

**ASARECA/RUFORUM THRUST 4: A
study of Agricultural Graduates in
Eastern, Central, and Southern Africa:
Demand, Quality and Job Performance
Issues**

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A report to ASARECA and RUFORUM

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TABLE OF CONTENTS

ACRONYMS.....	iii
EXECUTIVE SUMMARY	vi
ACKNOWLEDGEMENTS.....	ix
1. The study	1
1.1. Study design	1
1.1.1. Methodology.....	2
1.1.2. Overview	3
2. The context	5
3. The new paradigm	10
4. Country highlights	15
4.1. Kenya.....	15
4.1.1. Agricultural Education and Training in Kenya.....	15
4.1.2. Key demand aspects for agricultural graduates in Kenya.....	15
4.2. Tanzania	18
4.2.1. Agricultural Education and Training in Tanzania	18
4.2.2. Key demand aspects for agricultural graduates in Tanzania	20
4.3. Rwanda.....	22
4.3.1. Agricultural Education and Training in Rwanda	22
4.3.2. Key demand aspects for agricultural graduates in Rwanda	22
4.4. Ethiopia	24
4.4.1. Agricultural Education and Training in Ethiopia.....	24
4.4.2. Key demand aspects for agricultural graduates in Ethiopia.....	25
4.5. Malawi.....	26
4.5.1. Agricultural Education and Training in Malawi.....	26
4.5.2. Key demand aspects for agricultural graduates in Malawi	27
4.6. Mozambique.....	29
4.6.1. Agricultural Education and Training in Mozambique	29
4.6.2. Key demand aspects for agricultural graduates in Mozambique	30
5. Analysis and conclusions.....	34
5.1. Employers, potential employers, and trends in employment	35
5.2. Public sector employers	35
5.3. Private sector and NGO employers.....	37
6. A Plan of action	40
6.1. ‘Business unusual’ today, not tomorrow	40
6.1.1. Action point 1- ‘Business unusual’	44
6.2. Improving quality and content of training.....	45
6.2.1. Action point 2- Enhancing the quality of the undergraduate degree	46
6.3. Broadening access to degree level agricultural education and beyond	47
6.4. Understanding and addressing gender issues	48
6.4.1. Action point 3- Reviewing and learning from experience.....	49
6.5. Building a constituency	49
6.6. Enhanced governance.....	50
6.6.1. Action Point 4: Initiating a new governance process for agric. faculties	51
7. The future can be different	52

Annex 1: Detailed country studies	54
7.1. Kenya.....	54
7.1.1. Agricultural Education and Training in Kenya.....	55
7.1.2. Key demand aspects for agricultural graduates in Kenya.....	56
7.2. Tanzania	61
7.2.1. Agricultural Education and Training in Tanzania	63
7.2.2. Key demand aspects for agricultural graduates in Tanzania	66
7.3. Rwanda.....	68
7.3.1. Agricultural Education and Training in Rwanda	69
7.3.2. Key demand aspects for agricultural graduates in Rwanda.....	69
7.4. Ethiopia	73
7.4.1. Agricultural Education and Training in Ethiopia.....	76
7.4.2. Key demand aspects for agricultural graduates in Ethiopia.....	77
7.5. Malawi.....	78
7.5.1. Agricultural Education and Training in Malawi.....	80
7.5.2. Key demand aspects for agricultural graduates in Malawi	82
7.6. Mozambique.....	89
7.6.1. Agricultural Education and Training in Mozambique	89
7.6.2. Key demand aspects for agricultural graduates in Mozambique	90
Bibliography	97
List of Respondents.....	99

ACRONYMS

AET	Agricultural Education and Training
AIDS	Acquired Immune Deficiency Syndrome
AIS	Agricultural Innovation System
ANAFE	African Network for Agriculture, Agroforestry and Natural Resources Education
ARM	Athi River Mining (Kenya input supply company)
ARMing	Annual Review Meeting – Save-a-Cow (Ethiopia) and partners
ASARECA	Association for Strengthening Agricultural Research in East and Central Africa
ASDP	Agricultural Sector Development Programme (Tanzania)
ASSP	Agriculture Sector Support Programme (Tanzania)
ATAP	Associação dos Técnicos Agro-Pecuários: Association of Agriculture and Livestock Technicians
BSc	Bachelor of Science (degree)
CAADP	Comprehensive African Agriculture Development Programme
CARMPoLEA	Center for Agricultural Research Management and Policy Learning for Eastern Africa
CDS	College of Development Studies (Ethiopia)
CEO	Chief Executive Officer
CNAQ	Comissão Nacional de Acreditação e Qualidade’ National Commission for Accreditation and Quality
ERS	Economic Recovery Strategy (Kenya)
ERSWEC	Economic Recovery Strategy for Wealth and Employment Creation (Kenya)
FAO	Food and Agriculture Organisation of the United Nations
FIPS	Farm Input Promotions (NGO)
FPEAK	Fresh Produce Exporters Association of Kenya
FSR	Farming Systems Research
FTC	Farmers Training Colleges (Kenya)
GDP	Gross Domestic Product
HBS	Household Budget Survey
HIDA	Human and Institutional Development Agency (Rwanda)
HIV	Human Immunodeficiency Virus
HU	Haramaya University (Ethiopia)
IAC	Inter Academy Council
IARCs	International Agricultural Research Centres
IBRD	International Bank for Reconstruction and Development (World Bank)
ICT	Information Communication Technology
IFPRI	International Food Policy Research Institute
IIAM	Instituto de Investigação Agrária de Moçambique; Institute for Agriculture Research of Mozambique
ILRI	International Livestock Research Institute
INE	Instituto Nacional de Estatísticas; Institute of National Statistics
IRLDS	Institute of Regional and Local Development (Ethiopia)
ISAE	Higher Institute of Agriculture and Animal Husbandry of Rwanda
ISPG	Instituto Superior Politécnico de Gaza; High Polytechnic Institute of Gaza
ISS	Institute of Social Sciences (Ethiopia)
KARI	Kenya Agricultural Research Institute
LGA	Local Government Authority (Tanzania)
MDG	Millennium Development Goals

MSc	Masters of Science (degree)
NARES	National Agricultural Research and Extension System
NARES	National Agricultural Research and Extension System
NARS	National Agricultural Research System
NEPAD	New Partnership for African Development
NGO	Non Governmental Organisation
NORAD	Norwegian Agency for Development Co-operation
NUR	National University of Rwanda
PIREP	Programa Integrado para a Reforma do Ensino Profissional; Integrated Program for the Reform of Professional Education
PhD	Doctor of Philosophy
PRA	Participatory Rural Appraisal
PROAGRI	Pró-Agricultura (Estratégia de Desenvolvimento da Agricultura), Pro-Agriculture (Strategy for the Development of Agriculture)
R&D	Research and Development
RDI	Rural Development Institute (Ethiopia)
RRA	Rapid Rural Appraisal
RUFORUM	Regional Universities Forum for Capacity Building in Africa
SAC	Save A Cow (NGO)
SCARDA	Strengthening Capacity for Agricultural Research and Development in Africa
SODP	Seeds of Development Program
SUA	Sokoine University of Agriculture
TAP	Tanzania Agriculture Partnership
UEM	Universidade Eduardo Mondlanem Eduardo Mondlane University
UNAC	União Nacional dos Camponeses: National Union of Farmers
UNESCO	United Nations Educational, Scientific and Cultural Organisation
URT	United Republic of Tanzania
US	United States of America
WHO	World Health Organisation

"“The thing that bothers me is that the donors have consistently tried to avoid the issue of institution-building in Africa. In South and Southeast Asia in the 1950s, the donors were building the institutional capacity it took to create the growth that began in the 1960s. In the 1970s, we didn't do it in Africa because we were on the basic needs and rural development kick. An agronomist was viewed as doing elite stuff. A plant breeder was even more elite. I think it's time that the donors begin to take the issue of institution-building seriously or in 2010 we are going to be having this same conversation” (Ruttan, 1991).

EXECUTIVE SUMMARY

The overall objective of the study is to evaluate the demand for agricultural graduates at the bachelors, masters, and PhD level within selected ASARECA and RUFORUM countries and to use this information to inform agricultural education policy makers.

The agricultural development agenda is market-led and knowledge-intensive, and therefore needs graduates with the skills, mindsets, and knowledge to address these issues directly and efficiently. The mindset change needed is one that no longer dismisses the 'illiterate' subsistence farmers as incapable of making a significant input to the food supply chain beyond immediate family needs. In the new paradigm, smallholders are the innovators of the desperately sought after African Green Revolution. Mindset change and quality skills dominated the discussions with employers and graduates alike. **The demand for graduates in agriculture who have the right skills and mindsets can be expected to be strong in the coming decades provided the universities invest in building up their constituency amongst farming communities and development institutions.** These skills required of graduates include farmer training skills, implementation of adaptive or on-farm demonstrations or trials, financial management, agricultural value chain addition skills, and business start-up advisory and entrepreneurial skills, combined with the aptitude to participate from the outset as potential innovators in the system. While there is evident concern to improve services to farmers in the region, and skilled graduates will play a fundamental role in providing these services, past experience suggests strongly that the agricultural sector will fail to get its requisite share of resources unless farmers are able to express their needs clearly and effectively. The ASARECA and RUFORUM universities have a crucial partnership role to play, along with other development institutions, in building a powerful rural voice into the development process.

Amongst agricultural graduates at all levels, women are seriously underrepresented. 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. Girls are typically not encouraged to take sciences in secondary school, and agriculture is not a favoured subject amongst graduating high school students of either sex. Enlightened and focused programmes, such as those introduced by Sokoine University of Agriculture in Tanzania, can substantially increase female enrolments in agricultural education.

The private sector and NGOs are increasingly playing an important role in agricultural extension (and, in some cases, even replacing government services).

Key elements in this changing demand pattern are an emphasis on practical skills, and good quality first degree education. This requires universities to build strong partnerships with both employers (connecting actively with traditional employers in the public sector and the ‘new’ employers amongst community based and private sector organisations). Courses need to be refreshed with the latest knowledge from international and regional science, and to be informed by farming practice and constraints. Particular attention needs to be paid to ‘over the horizon’ issues (for example, climate change and the role of biotechnology) so that graduates are able fully to engage in these important debates.

The change to the emphasis of AET from diploma to degree level training that has occurred over the past decade is significant. There are also large gaps in the current establishment of many NARES which will need filling in the immediate or near future. This, if managed well, provides an opportunity to revitalize the farmer support services (both public and private) of the region through the rapid introduction of fresh thinking. But this will require careful and tactful intervention, and support from experienced regional and international agriculturalists. **There is a real opportunity for the regional university and research networks, such as RUFORUM and ASARECA, to provide leadership and vision to this change.** At present, many employers of graduates are not well informed about, or connected to, such regional networks.

