

# Capacity Development for Agricultural Transformation: Making Postgraduate Level Training Relevant to Africa's Agricultural and Rural Sector Development

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## **ABSTRACT**

*While modest success has been realized in agricultural development in Africa, food insecurity and challenges brought about by global changes continue to impact greatly on human health, energy and environment. As Africa endeavours to achieve the first of the eight Millennium Development Goals (MDGs), that is, reducing the number of poor and hungry people by one-half by the year 2015, these challenges have affected the drive towards the MDGs. Success of African agriculture and rural development will certainly come from good governance, strong rural policy, new research institutions and dedication to relevant training. This demands knowledge-based agricultural capacity development and focused science-based policies and institutions. This paper present new approaches to postgraduate level training in agriculture and related sciences that are deemed to have lasting impressions on the drive to make African Universities relevant to current and future agricultural and rural development needs of the region. It highlights existing cases of regional postgraduate programmes and argues for quality and policy relevance of training programmes in the context of sustainability as universities lead the science – policy interface and action research for farmer technology generation and support. The paper poses a number of institutional and individual capacity development questions and outlines an outlook-based approach to address the issues.*

**Keywords:** Agriculture, Africa, capacity development, agricultural innovation systems, universities, postgraduate training, higher education

## **Introduction**

In sub-Saharan Africa (SSA), as elsewhere, universities and other agricultural tertiary education institutions have made significant contribution to the development of agriculture. It is however widely agreed that they have been slow to respond effectively to changing socio-economic development needs (Chakeredza *et al.*, 2008). The realignment of universities to national, regional and global development agenda demands a paradigm shift in the mode of training, especially at postgraduate level where high

calibre expertise needs to be groomed to guide policy, relevant research and general development visioning for the region. Cost-effective training for agriculture professionals at this level remains desirable but still unachievable for many individual universities in SSA (Eicher, 2006) which are increasingly needing to compete within an increasingly internationalized higher education system and rapidly expanding knowledge base and changing technology. This will require changes in a wide range of agriculture knowledge, science and technology capacity development for innovation and using new types of public, private and university partnerships that foster an exchange of information, knowledge, and global experience (IAASTD, 2008 a & b) and resource mobilization. This must be done in the context that over the last 20 years or so, African universities have almost been overwhelmed by increasing demands/challenges: emerging issues and societal needs, dwindling financial support by governments, increasing demands for university education and increasing sensitivity of stakeholders to quality and relevance of university training.

Sustaining socio-economic growth in SSA in the backdrop of recent economic challenges for nations dependent upon agriculture demands a dynamic human capital: flexible, innovative, passionate and able to adapt technologies to local realities. Relevant human capital can play a key role in the management of the much needed agricultural development processes. It can also maximize allocative efficiency of scarce capital, technological absorption, and global networking while maintaining local relevance. Agricultural development is a function of productivity gains from efficient resource allocation, technological change, innovation, and institutional development. High quality human capital to man SSA agriculture affects all four of these. Educated and skilled persons are responsible for advances in agricultural knowledge, new start-ups, building the institutional capabilities of the market economy, and for agricultural and rural innovation. As SSA agricultural technology needs and those of modern technologies is ever getting more skill intensive while challenges/risks multiply, the demand for higher level human capital is rising. A 2008 survey, captured in the report, *Evaluation of Tertiary Level Agricultural Institutions in the African Humid Tropic Region*, conducted by the African Network for Agriculture, Agro forestry and Natural Resources education (ANAFE) in conjunction with Technical Centre for Agricultural and Rural Co-operation (CTA), concludes that radical changes are needed to be made to curricula at agricultural institutions of higher learning in Africa and calls on universities to lobby for funds to support facilities and improve practical teaching and learning. Similarly, cases studies of five universities in eastern and southern Africa (Batte & Wanzala, 2009) recommended urgent steps for strengthening university staff capacities and skills, and development of student peer-learning groups.

This is reinforced by the findings of a recent RUFORUM sponsored study into the demand for agricultural graduates in southern and eastern Africa which showed a remarkable consensus across the countries studied, and amongst the three main groups of interviewees (employers, graduates, and faculty):

**Quality of training and under investment in facilities:** The need for a major change in mindset (amongst both graduates and faculty) and substantial improvement in skills (practical experience, communication and report writing, up to date knowledge) dominated the discussions with employers and graduates alike. There was widespread recognition that curricula were outdated and students had poor access to up to date literature and research. The pressure on teaching facilities was seriously

compromising quality as enrolments continued to rise without concurrent investment in infrastructure<sup>1</sup>. This last was further exacerbated by the introduction of 'parallel programmes' where self funded students are encouraged to enrol. Parallel programmes help the immediate funding of university operations but has led to increased overcrowding, poor teaching, and inadequate supervision.

