate in its country of registration, RUFORUM has an agreement with the Government of Uganda, signed in May 2006. Article III of the agreement indicates that the Government of Uganda will provide subject to budgetary limitations: facilities from existing buildings and land for housing the RUFORUM Secretariat within the resources assigned by the Ministry of Education and Sports, wherever required and available; supplies and scientific equipment available to RUFORUM as may be required by their work and mutually agreed upon by the contracting parties; and counter-part funding to an amount not exceeding 25% of the funds allocated by RUFORUM for research and graduate training in Uganda. The Government of Uganda also provides to RUFORUM the privilege of tax-free importation into the country of vehicles, machinery, equipment and supplies, fixtures, laboratory and office equipment to be used in the program; as well as authorization for unrestricted movement of RUFORUM staff members into and out of Uganda as often as may be necessary, and expeditious clearance for entry into Uganda of training participants, scholars and visitors, for the purpose of conducting activities of the program. A recent policy change in the Uganda Revenue Authority has resulted in all RUFORUM staff being subject to payment of income tax. This significantly reduces the ability of the organization to attract the best talent in the region as staff in the Secretariat. This issue requires consideration by the board as to whether a further change in legal status is necessary to maintain immunity to income tax or whether there is possibility for lobbying for an exemption.

5.2 Governance

RUFORUM is a member-based organization owned by constituent universities in Eastern, Central and Southern Africa. RUFORUM has four principal organs of governance: (i) the General Assembly; (ii) the Board and its Committees; (iii) the Secretariat; and (iv) the National Chapters established in each country where member universities are located. Annex 10 provides RUFORUM's governance structure.

5.2.1 The General Assembly

The General Assembly is a hold over from RUFORUM's period as a company limited by guarantee. In that period the AGM provided governance oversight and due diligence on the programs of the organization. Those functions have now shifted to the Board of Trustees, and the AGM now provides a venue to bring together a broader array of stakeholders and every other year is combined with the Biennial Research Meeting. The AGM is held in conjunction with the meeting of the Board of Directors as well as the Dean's Committee. The Board uses the AGM to communicate with the larger constituency and to encourage their participation.

5.2.2 Board Representation and Committee Structure

The Board of Directors consists of 38 members constituted as 33 Vice Chancellors from the member universities, who attend by virtue of their appointments as Vice Chancellors/Rectors/

University Presidents, and 5 other persons representing Governments, the private sector, non-governmental organizations, national and regional agricultural research and extension institutions. The non-university Board members serve for three years, renewal once, while the tenure of Vice Chancellors has varied considerably. The Board is headed by a chairperson who deputizes a Vice Chairperson; and both are elected at the first sitting of the Board. The Executive Secretary of RUFORUM is the Secretary of the Board and serves as an ex-official member. Members of the Board serve for a period of three years and are eligible for only one further term of three years, unless they are Vice Chancellors of the core member universities. Membership of the Board is required to ensure there is a regional balance, and balance of skills, experience and gender.

The functions of the Board include formulating the regional agricultural training programs; setting the regional agricultural research priorities; appointing the Executive Secretary and other staff of the Secretariat; ensuring implementation of RUFORUM work plans and programs; reviewing and evaluating the performance of the Secretariat; monitoring and keeping under constant review the implementation of RUFORUM programs; appointing the external auditors and reviewing the strategic plan and mission, the work plan, financial statements, and budget of RUFORUM; and appointing committees to assist in the carrying out of its functions.

Board meetings are held at least one a year for the purpose of receiving and approving RUFORUM's annual reports, annual accounts, the auditor's report and fulfilling its other duties. A special meeting of the Board may be called as and when deemed necessary at the request of the chairperson, the Executive Secretary or by at least five members of the Board. The Chairperson decides the time and venue of the meetings of the Board with a notice of the meeting given to members by the Executive Secretary at least three weeks before the meeting date. The quorum of the meetings of the Board is one half of the members plus one other member. The Board members are entitled to payment of honoraria, reimbursement of travel, travel insurance, associated matters and other expenses related to attendance of the meeting. The member universities pay a membership fee and additionally the Vice Chancellors as members of the Board have been required to meet their own expenses, which some find difficult.

The Board is quite large, which affects the decision making process. There are a number of internal committees, particularly the Audit and Finance Committee, the Human Resource Committee and the Executive Committee. Additional there are a number of independently established committees that primarily report to the Secretariat and with unclear reporting lines to the Board, namely the Technical Committee, the International Advisory Panel, and the Dean's Committee.

Because Vice Chancellors makeup the majority of the Board's membership, the Board is prone to experiencing challenges to constituting a quorum for its meetings, considering Vice Chancellors (VCs) in African countries are state (presidential) appointees who require

government clearance to travel outside their countries. Board members are expected to meet travel costs and may not be willing to prioritize the Board meetings due to the expected costs. Although in certain cases the VCs' travel costs might be included in the budget of the Ministry of Education, the Ministry may choose to cut down costs which would then affect the funding of VCs to Board meetings. It is also important to note that VCs will tend to attend meetings in cases where they have an issue of interest for discussion in the agenda, particularly where decisions would affect their own universities. The demands on the VCs' time also affect timeliness in the signing of MOUs with RUFORUM for implementation of the regional programs and the activities thereof. The membership of the Board is also subject to the appointment of VCs and their respective periods of tenure, which in turn is subject to the appointments at national level—and their relationship with the government of the day.

With the Board meeting once a year, it would be more effective to provide for more regular meetings of the Board where urgent and crucial decisions can be made without necessarily having to call a special (full) board meeting for the same—which would likely face quorum issues as well. This is because a decision making process by the Board is arguably slow and less effective, putting undue pressure on the Secretariat, which is expected to follow through and implement its decisions. The Board needs to delegate and enable the Executive Committee to make decisions on its behalf as this would increase their effectiveness. An alternative option could rest on the VC's delegating authority to the Deans or Principals to attend the Board meeting, as the Deans would share the interest in the universities participation in RUFORUM and would at the same time be informed about the decisions to be made by the Board.

The Audit and Finance Committee consists of four members who serve for a period of three years and are eligible for re-appointment once. The functions of the Committee include providing oversight on financial operations of the Secretariat, reviewing annual financial reports of the Secretariat prior to submission to the Board, advising the Board on RUFORUM's accounting and financial management procedures, considering management's reaction and comments on RUFORUM financial reports before they are presented to the full Board by the Executive Secretary for confirmation, and receiving and reviewing the reports of the external auditor and reporting to the Board. The Executive Secretary serves as the Secretary to the Committee.

The Deans' Committee is constituted of Deans of faculties of Agriculture and related sciences participating in RUFORUM activities. Members of the Committee elect their Chairperson and Vice Chairperson on an annual basis and this is done on a rotational basis. The functions of the Committee include reviewing issues from the National Fora and Regional Thematic Groups and feed back of information to the Secretariat and Technical Committee; and advising the Secretariat on activity progress and issues emerging at individual university and country levels. The committee meets at least once a year at a venue determined by the Secretariat and the quorum of the meeting is one half of the members. The Executive Secretary serves as the Secretary to the Committee.

The Dean's Committee is in many ways most familiar with issues arising from the implementation of RUFORUM programs in the respective universities. The potential of the Dean's Committee is in many ways not being fully exploited in RUFORUM's management and governance structure. There is no fully worked out reporting to the RUFORUM Board and the Board does not effectively delegate policy issues to the committee. However, for the Dean's Committee to provide more input into Board agenda setting and policy making, the size of the Dean's Committee also becomes an issue. For the Dean's Committee to function efficiently in such a capacity raises issues about a possible executive committee and potentially internal committees formed around the core program areas of RUFORUM. Sharpening communication with the Secretariat—possibly through the committees, which would meet more often—would also improve program monitoring and problem resolution.

The Technical Committee consists of seven persons appointed by the Board of which three persons come from a list of persons provided by the Secretariat from regional universities and other four from key stakeholders. Members of the Technical Committee serve for a period of three years and are eligible for re-appointment for one more term. Although selection of members of the Committee is based on individual merit, a balance of skills, experience and gender in the Committee membership is required. The functions of the Committee include designing calls for proposals, approving competitive grants, overseeing projects selection, advising on regional training needs and programs, and considering research proposal and carrying out technical assessment of them. The Committee meets at least once a year and the Executive Secretary serves as its secretary as well as provides the necessary support, together with the Secretariat, for the Committee to carry out its functions. The Technical Committee performs key program functions, backstopped by the Secretariat. It primarily reports to the Dean's Committee and to the Secretariat itself, and ostensibly to the executive committee of the Board.

The International Advisory Panel (IAP) consists of eight persons nominated by the Board, with four of them from Africa and four others from outside Africa. Members of the Panel serve for a period of three years and are eligible for re-appointment once. The functions of the Panel are purely advisory and include mobilizing international support and partnerships for RUFORUM, advising the Board on research, training and outreach thrusts, assisting in resource mobilization and providing the necessary strategic orientation to the Board and the Secretariat. However, participation by the members of the IAP is highly uneven and a core group provides much of the functions of the IAP, virtually in an individual capacity and often in an ad hoc manner, depending on the issue. The input of these members to the Secretariat, particularly to the Executive Secretary, is highly valued but the IAP does not function coherently as a panel with clear reporting lines. In going forward there would appear to be a choice in the role and reporting of the IAP. There is value in the IAP serving as primarily a sounding board for the Secretariat/Executive Secretary, where a foundation of trust is established with well-positioned international experts. This role follows from the fact that IAP members can only monitor

RUFORUM activities from afar and the value is in strategic guidance. The other option is for a reconstituted IAP to perform more in an oversight function with more established reporting lines to the RUFORUM Board. This is a very different role and to a certain extent is provided by the Dean's Committee and the Technical Committee, although the IAP would provide an independent, international perspective complementing the other two committees. The question would be whether such a benefit would be balanced by the additional cost of yet one more oversight committee.

Recommendations

1. The Board will need to strengthen the functionality of the Executive Committee to enhance oversight and efficient decision-making.
2. The effectiveness of the Dean's Committee should be improved with clearer reporting lines to the Board.
3. The IAP should be maintained as an advisory panel on strategic issues to the Secretariat. Non-performing members should be dropped as determined by the Executive Secretary.
4. The operations of the Technical Committee need to be strengthened to oversee the implementation and quality of the graduate training programs.

5.3 The RUFORUM Secretariat

RUFORUM operates a lean Secretariat that is based in Kampala, Uganda and hosted by Makerere University. The Secretariat is expected to have the capacity to provide regional coordination, finance and program support. It is headed by the Executive Secretary and assisted by other staff appointed on merit by the Board on a contract basis for a fixed term, and ensuring regional representation (the Secretariat's organization structure is provided in Annex 11).

5.3.1 Roles and Functions of the Secretariat

The Executive Secretary (ES) is appointed by the Board for a fixed term of 5 years and, following satisfactory performance, the contract may be renewed. The ES is the chief executive officer of RUFORUM with the prime responsibility of executing the decisions of the Board; ensuring proper management of the staff, programs, finance and assets according to agreed procedures; ensuring the smooth and efficient organization and management of the human, finance and physical resources of RUFORUM; preparing the annual work-plans and budgets, financial statements, progress reports on implementation of programs as well as other documents for presentation and approval by both the Board and the General Assembly; organizing, planning and managing all meetings of RUFORUM; and performing any other duty as may be assigned to him or her by the Board of Directors.

In his capacity as the secretary to the Board and all of its subcommittees, the ES, and by extension the Secretariat, are required to provide logistical as well as documentation support to the Board and the committees ahead of their meetings. As the Secretary to the Board, the functions of the ES include keeping the Board informed on RUFORUM's progress in managing its affairs and implementing its mandate; securing Board documents and papers; providing administrative and technical support to the Board chair and the Board; preparing and shaping the agenda for the meetings of the AGM and the Board and ensuring timely circulation for the draft agenda to all members; and performing any other related duties as the Board chairperson, the Board and the AGM may assign for the realization of the goals and objectives of RUFORUM.

The program structures of the RUFORUM are ambitious and labor intensive in terms of their operation. Each principal program area, namely competitive grants, training and quality assurance, planning and M&E, and information and communication, has a program manager hired regionally and who is supported by a limited number of nationally recruited staff. In addition there is a finance manager with a limited national staff. These five positions, including the Executive Secretary, are financed by the BMGF core support and are obviously essential to the operation of the RUFORUM program. In the review team's view, the Secretariat is minimally staffed to implement current programs, much less to plan and innovate future activities, and as yet has not secured the additional funding that would permit hiring additional program staff, particularly the deputy executive secretary or for example a facilitator for national forums. Moreover, each of the program areas could utilize more junior staff. This need is being partially filled by hiring part time students from the university. This has been effective in the past and this trend should continue, exploiting the pool of human resources possible through being situated in a major university. For such a labor-intensive program, program managers should be staffed with a sufficient number of program officers to ensure operation of routine activities, as well as sufficient funding for student support for well identified, time limited activities. This will allow the program managers time to understand and plan for next steps in the development of their own programs.

What is clear is that there is little capacity to manage activities beyond the core programs and the range of meetings, including board meetings and the large, biennial workshops. This makes the development of other grant proposals something of a balancing act, both in terms of the time required to develop the proposals and, more importantly, in the time required in to implement such proposals. The review team is in accord with the business plan, which argues that grants should be developed in support of core programs and where there is pressure by individual donors to implement activities outside these areas, that these grants must be fully costed, including the provision for extra staff to manage the activity. This would also apply to additional staff in the finance office to handle the additional disbursements if these grants involve a competitive grant element (see discussion below on the finance unit).