There are major issues with the quality and focus of undergraduate training available within the surveyed countries. Reservations were expressed widely and consistently by graduates themselves, employers, and farmers to the study team. A widespread perception amongst employers is that agricultural graduates are weak in terms of problem analysis and solution skills. They may be receiving the theory in their coursework; they do not seem able to put the theory into practice.

Regional universities are modifying their programmes, but the pace of change needs reflect the urgency required to rectify the focus and quality of the training. Governance of the universities, involving effective mechanisms for listening to, and getting ongoing feedback from employers and students is desperately required. **AET institutions (and indeed faculties within those institutions), need distinct and real autonomy, with producers and stakeholders on their governing bodies. This will provide a powerful incentive to link training with market demand.**

Particular efforts are required to broaden access to agricultural education overall. Firstly, greater numbers of female students need urgently to be recruited. Secondly, it is a fact that too many children in Africa do not have adequate access to quality schooling – which restricts the pool of conventional entrants into the university system. The universities need urgently to develop

and expand opportunities for this category of students to gain ready access through the university system at all levels. Importantly this would also at the same time increase female opportunities for advancement. ASARECA and RUFORUM need to provide guidance and help to this process. Therefore, some initial pilots to test out the new ways of doing business would be ideal. As we have noted in this study, a key growth area is in the NGO involvement in agricultural development as many of these agencies take over the slack left by the running down of public extension services. **There is a real opportunity, and considerable mutual benefit, to a coordinated effort where the universities and the NGOs plan and implement an initiative to develop a high quality agricultural educational system for the region.**

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The remaining errors and omissions are our own.

1. The study

The overall objective of the study is to evaluate the demand for agricultural graduates within selected ASARECA and RUFORUM countries and to use this information to inform agricultural education policy makers. This will enable them to develop effective strategies for training agricultural graduates with the needed skills and competencies to address national and regional priority development issues in the ASARECA and RUFORUM region¹.

The ASARECA scoping report for SCARDA states that at present there is a poor match between the skills of graduates and the requirements of the research sector. Traditionally capacity strengthening for agricultural research has been perceived in a comparatively linear fashion where universities train scientists to take up posts in the NARS. This report goes beyond the scoping study to determine the requirements of other employers - especially the private sector, NGO and communication sectors.

This study takes account of the whole system into which capacity building of graduates fit. This will include those seeking graduates - NARES conducting research to enhance livelihood opportunities for the poor; the government sector seeking to ensure appropriate policies are developed and implemented; the private sector requiring technical skills in its marketing of farm inputs and outputs; and the NGO, extension and media sectors looking to create a flow of appropriate information to the poor. The perceptions and aspirations of the graduates are a further crucial element of the system as this affects their drive and motivation. We show, using data collected from stakeholders, that the skills required of agricultural graduates are necessarily broader than in earlier times and it is essential that training curricula reflect the new demands of employers. The study uses information available through the RUFORUM and ANAFE secretariat, and other sources, together with additional information collected during field work, to obtain a reliable data on:

- The nature of agricultural training available and recent reforms in curricula
- The nature of employers/ potential employers.
- The nature of employment of agricultural graduates – in informal, formal and self-employment.
- The views of the current employers on the quality of the trainees produced by the collaborating institutions and RUFORUM universities
- The aspirations and opportunities as perceived by graduates
- The usefulness of the skills and capacities the students and institutions acquired
- Challenges facing the female graduates

1.1. Study design

¹ The additional countries (Malawi and Mozambique) were added to the study by RUFORUM to build a picture of demand in the SADC region. As a form of shorthand, these are referred to in the document as being in the “RUFORUM” region.

The study was required to inform policy as to how the demand for agricultural graduates is expressed in the very different circumstances found across the ASARECA and RUFORUM region. Resources did not permit, at this stage, a country visit to each of the ASARECA and RUFORUM countries. Instead, a sample of four countries was chosen, in consultation with ASARECA to represent the range of situations likely to be found in that region. The chosen countries were:

- **Kenya** as a country that has gone through significant structural change and with a vibrant private sector,
- **Tanzania** as one where the transition from a centrally planned to a market economy was well advanced,
- **Rwanda** as a post-conflict state, and,
- **Ethiopia** as a country with chronic and severe hunger and agricultural productivity issues.

For the expanded study to take in SADC countries, Malawi and Mozambique were selected by RUFORUM for detailed analysis.

1.1.1. Methodology

The team aimed to collect the following data:

- The nature of agricultural training available and recent reforms in curricula
- The nature of employers/ potential employers and the employment of agricultural graduates – in informal, formal and self-employment.
- The views of the current employers on the quality of the trainees produced by the universities
- The aspirations and opportunities as perceived by graduates
- Challenges in attracting graduates, and, in particular, women

Three main techniques were initially planned to gather primary data – a questionnaire survey, face to face key informant interviews using an interview question guide, and student group discussions. A common format was used across all countries. In the event, the quantitative survey proved ineffective – the response was inadequate for any reasonable analysis as the information received was patchy and incomplete. The team then resolved to focus on the informal survey technique, using key informants. Dr Mutema, as a recent PhD graduate, was charged with the special responsibility of seeking out and verifying the opinions of current students and recent graduates. The team determined that a critical element in understanding the demand for graduates was to gain a perspective on employment prospects and opportunities from those either seeking work or recently entering employment. In the event, this enabled the team to gather some extremely valuable information.

The methodology used in undertaking the informal survey was a ‘cascading network’. All three members of the team had an initial network of contacts across the public and private sectors in agriculture in the region. Appointments were made to interview these contacts and they were interviewed using a basic check sheet to ensure that each interview covered similar ground. However, the interview approach agreed within the team allowed for expanded

discussion beyond the basic check sheet as information became available. Further key informants were sought on the advice of the original interviewees and the process repeated. **The team specifically sought strong and candid inputs from both conventional and potential stakeholders – and especially from the young.**

In Annex 1, the summarised information on the interviews conducted is reported. The following sections on the various countries visited contain the major highlights.

1.1.2. Overview

The study was informed by several central assumptions:

- The university has a core role in addressing the human and agricultural challenges of southern and eastern Africa.
- The agricultural development agenda is market-led and knowledge-intensive, and therefore needs graduates with the skills, mindsets, and knowledge to address these issues directly and efficiently.
- Smallholders are the innovators of the desperately sought after African Green Revolution.

Once the data were collected and analysed, some major points of consensus across all countries, and amongst the three main groups of interviewees (employers, graduates, and faculty) emerged.

Quality of training and underinvestment 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. 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.

Universities are not seen as centres of innovation: a particular worry was that the universities were not widely recognised as ‘centres of innovation’. Most interviewees noted that there were plenty of very well educated and competent people at the universities – and university staff are regularly consulted in the development of new programmes and initiatives. But universities are not seen as a reliable and fertile source of new knowledge. This is the result of two factors. Firstly, while individuals within universities, and, in some cases, whole departments, are carrying out some very innovative and creative work, the university community has largely not embraced innovation as its core business. Secondly,

and this is related directly to the failure to mainstream innovation for the rural sector, the structure and governance of universities is 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. And finally, 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: as the team reviewed university programmes in the context of national plans for the development of the agricultural sector, a major discrepancy appeared – while all countries surveyed were planning 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

2. The context

This study is an examination of the potential demand for agricultural graduates in the ASARECA and RUFORUM region. As such, the emphasis in the analysis is on the demand side of the equation – the field work and data collection focused on existing and potential employers. In addition, the views of recent graduates was particularly sought – we examine what made them chose agriculture as a career, what are the opportunities for, and obstacles to, career advancement from the perspective of a young graduate, and how useful was the university training graduates received been to their current position. The report draws, not only on the information gained during field work, but also on the work of others. In particular, the seminal World Bank report on agricultural education and training (IBRD, 2007) is acknowledged. This outstanding analysis of the issues associated with agricultural education in Africa provided an invaluable source of both data and inspiration. We use several key concepts from that report and develop them further here in the context of understanding the changing demand for agricultural graduates in the ASARECA and RUFORUM region.

We also sought the views of the universities as to how well they were meeting what they perceived to be the demand for their graduates, and what were the plans for changes in the future. The original workplan included a review workshop in each country at the conclusion of the fieldwork. In the event, the team decided that the work was not sufficiently advanced at the end of each country visit to justify the expense (in time as much as in money) – the various findings from the different country studies needed to be properly analysed and evaluated prior to full discussion at the country level. **Further work is needed to integrate the findings of this study into the longer term development plans of the universities of the region.** We hope that this means that institutions can take forward the recommendations and truly feel ownership of the activities that they plan in the light of them.

This report, as a pathway forward, still needs to be agreed and we suggest that this could be achieved by a high level workshop at which the major recommendations of the study were discussed by all stakeholders and developed into an action plan amongst those universities willing to take forward the principles developed in the report.

First, we examine the context. The university role in the challenging human and agricultural context of southern and eastern Africa is not as an upstream research institute of the NARS but as a fully integrated component of the national and regional R&D communities. Funding for universities and research does not usually come as unrestricted funds - most support is now linked to specific programmes and defined tasks and work plans. Furthermore, development agendas have also altered - agriculture now shares high priority with other development objectives (for example; HIV/AIDS, good governance, trade liberalisation). The universities of the region have been slow to recognise both the opportunities and the threats in these shifts in emphases. Consequently, they often are only now in the process of repositioning themselves. Furthermore, the agricultural development agenda is market-led and knowledge-intensive, and therefore needs graduates with the skills, mindsets, and knowledge to address these issues directly and efficiently. The mindset change needed is one that no longer dismisses the 'illiterate' subsistence farmers as incapable of making a significant input to the food supply chain beyond immediate family needs. In the new

paradigm, smallholders are the innovators of the desperately sought after African Green Revolution. Mindset change and quality skills dominated the discussions with employers and graduates alike. **The need for graduates with new mindsets and with enhanced skills was a universal theme throughout the field work phase. What was less evident was a consensus on how this might be achieved.**

Agricultural development policy in the region is increasingly informed by the use of “agricultural innovation systems” (AIS) to understand how societies generate, exchange, and use knowledge and information (IBRD, 2007). The AIS framework claims to embrace the influences of market forces, the impacts of organizational learning and behavioural change, non-market institutions, and public policy processes. The relevance of the increasing interest in AIS and its use to guide policy to this report is in the way knowledge is generated and transferred. In the conventional agricultural knowledge transfer model (which has its roots in the top down colonial period of much of the region), information flows from the informed and educated science and development specialists down to farmers and field workers. In simple terms, the poor, many of whom are farmers, are told what to do by experts. By contrast, the AIS conceptualisation is a more complex process-based systems approach, in which all individuals and organizations in the system continually learn and innovate. It is a system to which all contribute knowledge and which relies on the efficient transfer of information throughout the system in a non-hierarchical manner.