**Limited student opportunities in building analytical skills:** there were some surprising problems. The overcrowding and lack of investment has led inevitably to few (if any) 'hands on' student practicals. But there was widespread comment from graduates and students that opportunities for interaction amongst students themselves, in the form of group discussions, tutorials, and seminar presentations, were inadequate. This resulted, in no small part, to the lack of critical and analytical skills that are so widely recognised.

**The governance of agricultural universities needs updating:** current governance mechanisms are poorly suited to serving dispersed and poor rural communities, and interaction with stakeholders is poor. Thus there is poor 'ownership' of the universities by their stakeholders. As a consequence, faculties of agriculture are still not sufficiently integrated into the national and regional innovation systems.

**National agricultural development plans underplay skills needs:** the RUFORUM study reviewed university programmes in the context of national plans for the development of the agricultural sector. It was evident that, while there were ambitious plans for major increases in agricultural productivity, employment, and profitability, consideration of the human resources necessary to implement these plans was typically based on unrealistic and highly optimistic assumptions. As public sector support to agriculture has become more diversified, employment opportunities have shifted from public agencies to civil society and the private sector. But investment in human capital development overall has been constrained by public sector hiring freezes, eliminating an important avenue through which young graduates gain experience in the sector. The private sector has largely focused on attracting the more experienced and competent public employees that meet its mandate. Civil society has also poached heavily from the best of public sector agriculturalists, albeit often at a more junior and less experienced level. Many graduates of agriculture join other industries, seeing better opportunities there. The outcome is a large (and expanding) deficit of young people gaining experience in the sector – a recruitment 'black hole' for the not very distant future when the current generation of experienced African agriculturalists reach retirement.

Higher education is essential to development (Bloom *et al.*, 2006) especially in the knowledge economy but the resources allocated to agricultural higher education have been declining (World Bank Report 2008). In Africa, higher education has played and will continue to play a critical role in development efforts. Figure 1 illustrates this link. The current challenge HEIs face due to the

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<sup>1</sup> Bunda University College of Agriculture in Malawi, for example, has had very little new infrastructure (in terms of classrooms, laboratories, and student accommodation since the college was first established in the late 1960s. The subsequent rise in student numbers places an impossible strain on infrastructure. Yet, despite this, the college has one of the outstanding library facilities in the region.

inadequacy of funding combined with an enrolment explosion will continue to impinge on the capacity of most African universities to provide for effective and quality research, learning and outreach. At postgraduate levels, the agricultural tertiary institutions are at a crossroads and are constantly seeking to redefine their roles in response to global challenges and trends and the needs of local communities. While there remains a very essential role for a small caliber of highly qualified researchers, there is an increasing demand for more practical graduate programmes, in line with the MBA or residency period in medicine. After an extended period of neglect of the role of agriculture in development, the consensus of opinion regarding the importance of a vibrant agricultural sector is shifting - as evidenced, for example, by the 2008 World Bank 'World Development Report' being based on agriculture. This "engine of growth" concept, however, is predicated on achieving increased internally generated efficiencies in the use of the primary resources for agriculture (land, labour and capital) and, thereby, releasing some of these resources for use in both productive sectors elsewhere in the economy, and for increased social investments such as in health and education.

Efficiency is not simple to achieve. It not only requires the right public policy and private sector initiatives, but relies heavily on the availability, quality, and orientation ("mindset") of intellectual capital (accelerator of growth and development) within the agricultural sector. This intellectual capital includes farmers, educators, private entrepreneurs, and public servants. Thus agricultural education is an integral and essential part of a development strategy based on economic growth and poverty reduction. Innovative approaches including regionalization for resource mobilization, academic course provisions, quality improvement, institutional governance, and human resource management can address some of the challenges. At the policy level, there is evidence of support for this change in emphasis. The 2003 Jinja Consensus called for the creation of a new African agricultural university to build a different cadre of agricultural graduates who will go on to become entrepreneurs and wealth-creators rather than cogs in the wheels of existing public agricultural education, research, and extension organizations. University education would be grounded in student-centred learning styles in which instructors would facilitate rather than direct the learning process. Graduates would be armed not only with market-oriented skills, but also with a new standard of morals, ethics, and awareness. A new vision, most recently expressed in the World Bank's *2008 World Development Report: Agriculture for Development* sees African agriculture on the tipping point of considerable increased productivity. So there is potentially a receptive environment for modernizing initiatives within the sphere of African agricultural education and training.