As the M&E system gets populated with data and it gets embedded in participating faculties, the Secretariat should consider the development of a management dashboard and a reporting/communications strategy that provides both substantive feedback to member universities and a basis for managers to adapt programs to performance. This process is already apparent in the competitive research grants program but needs to be implemented in the regional degree programs. This will hopefully open more of a two flow of information with participating faculties beyond just the scheduled meeting dates.

5.3.2 Financial Management and the Move to Full Cost Accounting

In the last five years, RUFORUM has managed an annual budget of over US\$5 million of which 70% constitutes re-grants. From the funding sources information and disbursements, RUFORUM is a multi-donor organization with a targeted beneficiary constituency of 33 member universities and target final beneficiaries of over 2,000 faculty and 500 postgraduate students within Eastern, Central and Southern Africa. As well, RUFORUM is currently implementing about 17 projects and it is our considered opinion that this portfolio is too large for the size of the Secretariat. This portfolio requires a robust finance management system especially considering a core activity of RUFORUM is a small grants program (ranging from US\$60,000 – US\$300,000) to member universities and target beneficiaries.

A robust financial management system is important for RUFORUM especially in light of the need to continue building trust from all stakeholders (donors, governments, member universities, researchers/staff and students). Despite this interest, the current financial operating environment is characterized by the following: (i) a mix of manual and software processing of financial information; (ii) computer assisted financial management is not networked to aid ease of sharing information; (iii) budget management and control—budgets are controlled off the computer system, presenting difficulties in tracking expenditure and delays in disbursements; (iv) low staffing levels in the Finance Unit leaving very limited room for segregation of duties as a requisite for proper finance and accounting; and, (v) delays in accountability by grantees and compliance to accounting procedures plus non-timely submission of relevant source documents that are required to trigger financial disbursements.

Over the past years, RUFORUM has had a number of efficiency challenges in the Finance Unit considering the significant growth in operations (donors and grants awarded) but with minimal staffing. This limited proper segregation of duties i.e. limited self-checks and audit queries. We were told that some members of the staff in the Finance Unit have had to leave RUFORUM because of the pressure of work. Besides, the introduction of Pay As You Earn (PAYE) by the Government of Uganda on all expatriate staff has considerably made matters worse.

This operating environment poses the following other challenges: (i) delays in information processing and reporting; (ii) limited timely coordination with the other units at RUFORUM Secretariat (especially that between Finance and Grants Unit) in generation and sharing of data

leading to delayed decision making on disbursements; (iii) difficulty in generation of management reports, budget and actual analysis and reporting; and, (iv) delays in disbursement of funds due to longer verification periods of submitted reports, lack of proper accountabilities and source documents from beneficiaries.

In order to overcome the above challenges, there is urgent need to strengthen the RUFORUM Finance Management System. For this undertaking, the following activities and modifications are critical:

- i) Upgrading the accounting software to facilitate reporting under multi –donor and multi – currency environment. Use of automated system will enable quick assessment of finance reports submitted by Grantees and minimize delayed disbursement. Fortunately the secretariat is at an advanced stage to purchase a more robust financial system;
- ii) Networking data and computer equipment to facilitate capture, processing, reporting and sharing of data while ensuring segregation of duties both within the Finance Unit and among the different Units. The Secretariat is currently working with an external firm to handle this issue; and,
- iii) Capacitating the Finance Unit to ensure adequate segregation of duties. In addition to the two key staff, Finance Manager and Management Accountant, with a portfolio of over US\$5million, RUFORUM Secretariat requires dedicated Accountants/Budget Controllers to focus on grants and projects at RUFORUM together with the general ledger.

With regard to improving communication in terms of timeliness and details on information conveyed, the Secretariat will need to consider providing additional staff to support the Administrative Assistant who undertakes all administrative roles covering human resource issues, office administration and management, communication with all stakeholders, preparation of documentation for the Board meetings and the meetings of all its sub committees as well as secretariat support to committees at the university level, such as the Deans Committee and the National Forum, and administrative support to senior officers in RUFORUM.

In considering this recommendation, the Secretariat will need to carry out a job evaluation that evaluates the job descriptions, work flows and staff skills. The evaluation will seek to establish the competence of staff in regard to their job requirements to identify any gaps and make recommendations that are geared towards increased effectiveness and efficiency in service delivery. This evaluation will also establish the levels at which there is a need for delegation of authority on the administration of financial processes to ensure timely decision making and timely implementation of decisions through the necessary financial processes.

5.3.3 Planning, budgeting, and program monitoring

The annual planning process at the Secretariat starts in May/June of each year, beginning with a review of all activities of the previous year. The annual planning, monitoring and evaluation

calendar with key RUFORUM learning points is summarized in the Table 8. Progress against all the planned activities for the previous year is documented and those activities not completed are identified and included in the new work plans for the next financial year.

The Finance Manager and the Planning Manager then consolidate the unit level budgets and work plans into one document. The Executive Secretary and Finance Manager make the final budget allocations. This consolidated work plan and budget is submitted to the Audit and Finance Committee of the Board, and subsequently through the Board, to the AGM for approval in August/September of the same year.

Table 8: The annual Planning, Monitoring, Evaluation and Learning calendar of events

Activity	J	A	S	O	N	D	J	F	M	A	M	J	Outputs
Quarterly staff planning & review meetings		X			X			X					Quarterly progress reports Programs reviewed Projects reviewed Staff meeting reports Quarterly work plans
Annual planning and review process											X	X	Annual targets & milestones Annual work plans & budgets Annual M&E plan Annual Report Previous financial year closure & documentation
Annual staff appraisals											X		Staff appraised
Organizational self assessment											X		Internal document with key areas for improvement
Reflection and lesson learning events at Secretariat		X			X			X			X	X	Learning and reflection reports
Procurement planning											X	X	Annual procurement plans Annual budgets
RUFORUM Annual report											X	X	RUFORUM Annual report
Process monitoring	X	X	X	X	X	X	X	X	X	X	X	X	Data collection & storage

Activity	J	A	S	O	N	D	J	F	M	A	M	J	Outputs
and data collection													templates in place Data collected
Managing the MIS	X	X	X	X	X	X	X	X	X	X	X	X	Various databases kept up-to-date and M&E reports produced
Progress reports from PIs under CGS				X						X			6, 18 & 30 month reports in Apr. 12 & 24 month reports in Oct.
Field monitoring on PIs and students under the CGS Field monitoring on regional programs								X	X	X			Status of implementation of research Grants / Projects & Regional Programs Guidance on projects – content and implementation Challenges considered and solutions proposed
Management meetings		X			X			X				X	Management meeting reports
Annual audits	X												Annual Audit Report
Deans Committee Meeting AGM Board meeting (full board)		X											Deans Committee Report Minutes of the AGM Minutes of Board meetings Board Sub-Committee reports
M&E capacity building • In Universities • At Secretariat													MEL capacity of staff in focus faculties & secretariat build

Source: RUFORUM Secretariat documentation

In addition to the BMGF program, there are 17 other on-going projects led by Program Managers being implemented at the Secretariat (see Annex 12). These projects have various degrees of alignment to the Business Plan, some albeit loosely, but demanding significant staff time. Based on the lessons learnt, the Secretariat is re-directing its efforts on core areas and prioritizing development of project proposals in these areas.

It is important to point out that, in addition to claiming staff time, the large portfolio of projects is not fully costed, hence laying a claim on core budget. As the Secretariat moves towards rationalization of the existing projects, it should, in future insist on full cost accounting for any project, which is consistent with the implementation of the Business Plan. Importantly, some of the projects are not very well aligned to the business plan thus making staff undertake activities that are achieving outcomes not directly related to the agreed outcomes in the RUFORUM theory of change. This has implications on staff workloads, budget allocations, and the monitoring of these activities. Further to this, the Secretariat has 102 on-going sub-grants to the universities and nine regional programs that also need to be managed, supervised and monitored. The official work time is from 8am to 5pm, with a lunch break of one hour from 1-2pm, but it is a reflection of the dedication of staff that they often work before 8am and after 5pm, and sometimes on weekends, to accomplish targets.

5.3.4 Resource mobilization

RUFORUM's Resource Mobilization Strategy is principally targeted at seeking funds to achieve its Vision and Mission, specifically to address the seven Strategic goals in its 10-year Strategic Plan, 2005-2015. The operationalization of the Strategic Plan is guided by five-year Operational or Business Plans, which spell out the budgets for the key program areas for which funding has to be mobilized. To date the organization has had two Business Plans, the first, 2006–2010, and the second, which is ongoing, 2011–2016. RUFORUM also takes advantage of opportunistic funding, either to leverage other resources that complement its core activities or to allow the organization to leverage partnership and to explore future terrain/opportunities. Some of these later considerations have however tended to derail the organization from its core activities, something the organization is struggling to address to ensure focus on core programs.

The development of the second Business Plan took into account the critical need for RUFORUM to avoid “scatterization” of its activities. It lays out core areas of focus, identifies market segments for which RUFORUM services are required, and outlines how the market segments could be turned into funding opportunities. It is a very well thought out Business Plan, with sound principles. Moreover, a significant effort is being undertaken by the Executive Secretary to refocus on the core activities and a number of projects are being wound up or delegated to the member universities. The review also noted with approval a number of instances where the Secretariat had not accepted invitations to participate in certain projects, because they were considered to not contributing to its core focus.

The Board provides oversight of resource mobilization but the actual development of projects and interaction with donors has clearly been left to the Secretariat, with occasional support from the IAP. Yet, with this time consuming function, the Secretariat has not identified an individual in its staff complement with the role of resource mobilization as a primary responsibility. Rather each program manager is tasked with developing proposals in their program area, increasing the workload. There is a justification for the Secretariat to develop a dedicated Business

Marketing unit, although this obviously will initially have to be funded from core, and if successful would in the future be funded through its full cost accounting.

The BMGF has provided RUFORUM with a total of US\$14,230,669, and the funding ends in March 2014. The BMGF supports about 50% of the RUFORUM operation budget but more importantly provides this as essentially core support. The review team would highlight the critical importance of long-term core support for sustainable program development of a regional organization like RUFORUM. At the same time, reliance of such core support on one donor is a significant risk factor to the organization. At this juncture, RUFORUM is highly dependent on the continuation of core funding from BMGF. The organization requires US\$35 million to implement its current Business Plan (Table 9); it has so far managed to raise adequate funds for the first two budget years, being a mixture of BMGF core support and project funding from other donors. Going forward the ideal scenario would be to diversify core support, focus project support on core program areas, and move to full cost accounting—a good example of this is the CGIAR centers under the recent reform process.

Table 9: RUFORUM’s estimated 5-year budget, 2011-2016

Main Budget Line	2011/12	2012/13	2013/14	2014/15	2015/16	Total
	Jul-Jun	Jul-Jun	Jul-Jun	Jul-Jun	Jul-Jun	2011-2016
	US\$	US\$	US\$	US\$	US\$	US\$
Core Activities	5,368,324	5,513,150	5,674,125	4,777,538	7,742,126	29,075,263
Core Area 1: Demand-driven research, community action, and institutional strengthening grants	2,688,224	2,609,000	2,802,200	2,769,020	5,668,022	16,536,466
Core Area 2: Activities to guide and support research and institutional grants	485,000	565,000	660,000	460,150	540,150	2,710,300
Core Area 3: Monitoring and Evaluation	757,600	722,400	757,500	607,500	547,500	3,392,500
Core Area 4: Harnessing ICT for improved Performance at the Secretariat and Universities	1,090,000	1,327,500	1,197,750	691,025	727,628	5,033,903

Core Area 5: Tightening and Enhancing RUFORUM Governance Management	347,500	289,250	256,675	249,843	258,827	1,402,094
New Initiatives to Balance Growth and Expansion	pm	pm	pm	pm	pm	Pm
Secretariat Operating Costs	1,137,585	1,174,536	1,176,934	1,236,823	1,255,219	5,981,098
Regional Recruited Staff	580,634	586,600	592,686	628,133	634,465	3,022,519
Locally Recruited Staff	263,321	271,908	277,092	282,394	287,816	1,382,532
Other Operating and Running Costs	293,630	316,027	307,156	326,296	332,939	1,576,048
GRAND TOTAL	6,511,509	6,690,686	6,854,659	6,016,361	9,004,346	35,077,561

Source: RUFORUM Secretariat documentation

Recommendations

1. RUFORUM should consider establishing a Business Marketing Unit with the responsibility for grant development, donor liaison and overall resource mobilization. One option would be to give this responsibility to a deputy executive secretary, given that this position can be budgeted for either from core resources or full cost accounting.
2. BMGF should consider supporting RUFORUM's resource mobilization efforts by facilitating a donor round table discussion and introducing RUFORUM to specific/targeted donors.

6. RUFORUM WITHIN A LARGER AGRICULTURAL INNOVATION SYSTEM

RUFORUM as a membership platform of 33 universities in East and Southern Africa has both a representational role for HAE on the continent and a convening power, as reflected in the high level meeting with Ministers of Education. RUFORUM straddles the two sectors, as it trains the next generation of agricultural scientists in the region and is central to agricultural R&D, and at the same time budgets, governance, and quality assurance are all formulated within the educational sector. This is a necessary bridge for agricultural development, but there are few policy channels for this to occur within individual countries. This is best reflected in the CAADP process, where HAE was only belatedly been recognized to be a critical part of any investment plans for the agricultural sector.