The phrase “business unusual”, which has been adopted by many of the NARES of the region, is intended to encourage the needed changes in organizational cultures and behaviours, and the networks and linkages among innovation agents which are required in an effective AIS. Importantly (and again to simplify), the poor, along with other actors, contribute directly and using their knowledge and skills to the solutions to their problems². This has a clear effect on the demand for agricultural graduates. Policy makers who use AIS require graduates who have the skills and aptitude to participate from the outset as potential innovators in the system. Graduates need to be able to influence components of AIS from a range of positions, as well as having the capacity to drive innovation themselves.

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. So there is potentially a receptive environment for modernizing initiatives within the sphere of African agricultural education and training. **But, as we will show in subsequent sections, this requires more than simply curriculum change – it requires the explicit recognition by universities of their massively changed role within an AIS.**

² One major change is that farmers become active experimenters. An obvious manifestation of the new approach is the widespread adoption of the ‘mother-baby’ trial methodology where farmer designed and managed trials contribute directly and significantly to the development and verification of new technologies.

Kanayo Nwanze, president of the UN International Fund for Agricultural Development (IFAD), said governments should realize that "there is no safety net like food security," and funding agriculture helped alleviate rural poverty. In China, the world's fastest growing economy, agricultural growth was 3.5 times more effective in reducing poverty levels than expansion in other sectors. In Kenya, small-scale farmers exporting cut flowers to Europe had put "the horticulture industry ... on a par with Kenya's traditional hard currency earners - tea, coffee and tourism - in revenues," according to the UN Food and Agriculture Organisation (FAO). Vietnam, which was importing food only two decades ago, had become the world's fourth largest producer of rice, largely on the shoulders of its small-scale farmers, Nwanze pointed out. Investment in agriculture in Burkina Faso, in West Africa, had also seen food production double in the last decade.

Nwanze said investment in agriculture was now an imperative. The World Bank has projected that food imports into Sub-Saharan Africa will more than double in two decades. This is unsustainable in an environment where the combination of falling incomes and declining real exchange rates in much of the past 12 months had eroded purchasing power of the poor (and of poor governments) for food.

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Since two-thirds of the subSaharan Africa population resides in rural areas, a prosperous agricultural sector is fundamental to reducing poverty. The data show clearly that agriculture is an engine for economic growth for agrarian economies. 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 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 – and the evidence is clear that the quality of much agricultural education is below the standard needed. Change is necessary – as we will show – but, unless the universities properly 'buy into' the change, as opposed to seeing it as imposed from the outside, progress will be slow and disruptive (Ngugi et al, 2002).

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 at 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. Tanzania, for example, today faces a severe capacity constraint due to earlier decisions to sacrifice

training and the building of manpower resources. The current Agricultural Sector Development Programme (ASDP) notes (URT, 2006):

“Overall, the NARS has a significant body of well trained scientists, technicians and support staff. Important gaps however, remain including:

- Too few staff trained in post-harvest, marketing and general socio-economic aspects in technology development and transfer.
- Many NARS staff are approaching retirement, in large part due to an earlier freeze on employment, the “brain drain” and the impact of HIV/AIDS.
- Serious gender imbalance in all NARS organizations.
- A failure... to match long-term training with competitive salary schemes to motivate and retain staff after training.”

The emphasis in recruitment in the immediate future will be in the areas of marketing, policy and post-harvest operations. However, combined with the impending loss of senior experienced staff due to retirement, a focused and substantial training and retooling programme for NARS scientists is also proposed under ASDP.

It needs to be realized that the change envisioned under ASDP provides the chance to revolutionise the central NARS institutes through a focused and careful recruitment programme. To achieve this, however, requires more than just signing on young graduates with the requisite academic qualifications and experience; it also demands that a new system of career opportunities be developed and expanded so as to attract and hold the best and the brightest coming out of the universities, while allowing those that do not measure up to move into other areas.

In the diversified NARS envisioned within the ASDP, there are multiple opportunities for exciting career development for young agriculturalists, not all of whom need (or should) focus directly on research. From ward and district level public and private organisations right up to the national level, there is a major lack of qualified individuals who can help build the combined research/extension/farmer development process that is at the heart of the ASDP.”

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 emphasises the need (which is given addition urgency by the scarcity of resources – financial, personnel, and infrastructure) for quality as well as quantity.

Madukwe, 2008, emphasises the vital contribution that higher education, especially in science (and agriculture) must make to the development process, and the urgency with which change must be pursued. This is further supported by the analysis of the Inter-Academy Council

(IAC) which highlighted the important need for universities in developing countries to become vibrant centres of excellence capable of propelling their nations into the knowledge economy (IAC, 2004a; IAC 2004b). Madukwe, 2008, groups the process of reshaping university education into the following major thematic areas:

- **Knowledge:** systems of knowledge creation and diffusion that take into consideration the needs and experiences of the client are required and tertiary agricultural institutions must be at the forefront of the change process. Graduates need to be equipped with the capability to respond to the rapid changes that face the rural poor in Africa.
- **Retooling faculties of agriculture:** graduate education in agriculture has to be accessible to a wide range of potential candidates, and be of high quality, relevant, and cost-effective. Students and professors will work closely with farmers, other agro-entrepreneurs and policymakers on problems impacting on agriculture and the rural landscape. Importantly, this also includes explicit exploration of ‘over the horizon’ issues based around careful, peer reviewed, and prioritised analysis.
- **Developing agriculture as a career:** this has two aspects. Firstly, it requires a major change in mindset to move away explicitly from the view that agriculture is the occupation of those who have failed to achieve other careers. Throughout the industry (from farmers to scientists), programmes have to be developed to attract and retain youth and young professionals. This requires a detailed analysis of the current disincentives to participate in the industry, followed by imaginative steps to address these fundamental constraints. Training needs to focus on developing the necessary competencies to build a career in all aspects of agricultural production, processing and marketing. Madukwe, 2008, emphasises that the lack of understanding of the complexities of rural and agricultural life results in universities that rely on outdated curricula, material and training approaches.
- **Thinking long term:** exploring, in a focused and productive fashion, new opportunities for the rural poor and then developing these into practical and profitable options based on real constraints faced defined target groups and with their direct contributions explicitly and effectively included. Key areas include market transformation, international and regional trade, biodiversity, protecting and managing intellectual property, and exploring new roles for agriculture in the energy and pharmaceutical spheres.

All require efficient and effective cross fertilization of ideas, and the networking of farmers with policymakers, researchers and engineers, nationally as well as internationally, as well among others. The need to address knowledge gaps and learning processes becomes critical and the role of universities even more central to the process in creating lateral thinkers.

“Tertiary institutions need to speed up the pace at which they embrace these developments and respond by ensuring that centres of excellence are quickly identified and collaborations established with advanced centres in the north and south to provide leadership in their communities and countries...[L]inkages must extend even beyond the scientific-institutional stage, and should include linking ministries of education with ministries of agriculture, finance, health and international agencies.” (Madukwe, 2008).

3. The new paradigm

There is, therefore, strong evidence to a strong connection between higher levels of education, where quality is the criterion, and economic development. Considering Africa against the backdrop of these findings, one can see that the overall quality of education in Africa needs to improve, that enrolments in secondary and tertiary educational institutions need to continue to increase, and that science and technology education needs to be strengthened. Since most African countries remain agrarian societies and agriculture contributes significantly to both economic and social development, the need for renewed support to agricultural education and training is both obvious and necessary. **The demand for graduates in agriculture who have the right skills and mindsets can be expected to be strong in the coming decades.** Likewise, it is evident that improved agricultural performance will underpin progress towards many of the Millennium Development Goals.

In the new paradigm, subsistence farmers and their farms are our primary and most effective learning 'laboratory.' 'Literacy' could be redefined as “the ability to absorb, practice and disseminate knowledge through shared experience” where information is transferred, not through the written word alone but naturally on a farmer to farmer level. Through the innovative use of natural resources already available in and around the farms of the poor, outsiders and farmers together work in partnership to identify key opportunities and then integrate them such that the overall synergy is significantly greater than the sum of their parts. This builds confidence, self worth and dignity amongst all and unlocks the further innovation which will be central to the desperately sought African Green Revolution

The clear need is for an innovative and productive agricultural training system that is fully integrated with the farming communities, the private sector, NARES, international and regional agricultural research centres, NGOs, and higher education institutions in other countries (both regionally and internationally). By improving such linkages, faculty and staff are better able to identify science and technology needs that are relevant to their own country's context. The outcome is 'work ready' graduates who have significant work experience at graduation. Consequently, the application of knowledge is speeded up as the link between knowledge and wealth creation is firmly established. With improvements in the accessibility of agricultural information, especially in electronic form, graduates need expertise to locate, retrieve, decode and appraise the information and then to adapt and apply this knowledge to local circumstances. In the information age, graduates must have research skills which enable them to become familiar with new and emerging fields and respond to changes in the underlying base of knowledge within their specific discipline.

However, history shows that, despite agriculture's central role in the development process in Eastern Africa (and, indeed, elsewhere on the continent), the sector has typically not received the resources needed to help the (majority) rural poor break out of poverty. Farmers are not well represented in policy forums and, too often, their voices are obscured or distorted. The ASARECA and RUFORUM universities, in no small part through their training of graduates, have a major role to play in helping the needs and priorities of the rural poor to be properly expressed at policy level. This “constituency building” will be a key element in the strategy to build the long term resource allocation needed for quality graduate education in the region.

The evidence collected during the study showed clearly that the private sector and NGOs are increasingly playing an important role in agricultural extension (and, in some cases, even replacing government services). This has an important implication in terms of demand as public service extension typically included an intensive in-service induction training programme to turn the ‘green graduate’ into an effective extension agent. The private sector and the NGO groups do not do this in a coordinated fashion and, therefore, this should naturally become a core component of the university curriculum.

The Kulika Charitable Trust

The Kulika Charitable Trust is a non-profit making organisation with a mission to support community development. In the early 80s, Kulika started by identifying young people from communities with leadership qualities, who were later sent to the UK for postgraduate studies.