The Regional Universities Forum for Capacity Building in Agriculture (RUFORUM), a consortium of 25 universities in eastern, central and southern Africa, recognizes that for change to take advantage of the global goodwill requires more than altering and updating curricula; rather it requires that universities explicitly seek to integrate their programmes into the national and regional agricultural innovation systems. Specifically, RUFORUM is positioning its network to engage and contribute to the

Comprehensive African Agricultural Development Programme (CAADP), the framework for revitalizing African agriculture and Africa’s economic recovery. Thus RUFORUM is partnering with a number of organizations and Universities to champion a new approach to postgraduate training—to provide the required institutional capacity to build the required skilled human resource for driving the CAADP agenda. Strategic training programmes have been designed to respond to CAADP. This is because Tertiary Agricultural Education is key to the development of human and scientific capita. It also plays a vital role in building the capacity of organisations and individuals to transmit and adapt new applications of existing information, new products and processes, and new organisational cultures and behaviours (Spielman *et al.*, 2008). Strengthening the innovative capabilities of such institutions to offer quality and relevant postgraduate training through building innovation networks and linkages is thus critical.

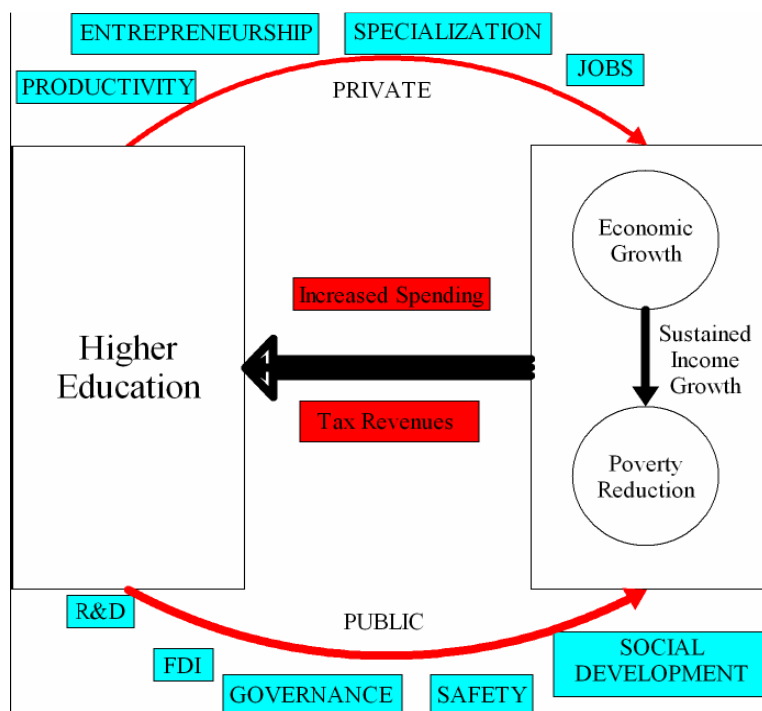


Figure 1: Higher education and development: A logical link (Source: Bloom, D., Canning, D., and Chan, K., 2006). (Source: Bloom, D., Canning, D., and Chan, K. (2006). Higher Education and Economic Development in Africa. *Human Development Sector, Africa Region, World Bank*)

Furthermore, education is a process. Intellectual capital needs continual renewal – it is eroded by exogenous factors which may intervene to negate the benefits of education (conflict and corruption are particularly pernicious in this regard). The loss of intellectual capital is an important agenda item for the African universities as highlighted during the July 2009 G8+5 conference in South Africa. Unless linked effectively to international science, intellectual capital can become outdated. And, finally, intellectual capital is lost as individuals age and pass away.

The empirical evidence for a substantial investment in building and sustaining intellectual capital is encouraging. Asian data show that increases in the output of engineering and natural science degrees have a strong relationship to GDP per capita. A similar positive economic response to increased tertiary education in agriculture (which includes both natural sciences and some engineering) could likewise occur in Africa. Evenson (2004), quoted in IBRD (2007), argues that higher education programmes in agriculture that create skills relating to science and technology “have a public externality value much higher than the private value of these skills in labour markets.” On this basis, he believes there is a strong justification for the creation of graduate programmes in innovation fields of study in Africa. But he emphasizes the need (which is given additional urgency by the scarcity of resources – financial, personnel, and infrastructure) for quality as well as quantity.

Very few postgraduate programmes in SSA Universities have changed significantly enough to address the new African Agriculture demands as they continue to struggle with inadequate resources (physical infrastructure, equipment, and communications facilities; limited human resources for teaching and research, both in terms of quantity and quality; poor incentives for teaching and research staff; limited or volatile funding from a small pool of resources; and other resource constraints) (Bloom *et al.*, 2008; Clark, 2006; Inter-Academy Council, 2004; Kroma, 2003). Many reforms to address these constraints have been largely structural and undertaken either in response to government demands for larger numbers of trained professionals, or driven by the availability of short-term and often volatile donor funding. Bloom *et al.* (2008) asserts that such reforms have not been successfully adapted to the specific context of SSA, implemented in ways that produce long-lasting organisational change, or generated positive impacts on agricultural development, poverty reduction, and economic growth. In the end such reforms have not yielded relevant postgraduate level training programmes that are responsive and innovatively attuned to the changing socio-political, economic, scientific, and agro-ecological milieu in SSA.