In its theory of change, RUFORUM explicitly identifies this policy and regional representational role as a key area in pursuing its overall goal of producing high quality postgraduates and relevant research. The objective is to link better HAE to other principal actors within the national agricultural innovation system and to ensure that HAE is more responsive to the demand and needs of employers of postgraduates. The principal vehicle for doing this is the organization of the national agricultural forum, which provides a platform for dialogue with principal actors in the agricultural sector and links to policy processes. At the same time, RUFORUM interacts with principal regional actors—particularly ASARECA, FARA, the East African Community, and COMESA—and represents the interests of HAE in principal agricultural forums. Where it has been less active is in linking to international actors in agricultural R&D, particularly the CGIAR. However, such institutional linkages do require staff time and transaction costs and the Secretariat has to be strategic in developing these links so as not to do so at the cost of managing its core programs.

6.1 Sustaining the National Forums

Agricultural faculties in general tend to be marginalized from the agricultural policy process. Partly this is because they tend to be located outside the capital city, partly because administratively they come under ministries of education, and partly because they have no united voice, made even weaker with the expansion in the number of agricultural faculties. The national forums were conceived as a platform to provide a collective voice for HAE within the agricultural policy process and to link more closely to other actors in the sector, especially given the desire to expand faculties' role in agricultural research in the country, to better facilitate outreach of that research and other services, and to link more closely to an expanding private sector.

The National Forums carry out activities on behalf of the Secretariat. The National Forum in each member country enters into an MOU with the Secretariat in regard to matters relating to its operations and finances. The Secretariat provides the necessary support to ensure National Forums are set up in each country where member universities are located. In each country, the National Forum consists of representatives of universities in member countries; a representative from a body responsible for higher education in each member country; a representative of the body responsible for agricultural extension services in each member country; a representative from the body responsible for national agricultural research in each member country; and, a representative of the relevant line ministry responsible for agricultural training and agricultural research in each member country. When the need arises, the National Forums co-opt representatives from farmer organizations, the private sector, civil society and any other categories of persons deemed influential by the chairperson of the respective National Forum.

The functions of National Forums include formulating the national agricultural training needs and program; formulating and setting the national agricultural priorities for the universities; ensuring that financial and other resources are mobilized and effectively deployed for carrying out

RUFORUM activities at national level; disseminating the agricultural products produced by the universities; articulating demands for agricultural training needs and research; and, mobilizing resources for operations of the National Forum. However, National Forums are only operational in seven countries and their sustainability remains uncertain, particularly since they have no dedicated budget under RUFORUM.

The driving assumptions in the formation of the national forums were that RUFORUM as a regional network firstly had the organizational ability to bring together the different faculties under one umbrella, secondly had the political weight to convene a forum of principal actors in the agricultural sector, and thirdly could sustain a coherent set of activities over time to demonstrate the benefit of the forum. However, the experience has been that it has been possible to mount a national forum in only selected countries and in virtually all those countries it has been difficult to sustain the activities and the political reach of the forum. While conceptually valid, the lack of effective implementation rests on one or more of the assumptions not holding.

With the increasing reliance on student fees to finance university and faculty operations, there is increasing competition between agricultural faculties and colleges for students. Higher quality students also create the potential for a more successful pool of alumni. The creation of neutral ground within which to create a focal point that represents HAE within the agricultural sector is difficult. A prime example of this was the shift from one country having a position on the RUFORUM board to all member universities having a seat. A common suggestion across the faculties was that RUFORUM have a country office that would be the focal point for coordinating activities in each country, including the national forum, thereby providing an honest broker. This would be a first best solution, but is well beyond the budgetary resources of the Secretariat.

Agricultural faculties are not well integrated into the agricultural policy process and do not carry the political weight of a ministry of agriculture or a national agricultural research institute. It is thus difficult for a university or even an HAE focal point to lead in the development of an agricultural platform. There is potential for organizing meetings around the skills needed in postgraduate training and attracting those in the private sector, agricultural research, and agricultural NGO's. However, such meetings to gauge demand and needs do not provide the basis for a more sustainable platform that links research, education, and outreach for smallholder development. In countries such as Ethiopia with a strong ministry of agriculture a national forum has not been attempted and in countries where they have been initiated they have not been sustained. Optimally HAE would participate in agricultural platforms that already existed, but in most countries these have not been organized. In general, policy tends to focus on particular commodities or services, such as irrigation or rural credit. In general, such national platforms need either a champion, usually with political weight, or a problem focus in order to be sustainable.

The national forums, to be successful, need to be organized around the core problem of training the next generation of agricultural scientists and professionals. To do this will require the development of a national HAE focal point. In countries like Rwanda, Malawi, or even Tanzania, where there are only one or two agricultural faculties, this is possible. However, there needs to be both a champion and an evolving agenda which sustains the platform, and in general this will require resources and backstopping from the RUFORUM Secretariat. In general, the Secretariat has neither flexible financial resources nor staff resources to undertake such a program across the member countries. The Secretariat has to be opportunistic in supporting the development of such platforms and the above preconditions should be in place. Where there is a national forum beginning to develop as a platform for HAE and drive a set of activities, the Secretariat needs to support and monitor the process. Work in this area needs to be highly prioritized and a staff member should be identified to track and, where necessary, support the development of the platform.

6.2 TEAM-Africa

The Tertiary Education for Agriculture Mechanism Africa (TEAM-Africa) is a recent initiative of the World Bank launched in 2011 that seeks to strengthen higher agricultural education on the African continent. A number of development partners and donors provide support to programs to strengthen university education in Africa, many of these with an agricultural component. Many of the bilateral donors support twinning programs between national universities and target universities on the continent. Other multilateral donors such as the World Bank have a range of programs in the higher education area, with a recent focus on developing regional programs patterned on the EAAPP and WAAPP programs in East and West Africa. Because most of these programs are supported through higher education grant and loan portfolios, there has been a lack of coherence in support to HAE and its linkage to broader agricultural policy processes on the continent, especially the CAADP process. The overall objective of TEAM-Africa is to bring greater focus to the development of HAE in Africa and to provide a platform for greater coordination of donor support to HAE on the continent, primarily through the CAADP process. FARA, as coordinator of Pillar 4 of CAADP (agricultural research, technology dissemination and adoption), has recently been designated as host of TEAM-Africa, with a view to coordinating research, extension and HAE within the CAADP process.

TEAM-Africa is both an opportunity and a challenge for the development of RUFORUM programs. On the beneficial side, TEAM-Africa provides a platform to link a range of donors to the potential of the RUFORUM regional approach, particularly since the bilateral donors tend to focus on individual countries and the World Bank must develop its regional approach through loan arrangements with individual countries. RUFORUM offers the potential of bringing economies of scope and scale to these programs and of reaching a membership of 32 universities in the East, Southern and Central Africa region. On the challenge side, TEAM-Africa will establish its own secretariat, governance structure, and implementation strategy under FARA. There will be an advisory body but it will probably be independent of university

stakeholders. It is planned that development partners will be coordinated and operate through a TEAM-Africa secretariat, and RUFORUM in East and Southern Africa and ANAFE in West Africa will serve as the implementing networks.

RUFORUM as program implementer for TEAM-Africa must trade off the potential of increased funding with a loss of control of its program focus, as another independent body has been created between RUFORUM (and its university membership) and donor support. The issue going forward in the development of TEAM-Africa and its relations with RUFORUM is whether RUFORUM's program structure is in reasonable alignment with the programs and donor agendas of TEAM-Africa, and particularly whether TEAM-Africa would move to regional implementation strategies from the current country foci. Without such a regional framework, it is difficult to see how such an alignment is possible and RUFORUM would lose credibility with its membership if only implementing programs focused on particular universities, especially if RUFORUM had little input into the design of those programs.

To date RUFORUM put its own core funds into covering the major portion of costs associated with its participation in TEAM Africa meetings. Moreover, RUFORUM has had little input into the design of the TEAM-Africa strategy. Because of this, RUFORUM with support from the board has decided not to participate in the further design and management of TEAM-Africa, but rather focus on the consolidation and deepening of its own program structure.

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ANNEX 1: CHARACTERIZATION OF THE PARTICIPANTS IN THE COMPETITIVE RESEARCH GRANTS PROGRAM

A1.1 Proposals received and awarded

There have been 4 calls for proposals since 2009. The number of proposals received in a single call peaked in 2010 (Table A1–1). The percent of compliant proposals funded each year has been decreasing, as this reflects funding constraints more than the quality of the proposals being submitted.

Table A1–1: The number of proposals received and awarded in the four calls.

Proposals	2009	2010	2011	2012	Total
Received	47	117	107	91	362
Compliant	46	84	94	75	299
Awarded	16	26	24	16	82
% of compliant funded	34.8	31.0	25.5	21.3	

A1.2 Participation by new member universities

In the first 2 years, new universities submitted very few proposals (Figure A1–1). But their participation has been increasing steadily since the Secretariat started offering proposal-writing workshops to create awareness of the GRG program and strengthen faculty’s skills to write an acceptable proposal—a World Bank (2000) review suggests this is best practice for a competitive grants program.

In 2012, approximately 33% of the proposals received came from new member universities; 67% of these were developed by faculty who attended a RUFORUM proposal-writing workshop. Namibia, and Gulu and Kyambogo universities in Uganda submitted more than 4 proposals each; Botswana, Burundi, Gezira (Sudan), Lesotho, and Mekelle submitted at least 2 proposals.

A1.3 Participation by female scientists

Female scientists have submitted a total of 83 proposals, or approximately 23% of the total proposals received to date (Figure A1–2). Nearly all of these (93%) were from female faculty at the older universities. Although women’s participation shows a slight downward trend over time, percentage-wise, this is due to the increasing participation of new universities, where male scientists submit the overwhelming majority of proposals.

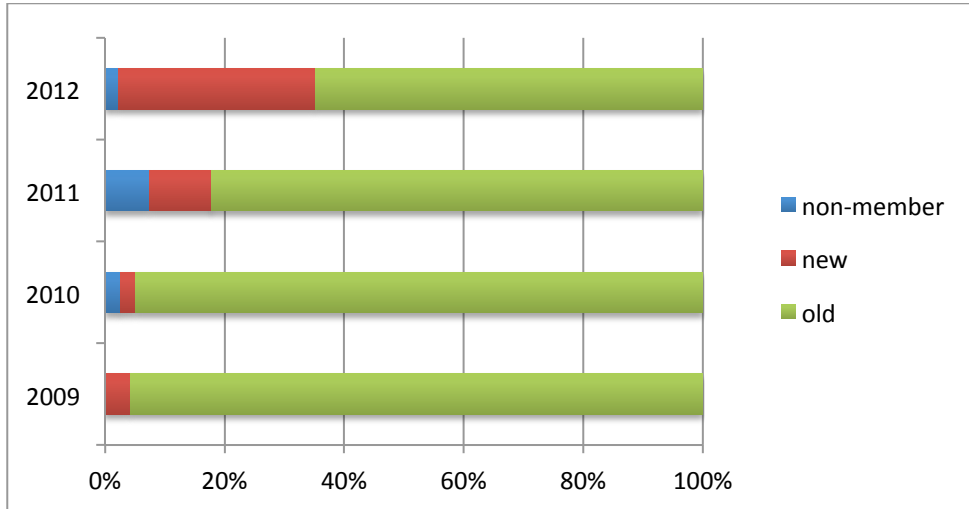


Figure A1–1: Percent of proposals from old vs. new member universities, 2009-2012.

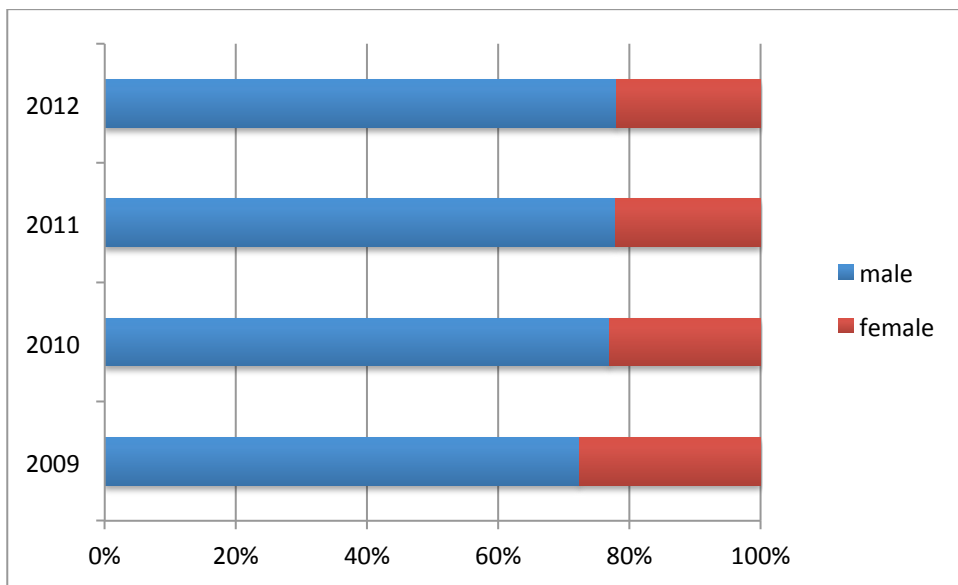


Figure A1–2: Percent of proposals submitted by gender, 2009-2012.

A1.4 Participation in subsequent GRG competitions by scientists who re-submitted proposals rejected in an earlier round

During the proposal review process, the reviewers give feedback to unsuccessful candidates, providing guidance on how their proposals might be improved. A number of these applicants have resubmitted their proposals in subsequent calls, and several have been successful the second time around. In fact, in both 2010 and 2012, more than 30% of the funded proposals came from resubmissions; in 2011, it was 10%. The peer review process offers clear benefits for RUFORUM members.