“Investing in our youth by empowering them with skills and knowledge is one of the best ways to save for the future. This is also beneficial to the youths themselves in the sense that they eliminate the effects of ignorance, disease and poverty. The first lot to leave was a group of farmers that toured Warren Farm in the UK and came back as key farmer trainers,”

The emphasis has now shifted to working hand-in-hand with the local universities here, building highly practical training courses for field staff in medicine, agriculture, engineering and entrepreneurship (with an emphasis on selecting students with both academic merit and significant field experience). The Trust recognises that scientific and technological courses remain the most under-represented both in student enrolment at tertiary institutions and in the job market. It, therefore, serves to bridge this gap through the provision of scholarships strategic for both national and individual development. A strong practical component is inbuilt through a sustainable agriculture programme based round a farm training centre for African farmers which also serves to train large numbers of farmers from a range of African countries.

Key elements in this changing demand pattern are an emphasis on practical skills, which also serves to build confidence in graduates and impacts positively on their self-motivation. Good quality first degree education is critical as it lays the foundation for any further learning and is the basis of the bulk of frontline agricultural practitioners. To achieve this requires a strong element of partnership building – especially between developing and developed universities/institutions to exchange information, build local content, and keep course content in line with modern developments. Useful examples in the region of such partnerships include MSc training in collaboration with Wageningen University in the Netherlands where students are jointly supervised by Dutch and local professors, and the

Kulika Trust Scholarship programme. A relevant South African example is the Umsobomvu Youth Fund (www.youthportal.org.za).

“If I hear, I forget; if I see, I remember; if I do, I understand”

David Bragg, Send-a-Cow UK

Central components on these programmes include:

- **understanding of local community dynamics and existing farming knowledge and systems**, so as to be able to help communities to scale up or improve on what they already know. This particularly requires building skilfully on existing practice, avoiding being disrespectful and prescriptive, and a full understanding of participatory learning and engagement,
- **the use of farm management methodologies** to encourage and facilitate efficient resource allocation and utilisation,
- **the choice and design of technology and interventions to suit farmers' constraints and opportunities**, and,
- **awareness of implications of globalisation on agriculture** and the consequent opportunities and challenges that exist for farmers in Africa.

We draw heavily on the analysis of IBRD (2007) in the following paragraphs. The report examines in detail the “technical education pyramid”³. The authors assume that the composition of the output of technical graduates (ranging from certificate and diploma holders in agriculture to advanced degree holders) reflects:

- the labour market opportunities for each skill level within relatively low technology economies,
- and, a nation’s collective capacity for utilizing science and technology in its development.

In this pyramid, the base (which is wide) comprises farmers who are trained through non-formal and secondary level vocational education. The narrower middle band of the pyramid is the practically skilled agricultural technicians at the post-secondary certificate and diploma level (e.g. extensionists, NGO specialists, marketing representatives, and programme managers), and the narrow apex is agricultural professionals trained at the degree level and above. The FAO suggests that the ratios in this pyramid should be twelve technicians and 40-100 producers trained for each university graduate (Rowat, FAO, 1984). On this basis, IBRD (2007) found that the pyramid was top heavy.

They then found data for enrolments at the differing levels of technical education from 15 African countries and compared these with data from other developed and developing countries – and, importantly, this leads in a different direction. In Africa, a much higher proportion of enrolments take place at the lower ends of the educational pyramid than is the case in what they define as ‘highly competitive countries’⁴. But these last countries attract a much bigger share of university students into science, technology and engineering fields than do African countries, and have a comparatively larger portion of students enrolled in postgraduate studies. They note that, given that the tertiary level gross enrolment ratio for the highly competitive countries is roughly ten times higher than the level prevailing in Africa, this translates into a substantial quantitative as well as qualitative advantage for the highly competitive countries. They suggest the following implications from this analysis:

³ This is the distribution of enrolments across the various levels of technical education - post-secondary technical, non-university polytechnic-type technical, university science and technology (sciences and engineering), and postgraduate (undifferentiated).

⁴ The ten most economically competitive countries in the world as listed in The Global Competitiveness Ranking 2006-2007

- University enrolments in science and technology should be increased at the cost of fields at the cost of university enrolments in the social sciences and humanities.
- The need to build and nurture local postgraduate programmes in science and technology.

IBRD (2007) notes the variability that exists between countries. Kenya approximates the profile of highly competitive countries and should focus on expanding overall numbers in tertiary level education. However, many other African countries, including Rwanda, should look towards shifting a portion of their lower level technical education enrolments to higher levels of the pyramid. This is all within a general caveat that quality matters – **it is essential to ensure that the quality of education at the university level is high before expanding student intake substantially.**

Eicher (2006), in a comprehensive and invaluable review of international experience, draws on eight country case studies to illustrate the dimensions of demand for agricultural graduates in Africa overall. He emphasises the critical role of public investment in helping a poor country ‘buy into the growth process’. While acknowledging the very real role to be played by the private sector, Eicher (2006) observes the substantial up front public investments needed in agricultural institutions and infrastructure before private investors will enter the input distribution and marketing sectors. He notes that the institution-building task is much larger in Africa than it was in Asia. This difficulty is compounded by the loss of skills when students fail to return home after degree completion overseas – or later join the African diaspora. War and poor national investment in agriculture exacerbate these trends – leaving severe shortages of suitably qualified Africans who can contribute to national development programmes in agriculture. Donors struggle to find local leaders to design and implement programmes, thus weakening national development efforts. While numerous donors and NGOs operate development programmes, the struggle to attract and hold staff distracts them from the objectives of their programmes and leads to failure and disappointment. Eicher (2006) quotes Ruttan:

“The thing that bothers me is that the donors have consistently tried to avoid the issue of institution-building in Africa. In South and Southeast Asia in the 1950s, the donors were building the institutional capacity it took to create the growth that began in the 1960s. In the 1970s, we didn’t do it in Africa because we were on the basic needs and rural development kick. An agronomist was viewed as doing elite stuff. A plant breeder was even more elite. I think it’s time that the donors begin to take the issue of institution-building seriously or in 2010 we are going to be having this same conversation” (Ruttan, 1991 p. 195).

Tragically Ruttan has proved remarkably prescient, leading Eicher (2006) to conclude that:

- the African human capital crisis is severe,
- it is not amenable to a quick fix,
- but unless effective action is taken now, the prospects for the needed green revolution in Africa are gloomy.

He calls for a renewed African and donor financial commitment to graduate training in agriculture, along with new partnerships to expand postgraduate training within Africa. These will serve to drive down the cost of graduate education, improve the quality of the university

experience, and increase the quantity of research output by African universities. His continental estimate of demand for agricultural graduates (which is informed quantitatively by the detailed case studies across the developed and developing world of successful experience) is considerable. He starts by upgrading the physical and intellectual capacities of African universities so that they are able to play their full role in capacity building on the continent. By the end of the first decade of his programme, all MSc programmes in African universities would be strengthened so that the need for African students to leave the continent for MSc study in the major specialisations in agriculture would be eliminated. By year 15, there would be strong PhD programs in the major fields of agriculture in several universities in Africa and the next generation of 1,000 African PhDs would have been trained in Africa and overseas universities in the full range of agricultural disciplines.

At a continental level, Professor Richard Mkandawire, spokesman for NEPAD (The New Partnership for African Development) in testimony to the British Parliament All Party Parliamentary Inquiry on Agriculture and Food for Development in 2009, noted the decline in the number of agricultural scientists, which was exacerbated by the impact of HIV/AIDS related deaths. There was a very serious erosion of capacity in agriculture support services in Africa – partly due to a severe brain drain in Africa, but also as a result of lack of financial support.

The overall evidence is clear that there is a strong and sustained demand for well and appropriately trained agriculturalists at all levels in the ASARECA and RUFORUM region. The drivers of this demand include:

- **the need for skilled professionals to contribute to the design and implementation of the agricultural programmes needed to help the region move out of poverty,**
- **replacement for the current generation of professionals who are rapidly reaching retirement age,**
- **and, building and sustaining the public and private institutions that will underpin the dynamic agricultural sector envisaged in the Millennium Development Goals and other regional development activities and plans such as CAADP.**

But, unless a strong constituency is built amongst the farming communities to express these needs, there is a grave risk that resources will be channelled (as has happened in the past) to sectors other than agriculture. ASARECA and RUFORUM, together with the universities of the region, need to play a proactive role in building a strong voice for investment in agriculture.

4. Country highlights

4.1. Kenya

The Economic Recovery Strategy for Wealth and Employment Creation (ERSWEC) identifies the following five critical areas requiring public action in the modernisation process of agriculture:

- Reform of the legal and regulatory framework governing agricultural operations in order to make it fair and just for all farmers, processors, and others involved in agro-related activities.
- Promotion of research and technology development.
- Reform of the extension service system to create a more effective linkage between research, extension and the farmers as the ultimate beneficiaries.
- Establishment and development of a market-based agricultural credit and inputs system.
- Promotion of domestic processing of agricultural produce in order to provide increased opportunities for value adding, employment creation and foreign exchange earnings.

In each of these focus areas, there are considerable requirements for skilled and experienced technical expertise to guide both the design and the implementation of the strategy.

4.1.1. Agricultural Education and Training in Kenya

AET is provided at undergraduate and graduate degree levels by the five public universities⁵, and recently there has been growth in private agricultural education and training institutions offering AET at different levels. **The consensus of opinion from both within universities (staff and students) as well as from employers was that the quality of graduates and postgraduates being produced by Kenyan universities has deteriorated in recent years.** In part this is related to increases in student numbers (without concurrent rises in budget allocations and infrastructure) and the resultant pressure on facilities such as lecture halls, laboratories and equipment – noted eloquently a decade earlier by Eicher (1999). As important, however, is the widespread acknowledgement that courses have failed to keep pace with changes in technological advances and the farming environment, and, in addition, are not focused on priority farmer priority areas⁶.

4.1.2. Key demand aspects for agricultural graduates in Kenya

⁵ The Agricultural and Veterinary College of the University of Nairobi is one of the oldest in East Africa.

⁶ For a full analysis of AET at university level in Kenya, see Blackie M and Woome P., “Challenges and Opportunities of the Regional Universities Forum for Capacity Building in Agriculture in Kenya, Malawi, Mozambique, Uganda and Zimbabwe”; a report to the RUFORUM Board, 13 August 2005

a) Government observations

In the public sector, the Ministry of Agriculture is the major employer. The Ministry of Agriculture has a particular priority for specialised agricultural extension training which provides high quality hands-on skills in crops, livestock and general agriculture that enables all levels of agricultural support service staff (from researchers to field extension workers) to communicate effectively with farmers and to develop the participatory problem solving approaches required in an AIS framework. Government officials observe the importance of inculcating into graduates values beyond technical expertise and subject knowledge.