This paper thus argues for a new vision for preparing professionals in the Eastern, Central and Southern Africa (ECSA) region capable of leading change through postgraduate training. While RUFORUM coordinates this new scheme, universities are playing key roles in the regional orientation of this training. Critical to success of Agricultural tertiary education and training (AET) in the region is the development of internationally competitive postgraduate training programmes and cells, that identify priority gap areas to increase agricultural productivity and strengthen rural value chains, and identify best practices in agricultural education that can be improved and scaled up through regional training approaches. In subsequent sections of this paper, we highlight cases from RUFORUM’s regional postgraduate programmes to propose a vision and an agenda for progressive action towards the production of agricultural graduates who will be relevant to the current socio-economic milieu in ECSA and the greater SSA.

### **Profiling the Right Postgraduate**

Chakeredza *et al.* (2008) note that the prime movers for sustainable agricultural production include: availability of improved technologies, human capital, sustainable growth of biological and natural resource capital, improvement in performance of supporting institutions and favourable economic policy environment. Central to making these components operational is the production of suitable graduates, who are (i) technologically competent and relevant, ii) equipped with the necessary “soft skills” and business skills and (iii) able to work with local and especially rural communities.

The 2009 GCHERA Conference poses pertinent questions to agricultural tertiary institutions: (1) Are they effectively selecting incoming students with a true vocation for agriculture?; (2) Are agricultural faculties committed to the sustainability of the natural resource base and the health of the planet? (3) Is this reflected in their curricula and research?; (4) Are the faculties, responding to market needs?; (5) Does the training prepare students for disaster preparedness, risk management and conflict resolutions?; (6) Is the training in response to changes in the global trade agreements and regulations?; (7) Do graduates have the knowledge and skills required for promoting sustainable rural development, enabling them to respond to the diverse needs of producers, rural communities, agricultural industries and businesses?; (8) Are graduates able to transform their scientific knowledge into relevant innovations, which will reverse the deterioration of the environment and the continued impoverishment of rural communities?; and (9) Are the graduates prepared to become leaders and innovators when they leave the university?

Emerging from the 2007 GCHERA conference in Costa Rica was the need for a new profile of graduates who:

- Have strong entrepreneurial skills and spirit, and are capable of initiating new job opportunities.
- Are guided by positive values and high ethical standards; are committed to a new vision of agricultural production compatible with the natural environment and the conservation of biodiversity.
- Have a solid grounding in the scientific and technical principles that underlie practice as well as the practical experience critical to developing confidence coupled with a generalist preparation that will enable them to develop holistic solutions to the problems that they will encounter in their careers.
- Are innovators with the confidence to be creative, adaptable and responsive to real needs.
- Are life-long learners capable of taking advantage of relevant information as it is generated and to take advantage of new information technologies
- Possess strong leadership, interpersonal and team-building skills and demonstrate strong communication skills, including effective use of international business languages and information technology.

In line with recommendations by many experts on HEI (Diao *et al.*, 2006; Johnson & Hazell, 2002; Rosegrant *et al.*, 2005; Sherrard, 2003), RUFORUM is reorienting and transforming postgraduate training at the regional level by encouraging member universities to reform the student recruitment process, the plan of study, the organisation of the programme, the nature and content of curricular and engage in

multi-dimensional approaches to integrated capacity development. This is against a myriad of development challenges as highlighted below.

After decades of steady decline, since 2006 world prices for staple grains such as rice and maize have increased steadily (see the following box). Shortages have been severe in sub-Saharan Africa (SSA), where agricultural productivity has been trending downwards for several decades. The farmer has so many demands on her very limited resources of cash and labour that she needs to know, as far as it is possible, that any investment she makes in her farming enterprises will repay the labour or cash adequately and reliably. If she has access to sufficient productive land, she may grow enough to feed herself and her family - providing her health is good and the weather favourable. But the start of the rains brings diarrhea and malaria. Often, illness of herself or her children will result in her planting her crop late. With a poor rainy season her crop may fail. Too often she will be unable to produce enough food for her family's needs and will seek work or food elsewhere – often planting, weeding or fertilising a neighbour's crop – which means that her own is left unplanted, unweeded and unfertilised until later in the season. Late planting and poor weeding mean a poor harvest and once again she finds herself without food before the next crop comes in. This is the downward spiral that creates much of Africa's poverty (Kumwenda et al., 1996). Add in the devastating AIDS pandemic (which in no small part is both driven and exacerbated by poverty – see Conroy et al, 2006), and farm households can find themselves enmeshed in a poverty trap with no evident escape.

This is the challenge that the universities have to take up – they are developing the skills and competencies in today's youth that can bring about change. The task is so daunting that only the best will do. It is a fact that agriculture is not perceived to be an attractive career proposition (Maduke 2002). Opinions such as “the clever do not go into agriculture as they can make more money elsewhere”, “girls are not interested in studying agriculture”, “people do not opt for agriculture because entrance requirements are too low” all stem from a widespread perception that a career in agriculture is unattractive. Improving the image of agriculture will not only increase the quality and quantity of university applicants but also bring benefits to the whole sector and to the economy overall. The universities have a central role in leading and facilitating this change.