ANNEX 2: CHARACTERIZATION OF THE PROPOSALS AWARDED IN THE CRG¹

RUFORUM has awarded 82 grants to date using BMGF funds.

A2.1 Proposals awarded: grants to member universities

RUFORUM currently has 32 partner universities; 17 of these have received at least 1 GRG grant (Table A2–1). Several universities have received 5 or more. Makerere has been the major beneficiary, receiving 34% of the grants. Sokoine, Kenyatta, the University of Nairobi, and the University of Zimbabwe have received 5-10% each.

Table A2–1: Distribution of Graduate Research Grants among partner universities, 2009-2012

Universities	2009	2010	2011	2012	Total
Botswana	0	0	2	1	3
Eduardo Mondlane	1	2	1	0	4
Egerton	0	0	2	1	3
Gulu	0	0	0	1	1
Jomo Kenyatta	0	1	0	1	2
Kenyatta U	1	2	2	1	6
Kyambogo	0	0	0	1	1
LUANAR	0	0	3	0	3
Makerere	8	12	5	3	28
Mekelle	0	1	1	0	2
Moi	0	1	1	0	2
Mzuzu	0	0	0	1	1
Lesotho	1	0	0	0	1
Sokoine	1	2	2	0	5
U Nairobi	0	3	2	5	10
U Swaziland	0	0	1	1	2
U Zimbabwe	4	2	2	0	8
Total	16	26	24	16	82

¹ This section is based on data from the PI grants database.

A2.2 Proposals awarded: by gender

Female PIs have been awarded 28 grants or 34% of the total to date. These were from 13 of the 32 partner institutions as shown below.

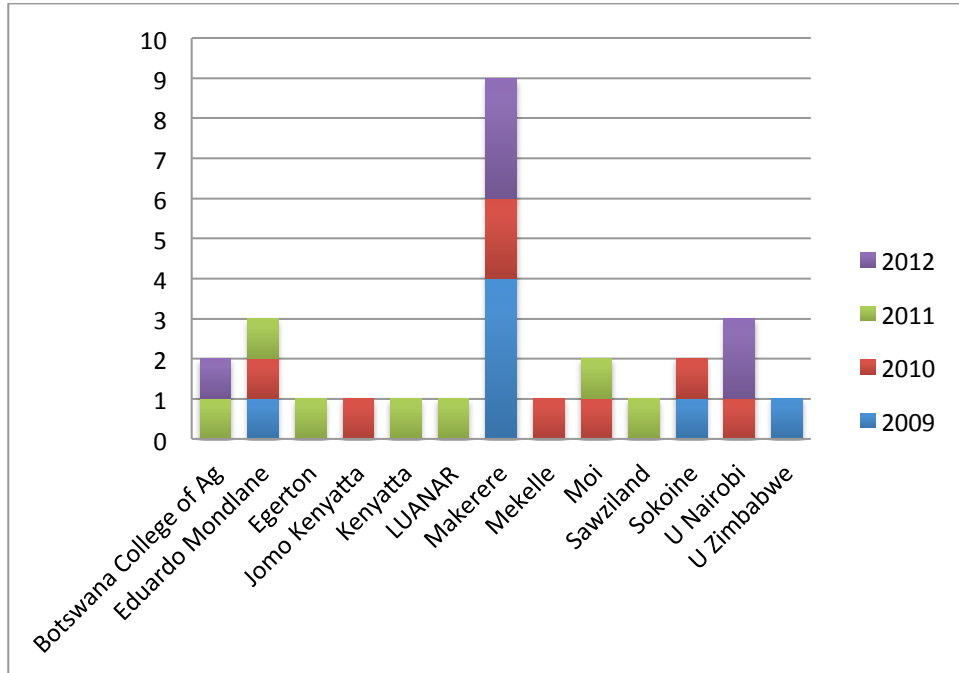


Figure A2–1: Grants awarded to female scientists at partner universities, 2009-2012.

A2.3 Proposals awarded: to junior faculty

The data show the program is awarding the majority of grants (72%) to junior faculty, who we define here as those PhD-holders who go by the academic title, “Dr.” Senior faculty who have earned the title Associate Professor or Professor, received 12% and 11% of the awards, respectively. This is consistent with the RUFORUM strategy of supporting the development of young scientists.

A2.4 Collaboration with other institutions

RUFORUM GRG grants are meant to help universities create linkages and partnerships with research and extension institutions and the private sector. According to the data, all of the projects have at least 1 external partner, 35% have 2 partners and 13% have 3 or more external partners. The dominant partners are National Agricultural Research Institutes (NARI), extension arms of government ministries, other national governmental agencies and other academic institutions (Figure A2–2). Approximately 30% of the projects partnered with their National Research institutes, while 25% were collaborating with Ministries and extension.

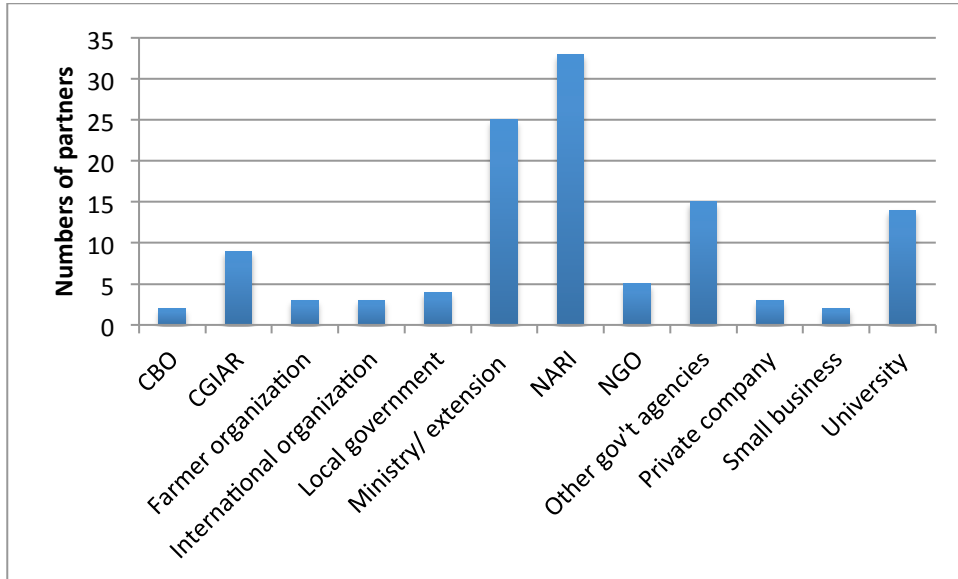


Figure A2–2: Institutional partners affiliated with RUFORUM projects, 2009-2012

A2.5 Characterization of student research areas and sub-topics

Students' thesis topics were categorized according to research area (Figure A2–3). Research topics within the top 6 research areas are shown in Table A2–2. Not surprisingly, the majority of students have focused on research areas that have traditionally been strong focal areas within FORUM/RUFORUM's Graduate Research Grants program. These are natural resource management (NRM; 21% of all grants), crop pests and diseases (P & D; 18%) and crop production (15%). These 3 research areas accounted for approximately half of all research being undertaken by students in the program.

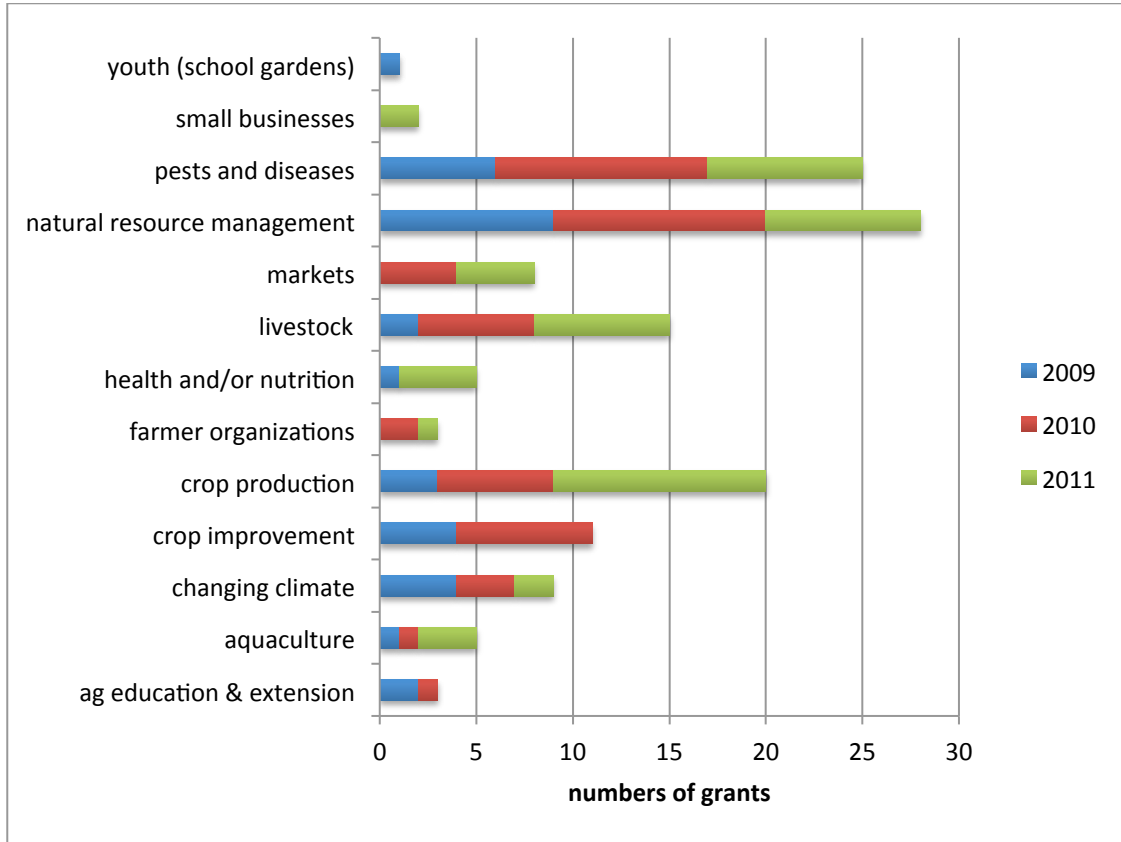


Figure A2–3: Research themes of MSc students funded by RUFORUM GRG program, 2009-2011

Table A2–2: The top 6 MSc student research areas and main sub-topics funded, 2009-2011.

1. Natural resource management	2. Pests & diseases	3. Crop production
Soil fertility (57%)	Crop diseases (36%)	Staple foods (35%)
Water (14%)	Insect pests (32%)	Legume (30%)
Agroforestry (14%)	Striga (16%)	Indigenous crops (25%)
	Nematodes (16%)	
4. Livestock	5. Crop improvement	6. Changing climate
Productivity	Farmer participatory evaluations	Climate adaptation strategies
Profitability	Screening for tolerance to biotic and abiotic stresses	Impacts on fragile lands
Disease management		
Food safety		

New research areas that have featured prominently in the past 3 years include livestock (11% of grants), crop improvement (8%), and issues around changing climate (7%). Research topics around market issues (value addition, value chain analysis, profitability), although not shown in Table A2–2, were the focus of approximately 6% of the grants awarded.

A2.6 Student completion of their degree programs

The data show that 38 students—28% of the 136 students funded from 2009-2011—had submitted their thesis for review (either with supervisor or external examiner) as of April 2013. Fewer have officially graduated. Students' progress towards degree has been negatively impacted by fund flow problems (discussed in the second report on GRG challenges and lessons), as well as time taken by examiners marking theses and calling students to defend them.

The data show that more experienced faculty may help their students navigate the MSc process more quickly; 37% of the students who have reached the thesis submission stage are supervised by senior faculty (those who have the title of Associate Professor or Professor), which is more than would be expected based on the proportion of senior faculty holding grants. Among universities, students from the University of Zimbabwe appear to have progressed a bit faster than their peers at other universities, with 9 of their 16 students having submitted their theses.

A2.7 Student journal articles

The delays impacting students' completion of their degree programs have also impacted the publication of journal articles, given that publications are normally produced after students have defended their theses. To date, 11 students (8%) have defended their thesis and 11 have produced journal articles (it's not a one to one correspondence though; some who have produced articles have not defended and vice versa). Similar to what was observed for time to completion, students supervised by senior faculty have produced more journal articles; in this case the trend is even more pronounced, as well as statistically significant; 73% of the students who have published journal articles had Associate or full Professors as supervisors. This is likely because senior faculty earn their academic titles by being active in research. Junior faculty (i.e., those with the academic title "Dr.") also typically have the lion's share of teaching responsibilities; this likely means it takes them longer to publish whatever research they do manage to do. RUFORUM offers junior faculty research opportunities and skill strengthening workshops to help them become more active scientists. However, these new activities are usually being added on top of their pre-existing responsibilities, which often include more than 75% time teaching.

RUFORUM students continue to publish journal articles in a mix of regional and international journals, as was the case during FORUM time. The grants team provided 8 papers for the review team; 3 were published in African Crop Science Journal, 2 in another regional journal based in Kenya and 3 in international journals. In addition to journal articles, RUFORUM students' research continues to be highlighted in Conference Proceedings, mostly from RUFORUM's Biennial Conferences. However, a few others were published in the proceedings from other conferences as well.