Agriculture is recognised as an unattractive career pathway among the Kenyan youths. They are less likely to become farmers because of land ownership issues, poor income opportunities from farming, lack of start-up capital and credit options, and the risk of exogenous events (drought, price interference, market collapse).

b) University staff and administrator observations

Egerton University staff noted that agriculture was typically a last resort, and, furthermore, the popularity of the subject had fallen even further in recent years. The two most popular degrees are food science and agribusiness management. Both are significant in terms of this study. The annual intake for food science is normally 35 students but there are years that the intake is doubled because of overwhelming demand. This demand comes from the perception that the degree prepares students for self employment and entrepreneurship on completion. The agribusiness management programme is also popular because of wide-range of opportunities which go beyond the agricultural sector – such as general management, accounting, and business practice.

The university is well equipped with resources to mount practicals in most fields. Nevertheless, the lack of “hands on” skills is recognised as a major challenge and one which is constantly demanded from employers in both public and private sectors⁷. Students have resisted some aspects of practical training, apparently claiming it reflects the needs of “the inferior and less educated diploma students and they expected more lectureship type of learning as they were training to become managers and officers”. The evidence from the Food Science Department suggests that this impression is somewhat misleading. What the students were objecting to was not practical training *per se* but the type of meaningless labour which adds little to the learning process. Where, as in Food Science, practical assignments are focused and linked to real problem solving, students respond positively to the opportunity to learn further skills.

An important source of income to public universities in Kenya comes from self-sponsored students (who pay fees double those received from publically funded students) - also popularly known as “parallel programmes”. This, however, has led to overcrowding of courses and compromises in terms of quality.

⁷ Also private sector employers believe that graduates have unrealistic expectations of remuneration.

A comment on ‘parallel’ programmes

Self-sponsored (parallel) students serve to boost university finances. These students have special privileges. They can choose their first preference degree programmes while normal entry students may be assigned to programmes of little interest if their first choice programmes are over-subscribed or they do not meet the minimum entry requirement. Parallel students can retake the entry exam while normal entry students have no second chance. Parallel students can enrol to start their degree programmes a year earlier than the normal entry student. An important outcome is that the enrolment of parallel students becomes a priority so as to maximise on income earnings – and education quality suffers. It is common to get directives on student numbers from university administration which ignores available resources and capacity.

Comments from the University of Nairobi noted that the universities needed to be significantly more proactive in increasing stakeholders’ involvement in their programmes. It is recognised that much needs to be done in terms of practical teaching - both laboratory and the hands-on operational and technical practical skills required by employers. In the case of the latter, this can be achieved through more (and better organised) industrial attachment and

secondments.

c) Student observations

Egerton University: the training was seen as too theoretical, the attachment too short, and their courses did not meet the expectations of their employers. They recommended more practicals, including longer period of attachment, with a formal structure, proper feedback and follow up between universities and industry. Attachments should be formally and collaboratively assessed by both the universities and industry. Too much teaching was out of date, there was insufficient emphasis on critical IT skills, and access to literature was poor. Students also noted the deleterious effect of over-enrolment as a result of the self-sponsored students’ programme which severely compromised the quality of training.

ILRI: there was common agreement that enrolments greatly exceeded the capacity of the teaching facilities, resulting in poor teaching and supervision. There were few (if any) individual student practicals (with the alternative being either a group practical or a demonstration). There is no interaction even among students themselves during studies in the form of group discussions, tutorials, and seminar presentations. Providing such platforms for students to share experiences would be very beneficial. The students highlighted the huge gap between what is taught at universities and employers’ expectations. Attachment and internship schemes are in disarray, with no supervision or interaction between students’ institutions and those providing attachment or internship to students.

Nairobi University: the group reported limited access to internet and modern computers. There was no inter-library loan facility and the university library was poorly stocked. The training involved too much theoretical teaching and few practicals. Field trips were rare and often did not take place. Most agricultural graduates moved out of the sector and took a different professional qualification such as accounting.

d) Private sector observations

Perspectives were sought from a number of private sector sources – these included Kenyan seed companies, horticultural producers, and NGO development agencies. The responses were consistent across all three groups, with the key factor being that the training provided by Kenyan universities needs considerable supplementation before graduates can play a full role in their jobs.

4.2. Tanzania

The Tanzania Government has developed an Agricultural Sector Development Programme (ASDP). The ASDP states that: “ *while the majority of Tanzanian farmers will remain at a subsistence level in the near future, poverty reduction will only be achieved by breaking out of the subsistence cycle.*”. Thus, the ASDP calls for the sector actors to **aim for more than subsistence** and to **understand the essential need for profitability**. The ASDP emphasises long-term reforms, particularly with respect to markets, institutions and investments as well as improved institutional functioning and service delivery, technology adoption, infrastructure development and greater commercialisation among smallholders.

The role of the universities is seen as one of working in partnership with others (most importantly farmers themselves) to create major change within the agricultural sector. A broader and deeper impact on the agricultural problems of Tanzania is believed to be possible through a focused effort across institutions, with the universities playing a crucial role.

4.2.1. Agricultural Education and Training in Tanzania

Sokoine University of Agriculture (SUA) is the major graduate agricultural training institution in Tanzania. Uniquely it has benefited from consistent and enlightened financial support over many years. In particular, the Norwegian Government, through various agreements with the Government of Tanzania, has been supporting SUA for the past 30 years. SUA now has a substantial core staff of highly skilled professionals in a wide range of agricultural and natural resource fields. It has an extensive campus, with good facilities, and trains the bulk of the future natural resource and agricultural scientists, outreach workers, and technicians in the country.

In 2004 SUA commissioned studies to assess training needs and conduct tracer studies in relation to the current and future job markets (see Iwega et al, 2005). The studies noted that generally SUA programmes meet the basic skills and competencies required by the job market. However, the graduates lacked value-adding skills in such areas as communication, problem solving, management and the use of ICT in their work. The curriculum did not enable the graduates acquire adequate hands-on computer and communication skills. Graduates were inadequately equipped with skills in entrepreneurship/business management which are important particularly in self employment. Graduates unable to communicate their ideas to others are limited in their job opportunities. Skills required by employers are good verbal communication and presentation, good written communication skills, analytical and problem solving skills, team working and dependability. There was severe overcrowding in classrooms, lecture halls and laboratories, poorly equipped lecture halls, laboratories and library facilities. The increase in workload for students and instructors had not been balanced by an increase in resources. SUA graduates have very low level of practical experience.

Figure 1 gives a summary of the major employers of SUA graduates. The figure shows that, although the macro-economic policy changes have reduced public sector employment, the government (Central and Local) is still the main employer, absorbing more than 55% of graduates who were able to secure employment. The private sector and Non Governmental Organisations (NGOs) are a new frontier for job creation for graduates (Figure 1). Unfortunately it was not possible to measure how this sector has grown since 2004. It is also conspicuous that self-employment is yet to be realized by SUA graduates. This could be attributed to lack of entrepreneurship skills and/or start up capital.

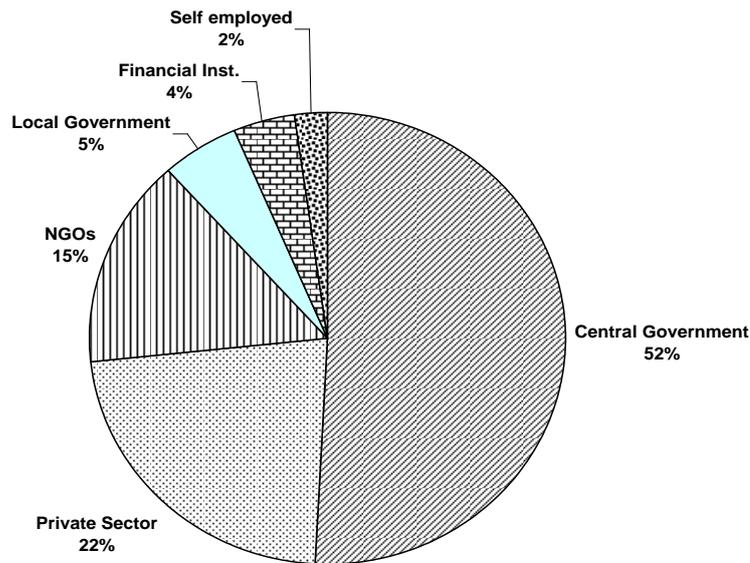


Figure 1: Major employers of SUA graduates by 2004/05 in terms of percentage response

Shambani Graduates

Three university friends conceived Shambani Graduates when they were visiting Morogoro rural district in 2003. They noted the lack of a link between the demand and supply of milk and signed up for a course on milk management. Together they conducted consultancies to generate initial capital for the company which became a limited liability company in December 2006. The business is based on the collection and selling of pasteurised milk. Milk is bought from Masai women who are trained to comply with quality standards. Today they are sourcing milk from over 200 farmers and the trust in the dairy system has given Shambani the security to expand into the Dar es Salaam market.

Their business endeavours have been acknowledged and augmented through the Technoserve award and the Dutch Business in Development Network award in 2006 and the 2008 Yara Prize. These have provided training as well as financial benefits which have enabled them to develop their capacity. This is of particular note as loans either cannot or have not been accessed. However, the operation is still at a relatively low level and is nowhere near matching demand. Further work is required to ensure increased supply in terms of quantity and quality.

Not only is this becoming a thriving business but the farmers, particularly Masai women, are reaping the benefits of a steady and reliable income from their milk which was previously considered a by-product. Consumers are also benefitting from a reliable supply of quality milk. The team are now keen to diversify the range of products that they supply.

However, there has been some success in the development of companies by the private sector (see case study on Shambani graduates). This group maintain their contacts with Sokoine to encourage students in similar ventures.

4.2.2. Key demand aspects for agricultural graduates in Tanzania

a) Government and public institution observations

As in Kenya, the public sector has conventionally been a major employer of graduates. However, in the past several years (again reflecting a recurring problem in the region), a freeze on recruitment has meant that many senior staff are approaching retirement with few trained young professionals to succeed them. A number of respondents commented on the lack of interaction between students and the private sector (which reinforces the findings of the 2004 SUA tracer study). While the consensus is that the quality of training suits the needs of employers (or can be upgraded relatively easily with additional focused training) there are comments on analytic and problem solving ability, as well as surprising weaknesses in both written and numerical skills. There are good career opportunities for young people in agriculture but this requires addressing the attitude issue (regarding agriculture and working with farmers as an inferior career choice)

b) University staff and administrator observations

In the biological sciences, enrolments, and the quality of students at entry, were tending downwards. To a large extent, this was credited as an outcome of the declining job opportunities in the public sector. By contrast, in the social sciences, particularly agricultural economics and agribusiness, the demand for student places was constantly rising.