### **New Approaches at RUFORUM**

The recent concerns with the quality of agricultural training at postgraduate level in Africa is compounded by observations that agricultural universities are under-funded, suffering from poor quality and in urgent need of curriculum reforms. Universities world- wide are noted for their slowness to address their agreed-upon reforms. In addition to the internal reforms of universities, a new set of problems has emerged under the “new” African agriculture that is dominated by climate change, biofuels, rising global food prices and food insecurity. Without doubt, institutional innovations and public-private sector partnerships are needed to generate human capital and institutional reforms to drive agriculture-based socio-economic development of the nations in SSA. This obviously requires



changes in a wide range of ways of doing business through innovative approaches and new graduate programmes on top of adopting regional and networking approach as used by RUFORUM. RUFORUM hopes to achieve this by using a multi-faceted approach.

First, the network is working with universities and consortia of universities in ECSA prepare a landscape analysis of the magnitude and country-specific challenges and tertiary education demands to address the issues surrounding the changing face of New Agriculture and Food Systems in SSA. Secondly, the network jointly with member universities and other stakeholders in higher education lays out the types of postgraduate training programmes that are needed at both MSc and PhD levels. Thirdly is enhancing adoption of emerging technologies such as ICT training modules about the New Agriculture that are needed to train innovative extension workers, policy makers, researchers, academicians and other professionals to work in the private and civic society sectors. Special attention is paid to the adoption capacity development approaches that would foster functional and leadership competencies of the graduates. The approach largely encompasses bottom up approaches to curriculum development in a bid to engaging the universities in Africa to respond to the New Agriculture and to increase their emphasis on graduate training within Africa because of the rising cost of overseas graduate education. A key aspect of the approach is joint resource mobilization, joint training and cross-learning among the universities in the region and with other networks such as Agri-Natura.

For the postgraduate level training, RUFORUM is working with the member universities to foster more engagement with stakeholders, and have established National Forums as an interactive platform for obtaining feedback with key stakeholders and generating demand agenda for university services. RUFORUM uses these fora to facilitate field attachment of students and for building experiential learning teams of university lecturers, students and other stakeholders. RUFORUM hopes in this process to produce more entrepreneurial graduates, but also faculty and graduates more responsive to especially rural communities. RUFORUM has identified three priority areas for the postgraduate programmes:

a) focus on increasing agricultural productivity while enhancing natural resource sustainability. Examples include the Regional PhD Programme in Plant Breeding and Biotechnology with focus on African neglected crops, PhD in Soil and Water Management and PhD in Dryland Resource Management. These programmes place great emphasis on responding to emerging environmental challenges, such as climatic change and variability, and prepare students to work in multi-stakeholder platforms. A major thrust in the training is to instill not only technical but also social and professional skills. Thus, the Plant Breeding PhD students work in National or CGIAR Plant Breeding Programme, undertake internship in seed companies (and also spend time in community based seed systems) and also take courses in Programme Management and Personal Mastery/Soft Skills. Students and lecturers are drawn from the different RUFORUM universities and beyond.

b) enhancing research quality and information management and sharing: the FARA 2006 study established that in most African NARS there were no research methods specialists to guide research. At the same time, there were concerns that the current training in Statistics and Biometrics does not address well agricultural research issues and take into account emerging frontiers such as tracking

development challenges and participatory approaches. Because this is also a weak area in most universities in the region, RUFORUM, in partnership with the University of Reading and Technical Centre for Agricultural and Rural Cooperation (CTA), is running a regional MSc Programme in Research Methods that draws lecturers from several universities and students from across Africa. Emphasis is on practical orientation of the training, making mathematics and statistics related to practical issues. Two main innovative features are that it is a professional training and it links methods to the context of research. The quality and reach of this initiative is further enhanced through linkage to research systems in the region, and utilizing a pool of trained experts to train across the region.

Belatedly, the Association for Strengthening Agricultural Research in eastern and central Africa (ASARECA) through a wide stakeholder consultation identified a regional need to build capacity in Agricultural Information and Communication Management. RUFORUM has been mandated to build capacity in this area. We have initiated a phased approach, involving MSc, diploma and short duration training at regional nodes. The first intake of about 30 MSc students are being trained in Kenya (University of Nairobi and Egerton University), with planned intake for Haramaya University in Ethiopia and Sokoine University of Agriculture in Tanzania in 2010, and at Makerere University in Uganda in 2011.

c) building capacity for policy analysis, through a Regional PhD Programme in Agricultural Resource Economics at the University of Malawi. The students undertake internships at national and regional agencies such as Ministries of Finance, National Planning Authorities and NEPAD Secretariat.