ANNEX 3: STUDENT EMPLOYMENT UPON COMPLETION OF COURSEWORK & RESEARCH²

National Agricultural Research Institutes (NARI or NARS) and other government research agencies absorbed nearly 30% of these students, followed by academia (20%), government extension services (16%) and the remaining categories at 4-10% each (Table A3–1). The basic trends were similar by gender, except a larger proportion of women went into academia.

Table A3–1: Placements of RUFORUM students funded under the BMGF grant by employer type and gender.

Type of Employer	Female	Male	Total
Government Research (NARI+)	5	9	14
Academia	5	5	10
Government Extension	4	4	8
NGO	2	3	5
Private Sector	1	3	4
International organization	1	3	4
Self Employed	1	1	2
Misc	1	1	2
Total	20	29	49

ANNEX 4: RUFORUM SKILL BUILDING ACTIVITIES³

A4.1 Skill-building workshops attended by Principal Investigators

The Secretariat offers faculty and students opportunities to strengthen skills and develop critical scientific competencies. These include Scientific Data Management and Analysis (SDM/A), Proposal Writing and Scientific/Technical Writing. The PI grants database shows that 136 grantees have participated in these activities. PIs from all but one University (Lesotho) have attended at least one workshop (Figure 4A–1). The numbers of GRG-funded MSc students who

² This section is based tracer information, provided by the grants team, for 49 BMGF-funded students who have secured placement after finishing their coursework and research under the program.

³ Information in this section is derived from the PI and student databases and supplementary info provided by the grants team.

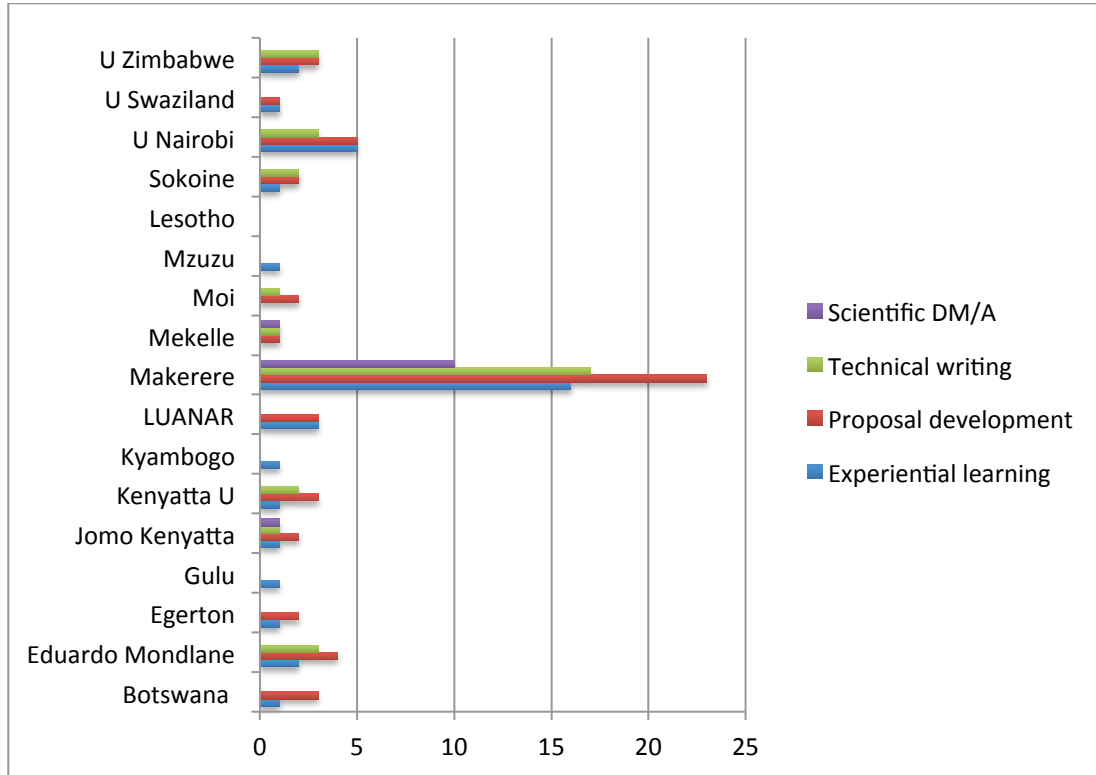


Figure A4–1: Numbers of RUFORUM capacity–strengthening workshops attended by GRG PIs from different universities, 2009-2012.

have attended the skill building courses over the last 4 years was not listed in the student database.

A4.2 Scientific Data Management and Analysis Training

According to the Grants Team, the SDM/A course is offered for 7 days in the second year of each cohort. It is offered as a caravan course and is open to any interested student or faculty member at the university where it is being conducted. The course is delivered in two separate sections: a 3 day session for faculty that emphasizes the SDM/A needs of the students they train and a 4 day session for students, which aims to provide students with supplementary skills for managing, analyzing and presenting their data. The faculty course reviews common problems that students experience in research design, data collection etc. Sessions are also devoted to facilitating the participants to formulate an action plan to address these. The students’ SDM/A workshops emphasize practical skills, especially training using statistical software packages such as Genstat and SPSS. It is meant to supplement the largely, theoretical and lecture-based single semester course on applied statistics, which the majority of the students in the region take in their first semester of their MSc programs. The Grants Team provided a sample training-program of a SDM/A course for PhD students held last month in Zambia. The course included 9 modules: Survey Design, Experimental Design, Data Management, Analysis of Variance, Regression Analysis, Generalized Linear Regression,

Applied Multivariate techniques, Statistical Considerations in Science Writing and Discussion of Individual Research Projects. Students who attended this course in Malawi completed a Survey Monkey questionnaire about it, which was made available to the review team. The majority of the students rated all but a couple of modules (Mixed models and applied multivariate analysis) as good to excellent.

According to the records in the PI database, 12 GRG PIs attended the course in 2010 and 2012; this included 6 male and 6 female PIs, who came from Makerere (10 total) and Jomo Kenyatta and Mekelle (1 each).

A4.3 Proposal writing and technical writing training

RUFORUM normally offers training in proposal and technical writing, particularly for potential applicants for its competitive grants programs, with a special emphasis on newer universities. In the lead up to the 4th call for proposals, teams from the Secretariat conducted 10 proposal writing trainings throughout the region, using funds from a Nurturing grant. A total of 236 faculty and staff from 13 universities attended (Table A4–1). As mentioned previously, a total of 20 new proposals were submitted during the 4th call by faculty who attended a workshop.

Table A4–1: Numbers of faculty members and staff at new universities who attended proposal/technical writing workshops held throughout the region in 2012.

University	No. of attendees
National University of Rwanda	3
Burundi University	4
Catholic University of Congo	4
Mzuzu	40
Kyambogo	31
Gulu	24
Uganda Martyrs	20
University of Juba	14
Haramaya	35
Mekelle	18
Lesotho	21
Catholic U of Mozambique	22
Total	236

Eighty-seven of the PIs who have won a grant attended either a proposal or technical writing mini-workshop. The Secretariat keeps track of faculty that receive a subsequent grant after winning their GRG grant. A Pearson Chi square test--to assess if attending specific trainings was associated with receiving a subsequent large grant--showed that those who attended the

scientific/technical writing training won significantly more grants ($p=0.001$) than those who did not (68% vs. 32%).

As with the SDM/A course, there is also a version that targets students. It's offered to students in their first year who are preparing to write their research proposals. Information on attendance of these sessions also has not been captured in the students' database.

ANNEX 5: STUDENT FEEDBACK ON RUFORUM ACADEMIC PROGRAMS ACCORDING TO A SURVEY CONDUCTED IN 2011⁴

The questionnaire had 83 respondents; 70 were students in MSc programs, 10 were in a PhD program and 3 skipped the degree question. Around 90% of the respondents had already completed their coursework. A summary of students' rating of key areas of program strengths and weaknesses is given in Table A5–1. The majority of students felt they had received significant capacities from the program, which are key areas that RUFORUM aspires to impact. Areas where the majority of students expressed dissatisfaction were communication, university infrastructure and the preponderance of coursework.

Table A5–1: Results summarized from a RUFORUM student survey given in 2011.

Program strengths ⁵	Program weaknesses
<ul style="list-style-type: none"> • Process of selecting, admitting & students is fair (78%⁶) • Course content is relevant, up to date & helps students to make connections with other areas of academic study (91%) • Teaching approaches foster students' development as independent thinkers who can relate & apply what they learn to the real world (82%) • Lecturers value student contributions & evaluate their outputs fairly 	<ul style="list-style-type: none"> • No proper channel/ representation for communicating program-related problems that impact them • Inadequate balance between coursework & practical exposure through field work/student exchanges • University library materials, computers and software, and tools & equipment are of poor quality

⁴ The information in this section is drawn from students' responses to a 2011 Survey Monkey Questionnaire.

⁵ Areas where > 60% of the students gave positive responses to questions (good to excellent rating; agree or strongly agree); areas of program weaknesses are areas where > 60% of students gave a negative response

⁶ Mean score of more than one question

Program strengths ⁵	Program weaknesses
<ul style="list-style-type: none"> • Supervision & mentoring is strong in the following areas: showing interest in student’s work, providing constructive criticism, discussing methodological issues & other issues related to subject area, providing opportunities for professional development & networking • Fostered development of stronger skills in the following areas (> 80% positive) <ul style="list-style-type: none"> ○ Problem solving ○ Academic writing ○ Critical thinking ○ Team work ○ Public speaking ○ Leadership & management • Enhanced abilities to (>75% positive) <ul style="list-style-type: none"> ○ Communicate complex ideas ○ Synthesize & integrate ideas/info ○ Plan & execute complex projects ○ Adapt to changing circumstances ○ Work independently ○ Create & interpret new knowledge ○ Conduct valuable/publishable research • Most important objective for enrolling in program was mostly (75%) or completely met (11%) 	

ANNEX 6: EVIDENCE THAT FUND FLOW DELAYS ARE ALREADY IMPROVING

The review team requested data for the various project milestones dates for the 2009, 2010 and 2011 grants. The purpose was (i) to assess the extent of the bottlenecks at various key stages in the process and (ii) to evaluate whether there was evidence that the actors, and especially the grants team, were improving the process with time (i.e., reducing delays). Milestone dates included grant’s official start date, the dates the first year funds were transferred, the dates the

PIs 6th month report was due and received, the dates the PIs 12th month report was due and received, and the date the 2nd year funds were transferred.

An analysis of variance was performed on the numbers of days that elapsed between specific milestone dates, by grant year, to assess the trends. There were highly significant differences ($p < 0.000$) between years for each of the four delays assessed. The 95% confidence intervals are presented below (Figs A6–1 and A6–2).

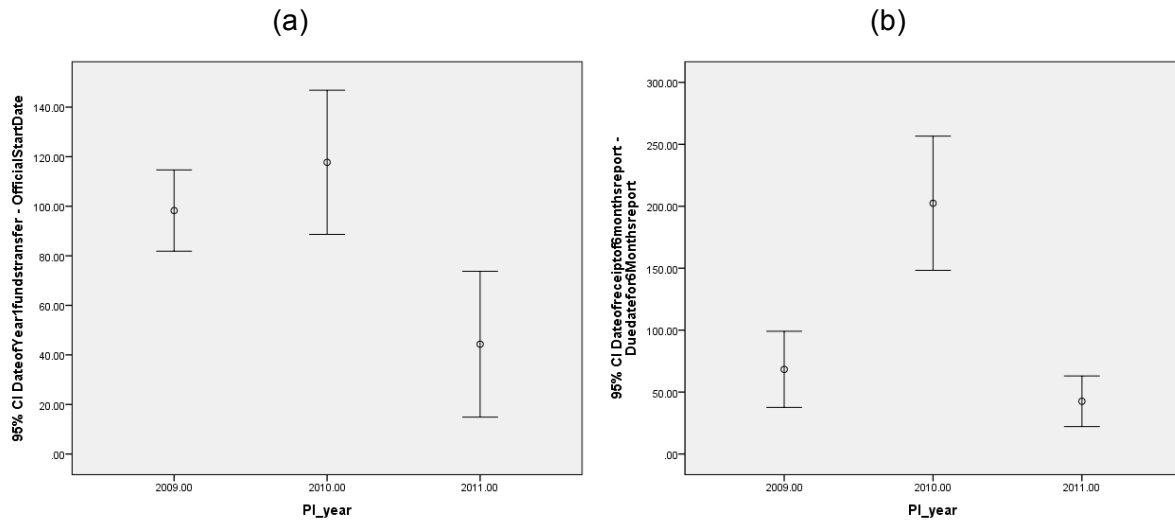


Figure A6–1: 95% CI, by grant year, for (a) the number of days delay in first year funds disbursement; (b) the number of days delay for PIs submitting the 6 month report.