Within SUA was an evident feeling that the conventional university hierarchical structure did not allow departments adequately and in a timely fashion to respond to changing demand patterns for students. **Questions of changes to curricula, engagement of specialist staff, and other factors which could transform the educational experience for students at all levels were held back by the cumbersome and top heavy administrative structure of the university.**

c) Private sector observations

The study focused on individual companies and the Tanzania Agriculture Partnership (TAP). Discussions with TAP resulted in the following key emphases:

- Most graduates look towards a public sector career as the university curriculum is not orientated to the requirements of the private sector and does not promote independent working.
- Students should have the opportunity of gaining experience through placements but there are problems of the availability of sufficient numbers of quality placements.
- Students are not adequately informed on employment options, which, at present, are not sufficient employers in the private sector to take all the graduates on offer. NGOs are increasingly employing graduates, although they tend to prefer experienced rather than fresh graduates.
- Graduates typically do not like working in remote areas, and one estimate is that only about 30% of SUA graduates actually work in agriculture.
- The universities are seen by the private sector as a source of consultants more than an active resource of new ideas.
- Children at school tend to avoid science and maths, and those that do study these subjects often choose medicine rather than agriculture.
- The 'job readiness' of graduates is diminished by a culture that favours passing exams rather than the acquisition of knowledge. This also leads to a culture which is unwilling to explore new ways of solving questions, to adapt new techniques, and to challenge assumed wisdoms. In addition, on this last point, other private and NGO sector respondents expressed concern that there was almost an arrogance amongst graduates which constrained their effectiveness once employed⁸

⁸ SUA does have a course on 'ethics at work' which could be a foundation from which to address this issue.

The Tanzania Agricultural Partnership

The Tanzania Agricultural Partnership (TAP) is an innovative public private partnership to support agricultural development, profitable commercial activities and poverty reduction. Coordinated by the Agricultural Council of Tanzania, TAP is a grouping of local, national and international partners willing to work together to respond to the major challenges and opportunities in agriculture. The Partnership combines commercial and development goals. And by doing so, it aims to provide increased choices and more efficient services to Tanzanian farmers. This will establish a sustainable, business-based foundation for small scale farmers to move from subsistence agriculture to profitable and diversified commercial farming.

The specific outcomes of the Partnership include:

- Profitable agricultural production is increased
- Markets and small farmer capacity is strengthened
- Appropriate inputs are affordable and accessible to small holder farmers throughout Tanzania
- Private sector investment is stimulated, and
- Benchmarks for best practices in development and commerce are established

The Partnership uses and builds on existing skills, knowledge and institutions. It focuses on informal efficiency, operational linkages and effective communication between partners. In developing new approaches, TAP takes some risks to overcome long-standing problems and to develop new solutions. It tries to learn from both errors and success. TAP makes progress by forging linkages and improving trust and understanding between key public and private sector operators.

4.3. Rwanda

Rwanda's education system is still recovering from the tragedy of the genocide but is reasonably well funded. There is a major initiative to hire a large number of expatriate teachers for various subjects and disciplines including agriculture to cater for the massive skills gap in both schools and tertiary institutions.

4.3.1. Agricultural Education and Training in Rwanda

Only 20% of those that complete primary school proceed into secondary education. Science study is encouraged through differential funding. Science students (including those taking agriculture) receive US\$3000 per student for science disciplines and US\$2800 for arts disciplines from the state (compared to US\$1375 and US\$1175 in Kenya). Rwanda agricultural students on internship are paid US\$2 per day - their Kenyan counterparts are paid nothing. In addition students on internship in Rwanda are followed-up by members of staff of their universities to assess progress, whilst in Kenya internship assessment is based on a student's own report.

4.3.2. Key demand aspects for agricultural graduates in Rwanda

a) *Human and Institutional Development Agency (HIDA)*

To meet planned economic growth and to achieve targets in the horticultural strategy plan, the sector requires 47 000 technicians by 2010. Large numbers of technicians are also required in the coffee, tea and livestock sectors

b) *Government and public body observations*

Rwanda lacks a harmonised skills' plan for the agricultural sector. Rwanda has a total of approximately 1 500 agricultural professionals, of whom approximately 80% are employed by government and the balance by NGOs and the private sector.

The managing director of the Rwanda Tea Authority felt that universities were producing office people, with modest practical skills. These issues were raised also by senior staff of the Rwanda Coffee Authority – who noted that coffee was Rwanda's main export, earning US\$21 million in 2008. These observations were common across the parastatal sector. Universities needed to give real life assignments, projects and other practical tasks to students, together with adequate funding and supervision. Soft skills, such as familiarity with the use and application of participatory methods would help graduates tap into farmers' knowledge and skills so as to fill in deficiencies in formal training. In the first instance, graduates needed to be all-rounders if they are to grapple with the many challenges that Rwanda smallholder farmers are facing.

c) *University staff and administrator observations*

National University of Rwanda

At National University of Rwanda (NUR), about 20% of the teaching staff (the total teaching staff complement was 500) are pursuing further education. The national aim is for 10% of population to be graduates, which is widely regarded as the minimum for a knowledge economy⁹. Presently there are 273 undergraduates. Agriculture is now a 4 year programme with options in Crop Science, Agricultural Economics and Agribusiness Management, Soil Science and Animal Science. In terms of overall science degrees, students' preference agriculture comes after medicine and pharmacy.

Higher Institute of Agriculture and Animal Husbandry of Rwanda (ISAE)

This institute started in 1987 to train agricultural diploma holders with practical agricultural skills (called 'technicians' in Rwanda). The first degree students graduated in 2009. An innovation at ISAE is the Stakeholders' Teaching Quality Validation (started in 2006) where stakeholders validate the quality of its programmes (which includes feedback and recommendations on how the institute can improve the quality of the graduate it is producing). The validation involves an annual Stakeholders' Consultative Workshops with inputs from local and central government authorities, farmers unions and associations, farmers' co-operatives, agro-processors and other private investors in the agricultural sector, Ministry of Agriculture and Ministry of Education.

⁹ Most developed countries have achieved 20% graduates as a percentage of the total population

d) *Student observations*

Students from ISAE complained that practicals were not adequate and poorly conducted. Only a quarter of the teaching time was spent on practicals and there was an issue with the competence of laboratory technicians in conducting lab practicals. Students reported a problem of reference materials, with much of it out dated. They regretted having enrolled on the programme and felt it was substandard.

Most students expressed the view that by the time they complete their studies they would only have 20-30% of what they anticipated. They felt the institution was rushing to introduce degree programmes without adequate resources (financial, human resources and facilities) and preparation and this was likely to damage its reputation as it would be producing substandard graduates.

e) *Private sector, NGO and International Agency Observations*

The country director of Heifer International found that fresh graduates lacked essential veterinary skills and the teaching they had had at university was very basic and poor. World Vision Rwanda and Plan International Rwanda estimated it took two years for a fresh graduate to gain essential skills to deliver efficiently and effectively. The country coordinator of FAO Rwanda had a view that today's NUR graduates were less practical than those of a decade ago. This was attributed to the poor quality of lecturers¹⁰ as well as inadequate training facilities such as laboratories and equipment. The curriculum lacked practical business and entrepreneurial courses. Rwanda graduates had specific skill problems in writing and reporting in both French and English.

4.4. Ethiopia

4.4.1. Agricultural Education and Training in Ethiopia

Tertiary education in agriculture is dominated by two main universities – Addis Ababa and Haramaya. At Addis Ababa, the Science Faculty has departments in Biology, Chemistry, Physics, Earth Sciences, Mathematics and Statistics and four programmes in Biotechnology, Food Science, Computational Science, Materials Science and Environmental Science. To encourage cross disciplinary studies, an Institute of Environment, Water and Development (IEWD) has been set up within the College of Development Studies (CDS) to promote integrated science, planning, policy, and development, and for encouraging sustainable development. The CDS and its five institutes undertake a multidisciplinary development oriented research in the areas of rural development, food security, natural resource management, regional and local development, gender and development, and population and development.

The Rural Development Institute (RDI) was set up in 2007 to provide education, research and community services in the areas of rural development. The focus is mainly on poverty,

¹⁰ For example, it is possible that a recent graduate can move into lectureship with full responsibilities and without induction or mentorship.

livelihood and food security, agricultural-agro-pastoral-and-pastoral development, non-farm sector, infrastructure and social services and associated policies and institutions.

Haramaya University College of Agriculture (originally the Alemaya College of Agriculture) was established in 1954 with support from Oklahoma State University in the US, Alemaya College of Agriculture was a college of Addis Ababa University until 1985 when it was upgraded to a full-fledged University of Agriculture. It then became a multi-disciplinary University in 1996, and it was renamed Haramaya University (HU) in 2006.

Since 1997, HU has run a BSc programme for diploma holders in either agriculture or forestry from accredited colleges who work in the public sector. The objectives of the programme are to upgrade the skills of front-line mid-career extension workers. HU is the only higher institution in Ethiopia that has been offering MSc training in the major specialities of agriculture, and launched PhD programmes in 2002. HU used to have the national mandate for both agricultural research and extension¹¹. Currently, HU's research and extension activities operate under the umbrella of the Ethiopian Institute of Agricultural Research (EIAR). HU has ambitious plans for new degrees in specialized at the BSc, MSc, and PhD levels. In addition, in collaboration with the International Food Policy Research Institute (IFPRI), a Center for Agricultural Research Management and Policy Learning for Eastern Africa (CARMPoLEA) is being established.

4.4.2. Key demand aspects for agricultural graduates in Ethiopia

The field programme for Ethiopia had two major emphases. The first was planned around using the CARMPoLEA initiative as the entry point for interacting with both the government and the university systems. In the event, the programme had to be changed when a key collaborator was summoned for an overseas assignment at the start of the activity. The other major component to the field work was a detailed examination of the requirements of non governmental development agencies as these are increasingly moving from a relief focus into development activities. Save-a-Cow Ethiopia (SAC) and partner NGOs have developed a coordination mechanism based around an Annual Review meeting (ARMing). This is an event which is designed and practiced by SAC to assess performance level of partner projects on the ground once every year, and to build capacity of project partners, while emphasising shared responsibilities and joint learning. ARMinig is used as a tool to identify and analyse critical issues, to learn lessons from existing practice, and to make meaningful decisions on the way forward for further partnership and improved performance. Participants in the 2009 ARMinig included both Ethiopian and international specialists, and a range of backgrounds from government service (both in Ethiopia and elsewhere in the region) to practicing farmers.

a) Employer and graduate observations

The employer and graduate observations surveyed during the 2009 ARMinig review mirrored exactly those of the preceding three countries. Graduates from Ethiopian universities lacked hands on experience and were, at least initially, reluctant to work with farmers and to recognize the value of farmer knowledge. To counter this, as part of the employee recruitment process, some ARMinig partners required that a potential employee spend several

¹¹ These mandates were transferred to the Ministry of Agriculture (MOA) and Institute of Agricultural Research (IAR) in 1963 and 1966, respectively

weeks working with one of their model farmers. Interestingly, this had not proved a significant disincentive to recruitment – although some potential employees were discouraged.