The isolated country level reforms have been complemented variously by recent regional initiatives through the Forum for Agricultural Research in Africa's (FARA's) Building African Scientific and Institutional Capacity (BASIC) network to improve teaching methods and content in the region's Agricultural Education and Training systems (BASIC, 2006; FARA, 2007; Von Kaufmann & Temu, 2003) and RUFORUM's networking approach to capacity building for training, research, and collaborative programs. The drive has been to build a new cadre of dynamic agricultural graduates armed not only with market-orientated skills, but also with a new standard of morals, ethics, and awareness. To go beyond mere structural reforms, such programmes must consider putting in place innovative, competitive and responsive agricultural postgraduate training and research systems to effectively contribute to the realignment of visions and mandates in universities and networks. This requires maintaining a long-term, multigenerational training system, resource mobilization system, incentives that attract and retain trained professionals, cost-effective training modalities (regional training models and sandwich programs with foreign universities) and the use of interdisciplinary learning and research centres; production enterprises such as science parks and start-up ventures; diversification and decentralization of funding mechanisms; and new partnerships (Clark (2006). As a Network, RUFORUM is engaging African universities to take advantage of ICTS to strengthen research, teaching and learning. The RUFORUM initial thrust is to ensure that by 2013, all its regional programmes have courses on-line and use OERs to reach a wider student population. In terms of graduates, RUFORUM initiated a

programme in 2007 to train at least 800 MScs and 150 PhDs by 2013: these numbers are still too low compared to the capacity gap needs in the ECSA region.

### **Addressing Gender Concerns**

Women comprise a small minority of agricultural students, and are inadequately represented at all levels of the agricultural industries (except as active farmers where they are over 50% of the workforce). There is considerable pent up demand for female agriculturalists to play a full role in the future development of the industry as customs and traditions often mean that women farmers are less likely to communicate adequately with male agricultural staff than with female. Consequently, all employers are seeking to increase the numbers of female graduates they employ as they are seen as vital to addressing the fundamental constraints of agricultural systems (especially, but not confined to, those in the smallholder subsector). Furthermore, the absence of women in the training system means that many potential excellent graduates are failing to enter the industry.

While gender issues are widely accepted and many agricultural specialists are fully attuned to gender sensitivity, an understanding of how to mainstream gender issues and, importantly, to engage fully women at all levels of agricultural development is less evident. The data show there are important obstacles to increasing the numbers of women agricultural graduates. Probably the most important one is the poor teaching of science to girls in school. Girls are not encouraged to study science subjects and, for those that do, the standard of training is often inadequate. For the school female 'high fliers' in science, careers in the health sector look more attractive and remunerative than those in agriculture (and recall that information on agricultural careers at school is typically poor in any event). For those with more modest school leaving qualifications, the favoured options are often the 'caring' disciplines such as food science, midwifery, nursing, or home economics. Very often these skills are acquired at diploma level and, if the women go on to further studies, it will not be in agriculture. But this does mean that there are a useful number of female diploma holders in science related subjects who could, with attractive programmes, be attracted to take further qualifications in agriculture.

Enlightened and focused programmes, such as those introduced by Sokoine University of Agriculture in Tanzania, can substantially increase female enrolments in agricultural education. Broadening access will go some way to providing career opportunities for women (who are often disadvantaged in education) to enter university level education.

RUFORUM is committed to working with its member universities to address gender disparities in the region. Women play an essential role in agriculture in Africa and women need to be more prominent in agricultural leadership and in universities. In addition agricultural research and curricula need to take into account the gender perspective, especially when designing development technologies and strategies which will need to be implemented predominantly by women. As a network, currently only 18% of our grantees are females while female postgraduate students constitute only 24%. Our grant system is being revamped to ensure greater gender sensitivity in research and training, and incentive scheme is being developed to increase recruitment of female postgraduate students.

### **RUFORUM Innovation thrust**

RUFORUM is promoting both structural and systemic changes to postgraduate level training in response to changing socio-political, economic, scientific, and agro-ecological conditions in the region. An innovation system perspective is being adopted requiring that postgraduate training programmes need to:

1. Accommodate different types of individuals and institutions;
2. Provide alternative menus of learning opportunities for students and lecturers to accommodate diverse capabilities;
3. Make sufficient reference to the needs of actors and organizations that have their own innovative capabilities developed over time and from context-specific factors;
4. Understand the nature and dynamics of organizational cultures
5. Catalyze significant change in the cultures and behaviors that characterize participating universities;
6. Be embedded in networks, partnerships, and other interactions that link a wide range of stakeholders in a dynamic agricultural innovation system; and
7. Address the fundamental economic constraint underlying innovation including the scarcity of resources with which to Innovate and implement the training programmes

RUFORUM’s regional postgraduate programmes focus on strengthening individual and collective capabilities to innovate; changing organizational cultures and behaviors; or building innovation networks and linkages. The network prioritizes the creation of more dynamic, responsive and competitive MSc and PhD programmes that harness new and emerging tools and approaches. These are not meant to replace on-going institution based training and research programmes but to complement parallel reforms occurring in SSA agricultural training, research and extension systems. The development, implementation and monitoring of these programmes are conducted through consultative processes. This results in coordination and creative engagement with universities and other relevant actors in postgraduate agricultural training and research organizations. Table 1 and Table 2 present some of the options and data targets of student numbers.