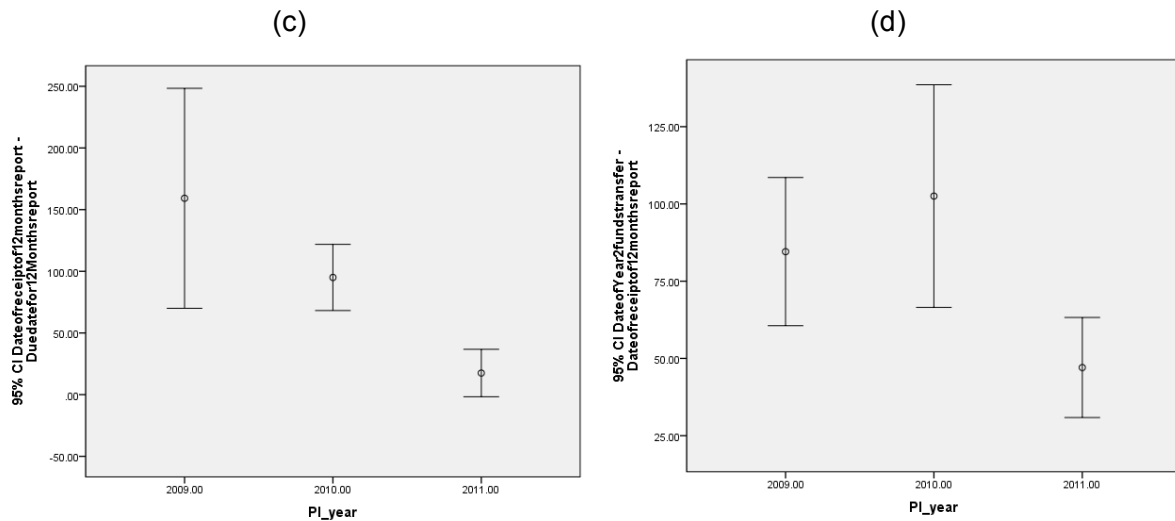


Figure A6–2: 95% CI, by grant year for (c) the number of days delay for PIs submitting the annual report; (d) the number of days delay for the 2nd funds disbursement.

The data show substantial delays for each process stage across years (overall mean > 80 days delay at each step). There were particularly notable delays for the Secretariat in 2010 (a, d); upon probing, these were quickly attributed to the fact that both the Biennial Conference and Ministerial Conference took place around the time the awards were made that year, as well as to reduced staffing, with one of the two grants team members on maternity leave.

ANNEX 7: TRACING MSc AND PhD GRADUATES

When the Research Methods MSc degree program commenced in 2009, the first cohort had a regional outlook with student representation of 8 countries (Kenya, Uganda, Tanzania, Zambia, Ethiopia, Burundi, Malawi and Zimbabwe). This number decreased the following year with student intake into the second cohort representing only 4 countries (Kenya, Tanzania, Uganda and Burundi). Two years later, in 2012, the 3rd cohort not only had reduced numbers but also had a sharp decline in student representation with only Kenyan and Ugandan students enrolled.

Information provided by RUFORUM indicates that the first two cohorts had full scholarship support through BMGF funding, and also partly from an EU-EDULINK project on Enhancing Research Skills in Eastern and Southern Africa (ERESA). Notably, four students in the third cohort are self-sponsored. Evidently, the lack of scholarship support not only led to a decrease in the number of students enrolled into the program each year, but also affected the regional nature of the program, making it more national than regional – as the number of countries participating in terms of sending their students to the program declined sharply.

Needless to say, without funding that directly supports students, the sustainability of the regional character of program is at stake. Table A7–1, which provides details on a trace of 16 graduates of the program, indicates that 15 of them have secured employment in Burundi, Ethiopia, Kenya, Rwanda and Tanzania. It would be deduced that these are graduates of the first and/or second cohort, which have good regional representation.

Table A7–1: Tracing MSc. Research Methods graduates

	Name	Organization	Position
1.	Cosmas Mugambi	Health Economics & Finance Research Consortium (HEFDC)	Research Consultant
2.	Esther Wairimu	Optimizing the Response to Prevention-HIV Efficiency in Africa (ORPHEA)	Data Manager
3.	Chimwemwe Salima	NEPAD Regional Fish Node	Project Coordinator
4.	Nepomuscene Ndaba	ISABU, Burundi	Researcher
5.	Hilda Wambani	Kenya Agricultural Research Institute	KARI
6.	Paul Murima	Ministry of Public Health & Sanitation-Kenya	Medical Entomologist
7.	Gregoire Hagenimana	Rwanda Agricultural Board	Researcher
8.	Januaris Mbatha	Kenya School of Government	Principal Lecturer
9.	Charles Mubelwa	Land O' lakes-Tanzania	M&E Officer
10.	Shiphar Mulumba	National SP Program-Uganda	Researcher
11.	Silas Ochieng	Financial Sector Deepening Trust Kenya	Research Manager
12.	Mayoba Moono	Currently Unemployed	
13.	Richard Wanzala	Jomo Kenyatta University of Agriculture & Technology (JKUAT)	Assistant Lecturer
14.	Birhanu Mulugeta	Haramaya University-Department of Economics	Lecturer
15.	Josephine Kiritu	Ministry of Agriculture-Kenya	M&E Officer
16.	Grace Wangombe	USAID under ROSTO/WESTAT/TANGO	Data Monitor

Source: RUFORUM MSc. Research Methods Program documents

Table A7–2: Tracing MSc AICM graduates

No.	Name	Organization	Position
1.	Pauline Mburu	Kenya Agricultural Research Institute	Agricultural Librarian
2.	Nada Siddig Abdalla Mus	Agricultural Research Coporation, Sudan	Support to ICT function
3.	Willard Zendera	Africa University, Zimbabwe	Lecturer
4.	Milkyas Hailu	Haramaya University, Ethiopia	Director of Libraries
5.	Victoria Mbigide	Women of Uganda Network	Information Officer
6.	Moses Yiga	National Research Organisation, Uganda	Librarian
7.	Dorine Odongo-Ochieng	Scinnovent Centre	Agricultural Research and Information Specialist

Source: RUFORUM MSc. AICM Program documents

Table A7–3: Tracing MSc Plant Breeding and Seed Systems graduates

	Name	Country	Funding	Status of Thesis/ M.Sc. Program	Position on return to home Institution
1.	Habarurema Innocent	Rwanda	AGRA	Graduated	Head, Wheat program at Rwanda Agricultural Board
2.	Kwemoi Daniel Bomet	Uganda	AGRA	Graduated	Research Associate, Maize Program at National Crops Resources Research Institute (NaCRRI)
3.	Namazzi Birabwa Sylvia	Uganda	AGRA	Graduated	Head, Research Unit at Victoria Seeds Company, Uganda
4.	Namugga Prossy	Uganda	AGRA	Graduated	Team-Leader, Potato Research in Kachwekano Zonal Research Institute in Kabale
5.	Ndacyayisenga Theophile	Rwanda	AGRA	Graduated	Research officer, Potato Program in Rwanda Agricultural Board
6.	Nsabiyera Vallence	Uganda	AGRA	Graduated	Research Scientist at Nabuin Zonal Research Institute for Dry Land Research in Karamoja; Secured PhD to University of Sydney, Australia (2013)
7.	Nyombayire Alphonse	Rwanda	AGRA	Graduated	Research Scientist attached with the Maize Program at Rwanda Agricultural Board; Recently secured PhD to ACCI-Kwa-Zulu Natal
8.	Obala Jimmy	Uganda	AGRA	Graduated	Research Scientist and Team Leader, Tea Research at Hoima Zonal Research Institute, NARO, Uganda
9.	Onaga Geoffrey	Uganda	AGRA	Graduated	Research Officer, Rice Program at NaCRRI and PhD Student University of Göttingen, Germany
10.	Ongom Patrick Obia	Uganda	AGRA	Graduated	PhD Student, Purdue University in USA under Prof. Gebisa Ejeta, Renowned Sorghum Breeder and World Food Prize Winner

	Name	Country	Funding	Status of Thesis/ M.Sc. Program	Position on return to home Institution
11.	Shumbusha Damien	Rwanda	AGRA	Graduated	Head, Sweet potato Program at Rwandan Agricultural Board
12.	Lado Maurice Mogga	South Sudan	SCARDA	Graduated	Research Scientist, Ministry of Agriculture, South Sudan; New AGRA Grantee; Recently secured PhD to ACCI-Kwa-Zulu Natal
13.	Mayada Mamoun Beshir	Sudan	SCARDA	Graduated	PhD Student at Makerere University
14.	Luka Otwak Opio Awata	South Sudan	SCARDA	Graduated	Research Scientist, Ministry of Agriculture, South Sudan; New AGRA Grantee; Recently secured PhD to ACCI-Kwa-Zulu Natal
15.	Inamahoro Michelle	Burundi	SCARDA	Graduated	Research Scientist, Potato Program at ISABU, Burundi
16.	Gafishi Kanyamasoro Martin	Rwanda	SCARDA	Graduated	Research Scientist with Maize Program at Rwandan Agricultural Board
17.	Fulgence Niyongabo	Rwanda	SCARDA	Graduated	Research Scientist, Rice Program at ISABU, Burundi
18.	Uwizerwa Mathilde	Rwanda	SCARDA	Graduated	Head, Soybean Program at Rwandan Agricultural Board
19.	Leonidas Dusengemungu	Rwanda	SCARDA	Graduated	Research Scientist at Rwandan Agricultural Board
20.	Cyamweshi Rasangamwa Katana	Rwanda	SCARDA	Graduated	Research Scientist at Rwandan Agricultural Board

Source: RUFORUM MSc. Plant Breeding and Seed Systems Program documents

Table A7–4: Tracing PhD Dryland Resource Management graduates

	Name	Gender; Country	Responsibilities
1	Tasokwa Kakota	Female; Malawi	Lecturer - LUANR, Malawi; Head of Department of Basic Sciences
2	Sarah Nalule	Female; Uganda	Lecturer -Makerere University, Uganda
3	Mary Baaru	Female; Kenya	Lecturer - Kenyatta University, formerly a Ministry of Agric. Kenya
4	Elizabeth Muthiani	Female; Kenya	Research Officer-Kenya Agricultural Research Institute
5	Eunice Githae	Female; Kenya	Lecturer – Narok University College, Kenya
6	Kudra Abdul	Male; Tanzania	Lecturer – Sokoine University, Tanzania
7	Robert Mulebeke	Male; Uganda	Lecturer - Kyambogo University
8	Richard Moyo	Male; Zimbabwe	Lecturer – University of Zimbabwe, Zimbabwe
9	Melusi Moyo	Male; Zimbabwe	Lecturer – Lupane Staet University, Zimbabwe
10	Joseph Ndung’u	Male, Kenya	Research Officer – Kenya Agricultural Research Institute
11	Mugerwa Swidiq	Male, Uganda	Research Officer – National Livestock Resources Research Institute, Uganda
12	Emmanuel Tairo	Male; Tanzania	Lecturer-Mkwawa University, Tanzania
13	Debela Hunde	Male; Ethiopia	Lecturer – Jimma University, Ethiopia
14	Zziwa Emmanuel	Male; Uganda	Lecturer – Makerere University, Uganda
15	Aphaxard Ndathi	Male; Kenya	Research Officer – Kenya Agricultural Research Institute
16	Elias Obudho	Male; Kenya	Lecturer-University of Nairobi, Kenya
17	Oswin Chibinga	Male; Zambia	Lecturer – University of Zambia

Source: RUFORUM PhD Dryland Resource Management Program documents

Table A7–5: Tracing PhD Agriculture and Resource Economics graduates

No.	Name	Organization	Position
1.	Horace Phiri	Lilongwe University of Agriculture and Natural Resources, Malawi	Lecturer
2.	Mildred Barungi	Makerere University – Department of Policy and Research, Uganda	Administrator
3.	Hellen Kongai	Makerere University, Uganda	
4.	Vincent Ekiyar	Ministry of Local Government, Amuru, Uganda	
5.	Bonface Kakhobwe	UNICEF	Researcher
6.	France Tilapasila Gondwe	ICRISAT, Malawi	Training Officer
7.	Mirau Mbise	Mkwawa University, Tanzania	Lecturer
8.	Irene Nambuya Musebe	Ministry of Agriculture, Kenya	

Source: RUFORUM PhD Agriculture and Resource Economics Program documents

ANNEX 8: CHARACTERIZATION OF THE REGIONAL PHD PROGRAMS

A8.1 PhD Program in Dryland Resource Management

The PhD program in Dryland Resource Management has been offered at the University of Nairobi since 2008, when the program opened doors to the first cohort of 18 students from 7 countries. Subsequent cohorts enrolled in 2010, 2011 and 2012.

Rationale: With large portions of arid and semi-arid lands across sub-Saharan Africa, the region faces the critical challenge of sustainable dryland resource management and the need to build capacity in this area of study. Sustainable dryland resource management has great potential for economic development and poverty reduction in SSA. The interventions should of course take into account the plasticity associated with highly variable ecosystems and require multi-partner interventions to elucidate and address various interactions within ecosystems as a whole. The focus should be cross-sectoral and requires partners to actively engage with end-users in an innovation process. It is with this mental framework that the PhD program in dryland resource management was developed. The program seeks to provide a platform through which the much needed knowledge management should be constituted as a key thrust in working with affected communities to create sustainable change in dryland farming systems in the ESA region and beyond.

Program Design: The program is designed to take a minimum of 3 years and a maximum of 5 years, and consists of course work with written examinations, research and thesis. Students take course work in the first year of study. Within this period, they are required to take seven core courses and at least five elective courses. Upon the advice of faculty, students may be required to attend courses that are considered appropriate to remedy deficiencies in their academic background, or to endow them with specialized skills that are useful to their study or research work. Students sit coursework examinations on semester basis, and are expected to pass all end-of-semester examinations in core courses and respective elective courses, to qualify to proceed to do their research. As part of quality assurance the university engages external examiners and each lecturer administers a questionnaire for evaluation by students.

Students develop their research proposals during the first year of study; the thesis topic is agreed upon between the student and the approved academic supervisors. Each student is required to present a minimum of two seminars in the course of their research work, as part of quality assurance. The research project is examined by written thesis and oral presentation. Students' theses are examined by two internal examiners and one external examiner, followed by oral presentation/examination at the Faculty where the student is registered.