There were strong feeling expressed that the universities made little effort to engage effectively with field development agencies – which made collaborative programme development difficult. The ARMing participants had all gone through a hard learning process in building effective partnerships involving some very disparate organizations and recognized the very real costs incurred in building effective joint programmes on the ground. Universities were typically perceived as being useful suppliers of occasional consultants rather than as sources of knowledge and technology for development.

There were important observations regarding both the international agricultural research institutes (IARCs) based in Ethiopia and regional networks. **In both cases, given the major contributions that the NGO community was making both in terms of relief and development in the country, the NGOs found it time consuming and difficult to build links with both the IARCs and regional networks. Both seemed to be somewhat formulaic in the way they interacted with development agencies (focusing on workshops and meetings planned by themselves rather than showing interest in contributing to existing partnerships and activities), and relied on providing packages of assistance rather than actively determining what was needed on the ground.** Most primarily worked with government agencies regardless of the contribution which other non government groups might be making.

Graduates noted that, in Ethiopia, except for what they termed ‘sensitive areas’ such as medicine, students were assigned to programmes of study rather than being allowed to make their own choice. This meant that many entrants into agriculture degrees had little knowledge of, and often little interest in, the industry. The NGO sector was a major employer although government continued to run a substantial national programme. However, one of the difficulties in a government position was that there was little job stability – employees were moved regularly and frequently so it was difficult to become properly familiar with local circumstances. This made working in remote areas even less attractive as building relationships with farmers and local agencies was problematic. Graduates also felt that the practical training they received at university was inadequate – they did not have the chance to learn needed practical and participatory skills and were insufficiently prepared for the very challenging tasks facing them once they moved into employment.

4.5. Malawi

4.5.1. Agricultural Education and Training in Malawi

Bunda University College of Agriculture was established in 1966, with a planned enrolment of 400 students - today there are 900 students, of whom 250 are in their first year. The college has an outstanding reputation in the provision of agricultural education in Malawi, demand for places is high, and it has an impressive alumni network. Although, in common with other agricultural faculties in the region, prospective students favour medicine, ICT related programmes, pharmacy, law and some commerce degrees to agriculture, the college is still able to attract high quality talent. Class sizes, however, are too large and this is exacerbated by directives from the authorities to enrol more students than it can cater for. Student internet access is good, with some students’ halls of residence even having a wireless internet

network, and the library is one of the best university agricultural libraries in the SADCC region. There is no allocation for infrastructural development to cater for the increasing number of students. As a result infrastructure is often in a poor state of repair. Field visits are hampered by transport problems. Many times education tours have to be cancelled, sometimes on the last minute.

Bunda has moved away from offering a general agricultural degree to a wide range of more specialised degree options - which is causing some misunderstandings amongst potential employers. The agribusiness and management degree programme is very popular. The college is endeavouring to ride on the popularity of the programme and to maintain an edge by constantly updating the curriculum through stakeholder consultations.

Building experience: Bunda volunteers.

Students typically wait about three months after finishing final exams before they get their results. In 2007, the college introduced, in collaboration with NGOs and other potential employers, an opportunity for graduating students to join these agencies as volunteers (and to gain additional practical experience) while awaiting the outcome of their finals. In 2008 three quarters of the graduating class chose to join the scheme (which is now run by a small office staffed by students themselves). Non graduating classes are also asking to join the scheme.

4.5.2. Key demand aspects for agricultural graduates in Malawi

The Government of Malawi, as articulated in the Malawi Government Development Strategy (MGDS), is committed to increased investments in order to achieve a minimum target of six per cent annual growth rate in the agricultural sector while eliminating food insecurity and malnutrition. The guiding policy document is the Agricultural Development Programme (ADP). Malawi data show clearly that broad-based food security has only been achieved with widespread access to inputs by the poor. This, among other issues, entails efficient planning, timeliness in the procurement and delivery of inputs, greater involvement of the private sector, efficiency in targeting of beneficiaries, efficiency in delivery of input supplies to various markets and appropriate use of inputs by smallholder farmers. The sustainability of the ADP initiative depends essentially on the availability of profitable, reliable, and ecologically sound production options being widely available to the poor.

The ADP will encourage broad-based agricultural growth in order to achieve 6 per cent annual growth rate as prescribed by CADDP with the assumption that it will be supported with an allocation of at least 10 per cent of the national budgetary resources as per the Maputo Declaration. In order to achieve the targeted 6 per cent agricultural growth rate, the ADP recommends an increase in government spending on agriculture of 23 per cent per annum, resulting in 33 per cent of the total budget allocated to the agricultural sector by 2015. This spending will focus on key activities such as promotion of increased use of inputs (fertilizer, improved seed, pesticides, herbicides), development and dissemination of economically viable technologies and options, irrigation development and infrastructure development. Both food and commercial production will require vital support services such

as research and development, extension services, institutional strengthening and capacity building.

A second major thrust of the MGDS is agricultural commercialization, with the medium term goal of increasing the value added to agriculture and productivity of farmers, and reorientation of smallholder sub-sector towards greater commercialization and international competitiveness. This will require a significantly enhanced research and development programme, closely linked to emerging and changing market needs.

Implementing the ambitious, but achievable, objectives of the ADP will require a substantial body of skilled technicians and analysts at all levels and across the public and private sectors. Malawi already struggles to meet its human resource needs and, therefore, the demand for agricultural graduates into the medium term future will be high. The critical issue, as elsewhere, becomes then of the quality of graduates being developed. The statistics on the current situation of the country's human resource base and needs are unreliable and there is no comprehensive human resource development plan for the agricultural sector.

a) Employer observations

Bunda College has made serious and significant efforts to engage with employers as it has developed its training programme. In the interviews that informed this study, some of the difficulties in applying adequately to stakeholders became apparent as some major stakeholders held clearly contradictory perspectives.

Agricultural Research and Extension Trust (ARET): ARET is a levy funded commodity research institute, with a programme focused on tobacco (but with a vision of a broader mandate). It recruits graduates in plant breeding, entomology, agronomy, plant pathology, seed technology, and agricultural engineering. Key skills include good communication skills and hands-on tobacco growing knowledge. In addition, outreach staff (which include research scientists) need to be well versed in agribusiness management, and natural resource management, and have the capacity to make decisions, conduct surveys and to grapple with assorted rural community-related issues beyond tobacco growing.

Seed Co Malawi: SeedCo is a private sector seed supplier. Somewhat contradictorily the company was unhappy with Bunda College for moving away from a general agriculture degree to specialist options, while at the same time, seeking specialist skills in sales and marketing, agricultural engineering and processing engineering, business and financial management, and entrepreneurship. Plant breeding is weak at the graduate level. These views matched closely those of the Seed Trade Association of Malawi.

Monsanto: Monsanto is both a seed producer and supplier. Key skills sought in graduates include a knowledge of seed technology and agronomy, laboratory analytical skills, interpersonal and decision making skills (which are important in dealing with different type of farmers with different levels of education), and good competence in ICT. Typically, the company employs individuals with prior seed industry-related experience rather than fresh graduates.

The company interview came up with the interesting observation that it is not the training that is the problem in Malawi (and in other places in Africa). Rather, the environment serves to mask the enterprising spirit of graduates. Universities need to become much more proactive

in creating a policy environment (facilitating changes in land tenure, credit and market access, and attitudes towards subsistence or peasant agriculture).

Press Agriculture: Press Trust observed attachments are too short, follow up is poor, and students benefit little.

National Smallholder Farmers Association of Malawi (NASFAM): NASFAM was established in 1997 to promote farming as a business among smallholder farmers. NASFAM sits on boards of agricultural institutions to influence the curricula. The introduction of an agribusiness management programme at Bunda is a welcome move. There is now a need to ensure that graduates have a wide technical and agronomic knowledge of a wide variety of crops.

Agricultural Trading Company (ATC): ATC is a supplier of agricultural inputs and finds graduates with a good combination of agriculture and business management plus marketing skills are in short supply. There is a need to help students gain a proper appreciation of the opportunities in a company such as ATC – which is often perceived as merely a ‘sales’ firm rather than a full service provider to farmers.

Civil Society Agricultural Network of Malawi (CISANET): This is a grouping of civil organisations in Malawi agricultural sector. It lobbies for an adequate budget allocation to agriculture, as well as promoting improved agricultural practices through its member organisations. The NGO community in general was looking for key competencies in organisational skills, as well as experience in collaboration, partnering, teamwork, and networking. Most Bunda graduates have good ICT skills which are also important, but Bunda does not interface adequately with stakeholders to learn how to improve the quality of their graduates. The government allocation of funds for Bunda was inadequate.

b) Graduate and student observations

Students no longer received any intensive practicals in machine maintenance and operation, or in livestock husbandry. With the larger class sizes, good attachments were hard to find and supervision had become poorer. The first year class is very large, with inadequate support. Accommodation is at premium, with many students living off campus in squalid conditions which do not lend themselves to studying.

However, the aquaculture and fishery programme was highly regarded. There are excellent learning opportunities (both practical and course based) and Bunda is recognised as a centre of teaching excellence in aquaculture and fisheries in the SADCC region.

4.6. Mozambique

4.6.1. Agricultural Education and Training in Mozambique

When Mozambique attained independence, it inherited a very conservative Portuguese education system and a tiny capacity in agriculture (two graduates at the BSc level). Important features of university training included an overloaded curriculum and an extended study period. The typical degree took 6 years to complete and incorporated many subjects of marginal significance to agricultural practitioners. University-level agricultural education is

provided by Eduardo Mondlane University UEM), and the Polytechnics, under the Ministry of Higher Education, Science and Technology (MSCAT). Higher education programs in agriculture (Educação Superior) have been initiated at the Cuamba campus of the Universidad Catolica of Mozambique (UCM). Under the Ministry of Higher Education, Science and Technology (MSCAT) a completely new system of polytechnical education similar to the South African Technikon has recently been instituted.