Table 1: Options and approaches to integration of reforms in regional MSc and PhD Programmes

Option	Approach to Integration in Regional MSc and PhD Programmes
Realign visions and mandates	Avoiding replication of foreign training programmes but realigning visions and mandates driven not by predictable, top-down priority-setting exercises, but by consultative processes that rely on inputs from user communities, the small holder farmers, private agribusinesses, rural producer associations, research organisations, extension services, non-governmental organisations and other sources of demand for post graduate level training in agriculture. Such consultative processes are backed by labour market and graduate tracer studies to gauge demand for particular skills; and routine priority-setting exercises.
Developing the human capital base by enhancing	Integration of Personal Mastery and Soft Skills, and Leadership and management enhancement in the training programmes and inclusion. Integration of new interventions designed to further develop the innovative capabilities of the graduate

<p>innovative capabilities</p>	<p>geared towards specific needs of different actors in the agricultural innovation systems of the region rather than on traditional benchmarks set by standards of public service or academia.</p> <p>Diversifying away from well-structured degree programs centred solely on traditional disciplines, and moving into in-building a wider variety of programs, ranging from short, applied courses to short-term professional training into long-term multidisciplinary degrees programs. Design of regional PhD and MSc programmes that are less encyclopedic and more strategically attuned to the different needs of social and productive actors. Integration of topical courses such as agribusiness, project management, social research approaches, social organisation; leadership, conflict management, and human resource management; and information and communications technologies (ICT).</p>
<p>Change management <b>and</b> inducing change in organizational cultures, behaviors and practices</p>	<p>Institutionalization of the regional postgraduate programmes requires concerted and coordinated efforts to induce change in organizational cultures, behaviors, and practices are a longer-term undertaking. RUFORUM engages actors to this end including policymakers, university management, other professionals and many other actors in the course development and implementation processes. Efforts to this end include capacity enhancement for leadership and management, quality assurance and a monitoring and evaluation system for postgraduate training. The programmes are actively adopting a long-term outlook as the reform practices and cultures of both formal and non formal agricultural training do happen overnight. This allows for learning and adaptation to the specific</p>
<p>Enhancing quality of graduate programmes and research</p>	<p>While most universities in Africa have elaborate quality checks with respect to undergraduate training, this is largely lacking for graduate studies. There are thus, no periodic reviews of the graduate programmes by external evaluators. With support from an EU-EDULINK project, RUFORUM is working in partnership with the Inter-University Council of East Africa, Higher Education Quality Assurance Mechanism in Southern Africa and Association of African Universities to develop a harmonized quality assurance system for postgraduate training and research in eastern, central and southern Africa Universities. This includes developing a credit transfer system in the area of agricultural tertiary education.</p>

Table 2: Targets for RUFORUM regional postgraduate programmes

Category of Postgraduate Students	Targets for 2013	Trained before 2004 (under FORUM)	Trained during 2004 – 2009 Period (under RUFORUM)
PhD	150	8	6
Female	50	1	2
Male	100	7	4
% Female	30	12	30
MSc	800	250	300
Female	300	50	72
Male	500	200	228
% Female	38	20	24

None of the RUFORUM member universities has the stable capacity to individually run the PhD and some MSc programmes (such as research methods) alone. RUFORUM therefore works to pool resources and capacities from the region and beyond. The coordination of the programmes epitomizes their regional structure (Figure 2) and their rollout is staggered for strategic reasons: (1) to facilitate lessons learning by dove-tailing for improvement of subsequent programmes; (2) to build and nurture regional and international partnerships that are critical to the quality and success of the programmes; and (3) to avoid over stretching the limited resources at RUFORUM Secretariat and member universities and among partners in the region and beyond.