As part of quality assurance and building competencies beyond the technical, students in the program take short skill enhancement courses (over 5–7 days) in proposal writing, journal publishing, scientific data management, personal mastery and soft skills and graduate research week. The graduate research week is a five day session where experts from the field interact with students by sharing their experiences, reviewing student proposals, advising students on the practicalities of field research in drylands, and advising students on potential sources of funding, information, internships, and so on.

Program Outputs: The program has had four cohorts of students since it was established. In that period, the university has engaged a total of 9 international faculty, 16 regional lecturers and 18 national ones through the faculty exchange program. The annual numbers are provided in Table A8–1.

Table A8–1: Staff exchanges/visiting lecturers in the Program

	National	Regional	International
Cohort 1	6	8	4
Cohort 2	5	4	2
Cohort 3	5	3	2
Cohort 4 (on-going)	2	1	1
Total for all years	18	16	9

Source: RUFORUM PhD Dryland Resource Management Program documents

Other program outputs include 14 PhD Theses, 21 papers in refereed journals, and 25 conference proceedings (*Source*: RUFORUM, PhD Dryland Resource Management Program documents).

Program Outcomes: The program is considered relevant as the knowledge attained is useful in building existing capacity that can offer dryland farming expertise. It is also viewed as inclusive of stakeholder participation with joint development of the curriculum and external reviews. The program design, which includes coursework, research and thesis, is lauded as relevant and appropriate.

Other positive outcomes of the program include:

- i.) The rigor and approach of the MSc. curriculum design, review, and teaching have been strengthened as majority of the PhD lecturers also teach the MSc students;
- ii.) The program has attracted funding from USAID, with a grant of US\$0.5 million, awarded in support of the development of a Sustainable Drylands Centre. The grant is supporting student and faculty research fellowships, a student exchange program, and Centre infrastructural development. The partnership involves RUFORUM Secretariat, University of Dares Salaam, Tanzania National Livestock Research Institute, ILRI, IUCN, AU-IBAR, and the Colorado State University.

Challenges: The program is currently in the fourth year of implementation with four cohorts in the pipeline.

As indicated in Table A8–2, six students from the first Cohort, admitted in 2008, graduated in September 2011 within the required 3 years; four others graduated at the end of that year; another four in 2012; and the last four are expected to graduate in 2013. It is notable as well that the students in Cohort 2 (2010), who are expected to complete in 2013, are currently doing their research for about 19 months now. Evidently, these students have experienced certain delays in the process of their studies and it would be useful and beneficial to RUFORUM to make closer checks on students' progress with a view to unraveling the issues.

As Table A8–2 indicates, student intakes in all the four cohorts have been far less than the number of applicants, with Cohort 1 admitting 18 out of 78 applicants (23%), Cohort 2 admitting 8 out of 36 (22%), Cohort 3 admitting 10 out of 20 (50%) and Cohort 4 admitting 10 out of 15 (66%). Also, the number of applicants steadily declined over the four years, an aspect that may have been occasioned by various factors. One factor may be the reduced period for the call of proposals as was indicated by students at the University of Nairobi. Access to funding may be another reason with potential candidates discouraged from sending in applications due to lack to funding possibilities. The low number of intakes compared to the applications may also have discouraged potential PhD students from submitting their own applications for fear of not being admitted into the program.

Table A8–2: Student numbers in the PhD Dryland Resource Management

Year of Intake	Number of Applicants	Student Numbers (% females in brackets)	Status of Students	Countries of origin of the students
Cohort 1 (2008)	78	18 (33)	6 students graduated in September of 2011, in exactly 3 years. Another 4 graduated in December 2011. 4 graduated in 2012. 4 are finalizing their thesis and hope to graduate before end of 2013.	Kenya, Ethiopia, Malawi, Tanzania, Sudan, Uganda, Zambia, Zimbabwe
Cohort 2 (2010)	36	8 (40)	Completed coursework, research proposals approved, undertaking their research activities for about 19 months now.	Kenya, Uganda, Ethiopia, Sudan
Cohort 3 (2011)	20	10 (40)	They completed their course work, developed proposals, proposals approved, and are seeking research funds, some beginning reconnaissance field-work activities	Kenya, Uganda, Ethiopia
Cohort 4 (2012)	15	10 (30)	Have completed first semester of coursework, currently in second semester	Kenya, Uganda
Total	149	46		

Source: RUFORUM PhD Dryland Resource Management Program documents

It is also noteworthy that the student representation continued declining over the years. As the table indicates, Cohort 1 had representation of 8 countries (Kenya, Ethiopia, Malawi, Tanzania, Sudan, Uganda, Zambia and Zimbabwe); Cohort 2 had 4 countries represented (Kenya, Ethiopia, Sudan and Uganda); Cohort 3 had 3 countries represented (Kenya, Ethiopia and Uganda), and finally Cohort 4 had representation from Kenya and Uganda. Evidently, the program began with a regional representation and outlook in 2008, but over the years this feature has been missing with more local than foreign students enrolled into the program.

A8.2 PhD Program in Plant Breeding and Biotechnology

The plant breeding and biotechnology program, which is implemented at Makerere University in Uganda, seeks to strengthen institutional and human capacity of regional universities to train scientists who meet the human resource needs of the public and private sector in crop improvement and related disciplines. The program was launched in 2008 and the second cohort of students reported in 2011.

Program Rationale: Investing in plant breeding is necessary because of the diverse needs of the Africa's farming community and persistent poverty and food insecurity. Recent surveys by the Forum for Agricultural Research in Africa (FARA) and the New Partnership for Africa's Development (NEPAD), as well National Poverty Reduction Strategy Papers, all advocate for increased development and use of science and technology to address the continent's persistent hunger and poverty. FAO and others have conducted studies which all point to the very limited capacity in terms of high level trained plant breeders, especially in sub-Saharan Africa. This has led to limited variety releases and generally weakened innovations systems that are critical for enhancing productivity to address food insecurity and livelihood issues – and thus the need to strengthen innovations systems for agricultural sector expansion and science-led growth of their economies.

Program Design: The program consists of coursework, written examinations and thesis and takes 3 years with a maximum of 4 years. Core courses are mandatory, and students are also encouraged to take relevant courses offered at another department or university as electives, to deepen their understanding of issues that relate to their research areas, or as recommended by the Doctoral Committee. Coursework examinations are taken on semester basis, and students are expected to pass all end- of-semester examinations in core and elective courses to qualify to proceed to do their research. As part of quality assurance, the university engages external examiners and students evaluate each course. The research phase is done through a written thesis and an oral presentation. The Doctoral Committee examines student's thesis. The thesis should address regional needs and impart new knowledge and advances in science and technology and research for development.

Program Outputs: The program outputs include publication of 12 journal papers and 32 papers in conference proceedings (*Source:* RUFORUM: PhD Program in Plant Breeding and Biotechnology).

Program Outcomes: Outcomes of the program include:

1. The program attracted funding from the Uganda Millennium Science Development initiative to sponsor 10 PhD students from Eastern and Southern Africa with full scholarships (\$60,000 per scholarship). The program has recently been earmarked by the Uganda Ministry of Agriculture, Animal Industry and Fisheries to train 12 PhD students under Uganda Government funding. In addition, the program has attracted funding from the ACP-EU Intra Academic

Mobility Programme to train 5 PhD students from Ghana, Benin, Burundi, Nigeria and Ethiopia. Other funding support to train 5 PhD students (from Ghana, Nigeria, Zambia, Sudan) had been secured from Carnegie Corporation of New York and DAAD.

2. Because of the good feedback on the program the Uganda government has decided to train 54 Masters and PhD students through RUFORUM regional programs. Three students have already been sent to the University of Nairobi Dryland program,

3. The profile and visibility of Makerere University has been enhanced at international level. This has contributed to the institution's improved ranking from position 68 to its current position of 8th top Universities in Africa, being the most highly ranked university outside South African universities.

4. The program has strengthened staff capacities of RUFORUM member universities and National Agricultural Research Institutes in the ECSA region. For example, students trained under the PhD program have returned to their home countries to lead plant-breeding programs. A trace of their current engagements is provided below.

Challenges: The program has so far enrolled 2 cohorts of students since 2008 with a total of 28 students in the pipeline. As Table A8–3 shows, 22 students are enrolled in the first cohort. These numbers sharply declined with only 6 students enrolled in the second cohort in 2011.

Table A8–3: Student numbers in the Plant Breeding and Biotechnology Program (2008–2013)

Year of Intake	Student Numbers (% females in brackets)	Status of Students	Countries of origin of the students
Cohort 1 (2008)	22 (23)	All have submitted theses; awaiting the viva voce	Kenya, Malawi, Uganda, Zambia, Zimbabwe
Cohort 2 (2011)	6 (50)	Currently taking course and establishing field trials for their research	Kenya, South Sudan, Uganda, Zambia
Total	28		

Source: RUFORUM PhD Plant Breeding and Biotechnology documents

The reduction in student numbers in the second cohort is attributed to lack of student scholarships. Of interest as well, is that the program did not enroll students for two years (2009 and 2010). Also, students enrolled in 2008 are still in the program five years later (in 2013) despite the maximum period given as 4 years. This is evidence of delays in the course of the students' studies, which they have identified as due to funding issues (delays in disbursement of funds) and delays in supervision of their research projects.

The regional representation of students in Cohort 1 was 5 countries (Kenya, Malawi, Uganda, Zambia and Zimbabwe). This number did not change much in the second cohort, with 4 countries represented – Kenya, South Sudan, Uganda, Zambia. However, it is notable that the representation changed with the second cohort only having students from neighboring countries unlike in the first cohort (when the program was initiated) where Malawi and Zimbabwe were represented.

The faculty exchange program was implemented in the two cohorts, with the first cohort having a total of 14 faculty members (6 national, 6 regional and 4 international). This number reduced in the second cohort, where a total of 7 faculty members have participated in the exchange program. Of these, 4 are national, 2 regional and 1 international. The number of international faculty is lower in both cohorts, with the program having a higher participation of national faculty members. Due to financial constraints, and as the program progresses, Makerere University draws from other universities in Uganda for the exchange program with less numbers from other regional countries and much less from international universities. This compromises the regionality of the program over time.

A8.3 PhD program in Aquaculture and Fisheries

The program is hosted at the Lilongwe University of Agriculture and Natural Resources, Bunda College Campus, University of Malawi. It was launched in 2009 and subsequent cohorts of students reported in 2010 and 2011.

Rationale: Aquaculture and fisheries production are major contributors to national economies. In sub-Saharan Africa, capture fisheries is also important contributing on average of 4% to GDP. There is however, a general decline in capture fisheries the world over, but more so in sub-Saharan Africa. To supplement the declining production of fish from capture fisheries, governments in sub-Saharan Africa have embarked on developing aquaculture at both smallholder and commercial levels. In southern Africa, Malawi has been mandated to coordinate the Inland Fisheries and Aquaculture Sectors of the region. To implement this, a state-of-the-art research and training facility was established at Bunda College in Lilongwe in 1999. Following an independent review of existing capacities for capacity development for the aquaculture and fisheries sector, Bunda was identified to host a regional facility for training at both MSc. and PhD levels for the 17 countries where RUFORUM member universities are located and others.

Program Design: This is a three-year program, which comprises one year of coursework and two years of research. Curriculum development of the course work ensures all courses have strong theory and practical components to achieve the objective of providing students with skills that are applicable to their learning and to their future work experiences. Assessment of course work is done at the end of each semester and covers all courses taught in one semester. At the end of the course/ module, each lecturer administers a questionnaire for evaluation. The

questionnaire are designed by the University of Malawi through the Registrar's office to capture issues of course/module content, delivery and relevance of such courses for the region

Upon completion of course work, students engage in fieldwork, which leads into the development of the thesis and other publications. The research project is examined through a written thesis and oral presentation. Student theses are examined by two internal examiners and one external examiner followed by oral presentation/examination at the Faculty the student is registered in. Students who fail their research thesis work are allowed to make two re-submissions and are discontinued upon failure in the second re-submission.

Program Outputs: The program has also had the publication of 15 journal papers, 10 papers in conference proceedings, and 10 students' theses that are in their final stages of publication.

Program Outcomes: The program has contributed to building the capacity of the staff from member universities as well as national research institutions. As the PhD students are waiting for final oral presentation at the University, some have resumed duties at their workplaces. The following is an example of 10 students enrolled in the program and their current engagements:

Six out of 10 candidates are faculty members at universities in Kenya, Malawi and Uganda. This is a good example of building the capacity of faculties within the member universities, and sponsorship to facilitate more faculty members to benefit should be highly encouraged. Although there is no direct evidence of the impact these lecturers have on the universities, it would be expected that the quality of teaching and curriculum development at the universities has improved and ultimately the programs they are teaching in.

The other four candidates are making a contribution to the national aquaculture research institute in Zambia and the Ministry of Fisheries in Malawi. Of note is the Director of Fisheries at the Ministry of Agriculture in Malawi – it is expected with the capacity built, he is making a contribution to the policy-making process in the ministry!

Challenges: A trace of the PhD candidates in the program reveals that the representation of women is still low considering only 1 out of 10 are women. This indicates the need to promote female participation in the sciences at the higher levels of education, a role that both the universities and RUFORUM must take up.

Table A8–4 gives a summary of student's statistics, including the number of applicants for the program per intake.

As indicated in Table A8–4, the program experienced a drastic reduction in the number of enrolled students in the second year of implementation, with only two students enrolled in Cohort 2. The reduced number of students in the program was due to lack of funding from RUFORUM to provide scholarship support. Again, it evident here that the regional representation of students reduced in the second cohort where the two students from Uganda and Zambia enrolled, compared to 10 students in Cohort 1 representing four countries – Kenya,

Table A8–4: Student numbers in the Aquaculture and Fisheries Program (2009–2013)

Year of Intake	Number of Applicants	Student Numbers (% females in brackets)	Status of Students	Countries of origin of the students
Cohort 1 (2009)	15	10 (10%)	Students have gone back to their home countries having completed course work and submitted research thesis work for external examination	Kenya, Malawi, Uganda, Zambia
Cohort 2 (2010)	6	2 (10%)	Currently taking coursework and developing proposals	Uganda and Zambia
Total		12		

Source: RUFORUM PhD Aquaculture and Fisheries Program documents

Malawi, Uganda and Zambia. Of interest, as well, is the fact that no local student enrolled into the program in the second cohort. This calls for RUFORUM to upscale its partnership with governments with a view to soliciting for funding for both foreign and local students, particularly in cases where local students are not enrolled due to funding constraints.

Although the program has established the faculty exchange program, it has not been very effective, with only 10 faculty participating in the time the program has been in existence. The 10 constitute 4 national lecturers, 4 regional, and 2 international ones. This is an area that needs improvement and the necessary support from RUFORUM to ensure there is constant movement of faculty across countries and internationally to thus improve the regionality of the program.

A8.4 PhD program in Agricultural and Rural Innovations

This program has been implemented at Makerere University in Uganda, Sokoine University of Agriculture in Tanzania, and Egerton University in Kenya. It was launched in 2012 and the subsequent cohort of students is expected in the last quarter of 2013. In particular, Makerere University plans to draw students from Benin, Burundi, Ethiopia, Ghana, Malawi, Mozambique, Nigeria and Zambia.

Rationale: As a new discipline, innovation systems requires developing capacity at all levels of organizations involved in agricultural and rural development. The strategic starting point is the level that can influence and cause a multiplier effect to build the capacity of organizations and systems. Training at the PhD level seeks to build such capacity and to apply innovation systems approaches to agricultural and rural development. This caliber of human resource is required in Higher Education institutions that train professional development agents; in policy development

institutions that formulate guidelines for development practice; and as managers of agricultural and rural development organizations who plan/design and manage development interventions.

Program Design: This is a 3-year program that consists of one year of coursework and a research phase that leads to a dissertation. The one-year of coursework is split in two parts, allowing students to go for field research before embarking on the second semester courses. During coursework, students are required to take all of the core courses and at least two elective courses. All courses taught within a semester are accessed at the end of the semester. Course evaluations are also carried out by students for quality control. The program also offers seminar series that are compulsory and expected to be held every year throughout the program duration. Plans are underway to offer some of the courses through the distant education mode (eLearning).

Years 2 and 3 of the program are committed to research and submission and defense of the dissertation. Research undertaken in this program is primarily development-oriented, seeking address pertinent problems while fulfilling the academic research quality requirement. Wherever possible, it is desirable that students conduct research linked to ongoing initiatives aimed at poverty reduction, food security, improved rural livelihoods in public and private (including NGOs) agricultural and rural development organizations. This way, the research is anchored within the development process. Students are required to draw their thesis out of the research, which shall be defended orally. Thus, the research project is examined by written thesis and oral presentation.

The design of the program aims at piloting a model of joint degree training by three different universities, building on a European Erasmus Mundus Model where students take courses in different universities and may get a degree award from one or more universities. Thus, students are registered in one of three universities, but follow the same curriculum. They take most courses at their university of registration, but take earmarked joint courses in one or both of the other two universities. This approach is different from that of the other RUFORUM regional programs where students take courses in only one university. However, in both cases students and faculty are drawn from several countries. Additionally, the program involves joint 'summer' sessions with other students involved in agricultural innovations especially from Europe (the Erasmus Mundus program).

Program Outputs: The program admitted its first cohort of 22 students in 2012 and they are currently in the second semester of their course work. At the end of the semester they will take their examinations to qualify to commence on their thesis work in the second year. Being in the first year of implementation, the program's main output is the program curriculum developed prior to the launching of the program.

Program Outcomes: Although the program is currently in the first year of implementation, it has already attracted international attention. It was profiled at the Global Consortium of Higher Education and Research in Agriculture (GCHERA) Conference, held in Buenos Aires in 2012,

as one of the innovative programs for training agricultural change agents. The program has also received support from the Uganda Government, which has already provided 8 scholarships for research scientists to train at Makerere and Egerton Universities. The program at Makerere University has also received funding from EU-EDULINK that will allow for joint training of African and European students. It is also anticipated that the EU Program - Intra ACP Academic Mobility - will also provide scholarships to 8 students in the program.

Challenges: Table A8-5 provides student statistics for the first cohort enrolled in 2012 and the only cohort in the pipeline to date. The number of students admitted into the program was fairly high, with 22 out of 30 applicants (73%) enrolled.

So far, the cohort has a student representation of 3 countries – Malawi, Uganda and Rwanda. Being a new program and with a second cohort of students expected to join the program in the last quarter of 2013, it is still early to assess the regional representation of the program, or the impact of the program.

Table A8–5: Student numbers in the Agriculture and Rural Innovations (2012)

Year of Intake	Number of Applicants	Student Numbers (% females in brackets)	Status of Students	Countries of origin of the students
Cohort 1 (2012)	30	22(36%)	Students are in second semester of course work	Malawi, Uganda, Rwanda

Source: RUFORUM PhD Agriculture and Rural Innovations Program documents

A8.5 PhD Program in Soil and Water Management

The program in soil and water management is hosted at the Sokoine University of Agriculture in Tanzania.

Rationale: Following a wide range of consultations within the Eastern, Southern and Central African region (ESCA) conducted during the period 2004–2005, it was concluded that there exists a deficiency in highly qualified human resources in the Agricultural sector. Accordingly, in 2006 the Vice Chancellors of the RUFORUM member universities agreed to launch joint regional PhD training programs in critical gap areas including soil and water management. The decision aimed at developing the required human resource capacity in order to address the development challenges in the region. Thus, the Soil and Water Management Program was launched with the aim of producing competent graduates with the capability of managing soil and water, which are key components natural resources. Importantly, this initiative aims at

building capacity to support the CAADP process, more specifically Pillar 1 of increasing access to sustainable land management and reliable water control systems and Pillar 4, which addresses the improvement of agricultural research, technology dissemination and adoption.

Program Design: This is a four-year degree program that consists of one year of coursework and a research phase that leads to a dissertation. However, a candidate can be allowed to graduate in three years upon meeting all the degree requirements. Students are also allowed to prolong studies to a maximum of 5 years, provided there are compelling reasons for the extension and a proof of meeting the corresponding costs. The coursework is conducted in the first two semesters of study and comprises of courses that have strong theory and practical components. Students sit coursework examinations on semester basis, and are expected to pass all end-of-semester examinations in core courses and respective elective courses, to qualify to proceed to do their research. The university engages external examiners as part of quality assurance. At the end of the course/module, the Head of Department administers a questionnaire for each lecturer for evaluation by students.

The second component in the program is fieldwork, leading to the development of the thesis. The research phase is examined through a written thesis and oral presentation. Students' theses are examined by two internal examiners and one external examiner. At this stage the candidate may pass without corrections; pass with minor corrections; be required to re-write the thesis and re-submit for re examination; or, have their thesis rejected and are discontinued from studies.

When a student passes the thesis with or without minor corrections, they proceed to make the oral presentation/examination at the Faculty where the student is registered. The oral examination is assessed on a pass or fail basis by a panel of academicians constituted by the Dean of the Faculty. Students who fail their thesis work are allowed two re-submissions and are discontinued upon failure in the second submission.

Program Outputs: Table A8–6 provides details of student progress in the program for both cohorts. As Table A8–6 shows, the program has a total of 28 students with 17 enrolled in Cohort 1 and 11 students in Cohort 2. It is commendable that the regional representation in the program has been stable with the first cohort having students from 5 countries and students in the second cohort representing 6 countries – and this is despite the fairly low number of students admitted into the program in the two cohorts. These statistics indicate a good regional representation of the program with regard to students.

Other program outputs include publications by students in peer-reviewed journals, which are expected during the second and third year of students research work; five conference proceedings from students; and an approved curriculum for PhD (Soil and Water Management) with course work.

Table A8–6: Number of students enrolled (registered) for the PhD Soil and Water Management (2010–2013)

Year of Intake	Student Numbers (% females in brackets)	Current status of Students	Countries of origin of the students
Cohort 1 (2010)	17 (24%)	Students have gone back to their home countries having completed course work. The candidates are now conducting research for their thesis to be submitted later for external examination	Ethiopia, Tanzania, Malawi, Kenya and Rwanda
Cohort 2 (2011)	11 (36%)	Students have just completed their coursework at SUA. Currently they are writing their research proposals while waiting for approval of their examination results. They are expected to start their PhD research work in their home countries in June 2013.	Uganda, Ethiopia, Zambia, Tanzania, Malawi, Kenya
Total	28		

Source: RUFORUM PhD Soil and Water Management Program documents

Program Outcomes: The program attracted funding to the tune of US\$1,867 from the Alliance for a Green Revolution in Africa (AGRA) to sponsor 20 students from Eastern and Southern Africa with full scholarships (US\$60,000 per scholarship), rehabilitation of laboratory facilities (US\$0.32 million), upgrading of internet facilities (US\$6,000), stabilization of power supply by purchasing a generator (US\$30,000) and rehabilitation of green houses in the Faculty of Agriculture (US\$10,000). The profile and visibility of the university has been enhanced at international level, with partnerships with Wageningen University, Millennium Villages Project and the World Agroforestry Centre. The Program has also attracted additional funding from the International Development Research Centre (IDRC) Doctoral Grants Research Program to sponsor research for 10 students at US\$15,000 each in Cohort 1.

Challenges: Table A8–7 provides details of students who applied for the program, those who qualified for admission, those who registered and the qualified applicants who did not register due to lack of scholarships.

As shown in Table A8-7, Cohort 1 had a total of 87 applicants of whom 46 (52%) qualified for admission into the program. Seventeen (36%) out of 46 qualified students registered, while 29 (64%) students did not register due to lack of scholarships. The registered students represent 10 countries in the region. In 2011, Cohort 2 received a total of 48 applicants with 26 (54%)

Table A8–7: Applicants for the PhD Soil and Water Management (2010-2013)

Year of Intake	Number of applicants (% females in brackets)	Number of students qualified for admission (% females in brackets)	Number of students registered (% females in brackets)	No. of qualified applicants not registered because of lack of scholarship	Countries of origin of the students (applicants)
Cohort 1 (2010)	87 (20%)	46 (28%)	17 (24%)	29	Burundi, Uganda, Ethiopia, Zambia, Zimbabwe, Lesotho, Tanzania, Malawi, Kenya and Rwanda
Cohort 2 (2011)	48 (15%)	26 (18%)	11 (36%)	15	Uganda, Ethiopia, Zambia, Tanzania, Malawi, Kenya
Total	135	72	28	44	

Source: RUFORUM PhD Soil and Water Management Program documents

having qualified for admission into the program. However, due to funding constraints, only 11 (42%) out of 26 qualified students registered with the balance closed out due to lack of scholarships.

It is worth noting that the second cohort not only had a reduced number of student applicants, but also a reduction in the number of countries represented, which dropped down to 6 countries.

However, a look at the faculty indicates the need to scale up the faculty exchange program to be more representative regionally. As shown in Table A8–8, none of the two cohorts had faculty members from other African countries participate in the exchange program. A total of 4 local lecturers and 5 international faculty members participated in the exchange program. The participation of 4 international faculty members in the second year would be explained by the partnerships established between Makerere University and Wageningen University, Netherlands, evidence of the crucial role that partnerships play in the development of growth of a graduate program.

Table A8–8: Staff exchanges / visiting lecturers

	National	Regional	International
Cohort 1 (2010)	2	0	1 (from the US)
Cohort 2 (2012)	2	0	4 (from Wageningen)

Source: RUFORUM PhD Soil and Water Management Program documents

ANNEX 9: GRADUATES OF RUFORUM SUPPORTED REGIONAL PROGRAMS

Table A9–1: Critical mass of MSc and PhD students trained to drive innovations responsive to Africa’s Agricultural demands

Program	Center of Leadership	Year of launch	No. trained (2008–2013)
PhD Dryland Resource Management	University of Nairobi, Kenya	2008	36 (16 graduated)
PhD Plant Breeding and Biotechnology	Makerere University, Uganda	2008	28
PhD Aquaculture and Fisheries Science	LUANAR, Malawi	2009	15
PhD Agricultural and Resource Economics	LUANAR, Malawi	2009	8
PhD Soil and Water Management	Sokoine University, Tanzania	2010	25
PhD Agricultural and Rural Innovations	Makerere University, Uganda	2012	18
PhD Food Science and Nutrition	Jomo Kenyatta University, Kenya	2013*	?
MSc Plant Breeding and Seed Systems	Makerere University, Uganda	2008	39
MSc Research Methods	Jomo Kenyatta University, Kenya	2009	62
MSc Agricultural Information and Communication Management	Egerton University, Kenya	2008	38
	University of Nairobi, Kenya	2009	46
	Haramaya University, Ethiopia	2010	26

Source: RUFORUM, Regional Postgraduate Programs: Milestones, Achievements, Lessons, Looking Ahead

ANNEX 10: CHART OF RUFORUM GOVERNANCE STRUCTURE