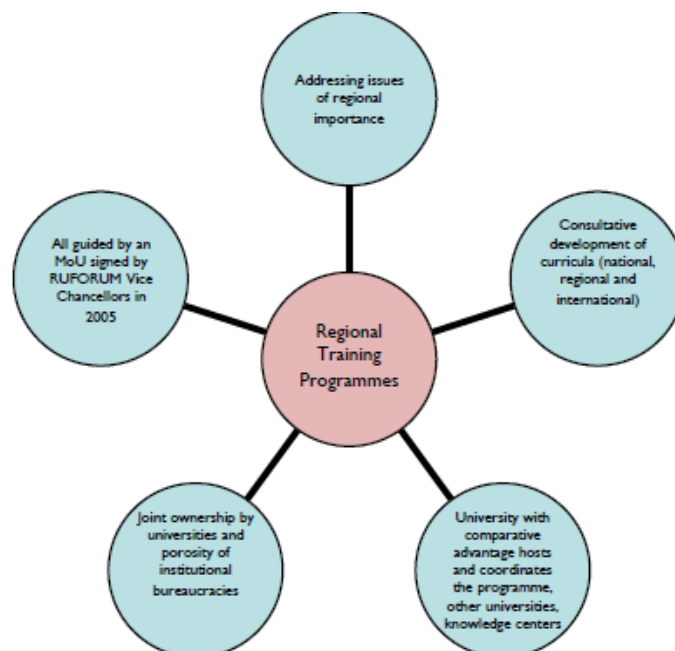


Figure 2: Regional nature of RUFORUM postgraduate programmes

RUFORUM recognizes the urgency to build Africa's next generation of agricultural scientists as a "replacement stock" for the aging and retiring professionals. RUFORUM is currently coordinating the implementation of the following regional PhD and MSc programmes hosted in various universities in the region: Dryland Resource Management at the University of Nairobi,

These regional programmes are meant to contribute to redress challenges facing agricultural tertiary education in SSA, some of which include, according to Wallace (2007):

- incoherent policy framework for agricultural education;
- weak or non-existent linkages among the various training institutions involved; both across the divide between formal and non-formal modes of education and between the various stakeholders in a rural knowledge system, including training, research and extension providers, as well as end users at household and community levels;
- lack of labour market studies either for professional and vocational training, or of training needs assessment among rural households. (The identification of new target audiences, and the training needs of women in particular were also generally overlooked);
- the management of training organisations often lacked capacity, especially for strategic planning, pre-appraisal, monitoring/evaluation and for entrepreneurial thrust;
- Ability to recruit and retain staff with the skills, aptitudes and commitment for all the activities required for effective rural training (including teaching, research, outreach and networking);
- institutions often lacked a sufficient 'critical mass' of change-oriented staff to ensure successful innovation;
- rigid teaching curricula that often fail to adapt to changing priorities in the external environment (e.g., sustainability, conservation, gender issues), or to deliver job-related and transferable skills.

## **Conclusion**

After decades of neglect of higher education in Africa, there is today the realisation of the urgency to rebuild higher education institutions (HEIs) in the continent, to provide the required skilled human capital to support innovations and direct the continent's development agenda. African universities and their networks such as Association of African Universities and RUFORUM, must quickly engage in this process to develop more sustainable and development oriented research, training, outreach and advocacy programmes. They together with their partners in and outside Africa must continue to lobby for political commitment to this cause. Otherwise Africa will remain outside the world knowledge base economy, and the continent will continue to be a consumer rather than a generator of innovations.

As recommended in the 2007 GCHERA conference, African universities must quickly re-engineer themselves to deliver the quality and type of graduates required to build innovation capacity in the continent. The challenge is not only for universities, but also to consumers of university products to become more actively engaged in university processes, provide policy direction for reforms and engagement, and foster field opportunities for student internships. The universities on their part must

be strategic, identifying areas of comparative advantage. Resources will continue to be limited and scattered, requiring that African universities strengthen networking to ensure economies of scale and scope, and where necessary run regional programmes to address strategic gap areas. Strategic partnership with other networks such as Agri-NATURA (European Network of Agricultural Universities and research) and NUSLGIC (Association of USA Land Grant Universities) will be important for enhancing quality and mobilizing resources.

Among several demands, African universities must quickly re-build Africa's human capital base, and ensure research and up-take pathways lead to increased entrepreneurial capacity within an overarching agricultural innovation system framework. Innovative models of capacity building are needed that link especially postgraduate training and research to increasing productivity of small-scale farmers and agri-business. For RUFORUM, the approach is to mobilise existing capacities to train within Africa, but with linkage to other knowledge centres within and outside Africa. RUFORUM has identified key investment areas that relate to increasing small-scale productivity, enhancing the natural resource base and resilience of small-scale farming communities, and builds capacity for policy formulation and implementation. We have established Networks of Specialisation to marshal existing capacity to produce quality graduates and research products, in line with CAADP and sub-regional and national priority needs.

In addition to other reforms, African universities must develop themselves beyond being national universities: education is now part of globalization. Students will go to the best universities, which through ICTs, they may access within their homes. Thus there is urgency to reform for development relevance, while ensuring that these universities remain internationally competitive.

Amidst the challenges listed above, African universities have supported development process in the continent. With increased and sustained support from African governments and their development partners, AU\_NEPAD, RECS such as COMESA and strategic leadership from AAU and FARA, African universities can be strengthened to support more effectively development process in the continent. A key component of this will be postgraduate training in strategic areas, because no country in the world has developed without a strong human capital base.

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