In 2006 a major curriculum review was rolled out which serves to align Mozambican degrees to those of SADCC. It is also envisaged that the dropout rate will be substantially reduced. Under the old system only 5-10% of the initial enrolment in science degrees graduated.

4.6.2. Key demand aspects for agricultural graduates in Mozambique

Before independence Mozambique had an effective system of support to farmers based around three levels of expertise – the assistant agricultural technician, the agricultural technician, and the agricultural extension officer. The first two were had strong hands-on practical skills, but little (if any) theory. The third category had a good balance of practical and theoretical agriculture. At independence, this system was replaced by one in which central planners sent instructions to the field to be implemented.

Unfortunately, much of the structure of the central planning model remains in place. Today the system has many highly qualified agricultural administrators at the top but few who can interact effectively with farming communities. Government institutions lack capacity (financial and human resources) to deliver sound, strong and effective agricultural development programmes. The overall consensus amongst many interviewees of this study was that the country requires a “how to do things” type of education and training in agriculture.

The agriculture sector, as a whole lacks, basic skills and access to information and improved technology. Farmers are served by a tiny extension service (of about 700¹² persons, the majority of whom have a low technical education level). While NGOs are picking up some of the burden, there is a critical need for adequately trained extension staff. Business skills and entrepreneurship have been smothered by years of central planning and, even more devastatingly, by the effects of conflict. There is a limited number of university trained staff capable of structuring and carrying out research in specific relevant areas. Excluding support staff, there are fewer than 500 professional level employees in the research system – of whom just over 100 have degrees. Very few have graduate level training adequate to formulate and supervise research studies. Training extension workers is a priority for increasing smallholder productivity. The recently reorganised extension service under the Ministry of Agriculture and Rural Development (MADER) is beset with staffing problems.

Eduardo Mondlane University: Overall at UEM, student enrolment has risen to 20000 from 3000 in 1998. But in Agriculture, the increase over the same period is 200 to a total of 700 students. Currently there are two undergraduate options in the Faculty of Agriculture - BSc Agriculture and BSc Forestry. After the curriculum review is implemented, a total of four options are envisaged - BSc Environment, BSc Agronomy, BSc Forestry and Natural Resources and BSc Agricultural Economics. The degrees will be completed in 4000 hours

¹² By comparison, Tanzania has 5,000 and (before the current economic meltdown) Zimbabwe had 8,000 extensionists

within three years. Each student will produce a monograph or special report based on three months fieldwork rather than the previous thesis which required a full year to finish. In each year of the three years of study students have two months of internship, plus three months in the final year to do their investigation for the monograph or special report.

The country requires about 28000 trained and experienced agriculturalists, while it currently has some 1500.

High Polytechnic Institute of Gaza (Instituto Superior Politecnico de Gaza): the Polytechnic has a total of 327 students, 15% female and 85% male, with its first intake in 2006. The curriculum uses competency based training (CBT). The curriculum is rated as good but difficult to implement because of inadequate resources. In each semester specific competencies have to be learnt but in most cases these is not possible because there are no means to make students practice. As part of the CBT process students have to draw up an internship/attachment plan and present and defend the plan. This makes students take the initiative and helps develop their negotiating skills. Students are required to produce an assessed attachment report, which they have to present and defend before a panel comprising of an external assessor, the attachment employers, and members of staff.

At the end of the third year student present a business plan using the knowledge they have acquired from their business management and accounting classes. The business plans are presented and assessed by a panel of judges which include people from financial institutions. The plans are required to be good enough to be fundable through a bank loan.

A Comment on the Competency Based Training System at ISPG-High Polytechnic Institute of Gaza and Objective (Generic AET) System at University of Eduardo Mondlane

The Polytechnic Institutes in Mozambique are seen as a new way of delivering agriculture education and training at higher level. The principal aim is to overcome the problem of how to establish an acceptable balance between theory versus practical education and training. The curriculum documents of two institutions that represent both the old (UEM) and the new (ISPG) education delivery approaches were collected. The UEM focuses on objective based approach, while the ISPG focuses on competence based approach.

“For each course or subject they try to define the practical skills or competencies that the student is expected to acquire. Then they define specific activities that must be carried out to acquire these competencies. The difference from the generic and this one is that in the generic (like UEM) they are guided by objectives to be achieved in each course. The competency based approach adopted by the new universities adopts a more practical approach of teaching, guided by the need to show achievement in specific competencies. When I talked to a student group at the competency-based institution, they said “we are not like those students at UEM who know nothing, we are true agriculturalists.”, and the UEM students on the other hand indeed confessed that, in terms of practical, “we learn 5-20% of practical”, and one guy even shouted “its just 1% practical”. I could see the students at UEM are quite concerned about the poor quality problem.” Maxwell Mutema, field notes for this study

a) Employer observations

National Peasant Farmers Union of Mozambique (UNAC): the union is worried that 99% of students from rural areas who get a qualification in agriculture do not go back to rural areas after completion. Overall, the Mozambican agricultural sector has a very poor research-extension-farmer linkage and sometimes, there is an even unhealthy rivalry between public agricultural research and extension at the expense of farmers.

Association for Agriculture and Livestock Technicians: the association strongly believes that agricultural education and training provided by state institutions is not market-led. There is little curriculum review which, at a minimum, should occur every 5 years. Immediately, entrepreneurship, employment generation and agro-business should be incorporated into the curriculum. In addition, the review should link market expectations and human resource development priorities with practical steps to mobilise resources.

Technoserve-Mozambique Country Director and Deputy Director (Jack Waters and Juma Juma): tertiary agricultural education in Mozambique provides some good theoretical and technical teaching but is very poor on practical teaching. There is resistance to introducing fundamental changes to make the education responsive to the market. Increasingly, Mozambicans travel to South Africa for university education. Acquiring practical skills is difficult as there are so few places for meaningful attachment. Lecturers are inexperienced. The universities should also focus on soft skills such as entrepreneurship and inter-personal communication.

Former Director of the Centre for Agricultural Training in the Ministry of Agriculture (Dr Kazembe): there is inadequate budget for agricultural education. Also there is a growing distrust between the public and private sector. This is driven by a perception that the private sector is largely extractive and is ploughing little back into capacity development in Mozambique.

Director of Mozambique Agriculture Research (IIAM): graduates have poor scientific research reporting, statistical analysis and writing skills in general. Poor remuneration contributes to a lack of motivation. There has been a tendency for government to focus more on numbers than rather than quality in education generally. This is compounded by the fact that when individuals are sent overseas for further education they sometimes study different programmes to the ones they had been sent by the institute. There is very little stakeholder consultation on curriculum development and other matters to do with improving the quality of agricultural training at the university. The only significant consultation effort by the university so far is the Masters Degrees Council, which comprises of public sector, private sector and the NGO sector.

b) Student and graduate observations

Student Group Discussion: High Polytechnic Institute of Gaza: the efforts by the polytechnic authorities to give quality and hands on training were enthusiastically acknowledged. They proudly compared themselves as more superior in practical agricultural knowledge than UEM graduates, as illustrated by this quote from one of the students,

“we are true agriculturalists who learn how to farm. We are not like those from UEM who know nothing about the real agriculture.”

They had individual crop plots to care for, and managed various crops from planting to harvesting. More needed to be done in improving livestock and farm machinery practical

work. They also went on regular study tours. There were limited IT facilities - only 15 computers for over 300 hundred students, and only two were connected on internet. The library had few books, journals or agricultural periodicals. The labs were poorly equipped. Some teaching staff were not fully conversant with the CBT approach and lacked the practical competencies required. Students suggested staff professional development programmes to address this deficiency.

Students were routinely asked to contribute towards curriculum improvement through evaluation forms which they were made to complete at the end of each academic year. They took the evaluation as a genuine effort to involve them in improving the institution. But the curriculum was very well received by students. With improvement in availability of training equipment, they had no doubt that their institution was going to emerge as the premier agricultural universities in the country. They would also appreciate exchange visits among similar institutions in the country such as High Polytechnic Institute of Chimoio so that they could exchange notes and experiences.

Student Group Discussion: University of Eduardo Mondlane: the group comprised of 20 students. Concerns expressed by the students were the absence of practical work, inadequate attachments and field visits, and poor IT facilities, library services, and training (especially in statistics, and communication and scientific writing).

5. Analysis and conclusions

A major role of university training in the ASARECA and RUFORUM region must be to address the serious and chronic poverty which afflicts so much of the region. Any discussion of poverty quickly turns to the numbers – which are frightening. As Easterly (2006) so graphically notes, eight hundred and fifty million people worldwide do not have enough to eat even; ten million children die from preventable diseases. We know how to produce food – obesity is a problem of increasing severity in the developed world. The diseases killing all those children have well known causes - the children do not need to die. Surely it is just a straightforward process of getting the answers out to those who need them. Of the three major flash points of poverty in the world, Africa is the one where the signals – child mortality, malnutrition levels, life expectancy – are all pointing the wrong way. Success in turning round the trends in Africa is fundamental to “making poverty history”.

Because the numbers are huge, those who want effectively to address the evident poverty crisis that affects so much of the human race must, if their efforts are to have any impact, think big as well. Big thoughts need big plans to carry them into action. The past several years have seen a plethora of plans – the United Nations came up with the Millennium Development Goals (MDGs); Tony Blair, the British Prime Minister of the time, noting that poverty in Africa was a “scar on the conscience of the world”, set up the Africa Commission to provide a coherent set of guidelines for creating change on that continent; Bob Geldorf, through his “Make Poverty History” campaign, set the agenda for the 2005 G8 conference at Gleneagles in Scotland.

The record of such plans is unpromising. After the Second World War, the Marshall Plan for Europe helped rebuild a devastated continent and to set the scene for the future (largely) peaceful developments in the region since then. But in the developing world, progress is unspectacular (and dismal in Africa) despite enormous and costly programmes (Easterly, 2006). We, in this final section, follow Easterly’s (2006) proposition that:

“It doesn’t make sense to have the goal that your cow will win the Kentucky Derby. No amount of training will create a Derby-winning race cow. It makes much more sense to ask, ‘What useful things can a cow do’[D]ecades of experience show aid agencies to be cows, not racehorses”

We also draw on widespread evidence that significant, widespread change is possible, affordable, and reliable when we use the skills and knowledge of the poor (linked to high quality analysis and science) to help them solve their own problems – rather than imposing our ‘big plans’ on them. The moving words of Bishop Tenganena of Malawi, who bravely and forthrightly spoke at the 2005 “Malawi after Gleneagles Conference” in Edinburgh, say it all:

“It is difficult to believe in your own self worth if all the time you are told you are failing. The poor struggle every day to survive; recognise what they are doing, the obstacles in their way, and give them a hand of friendship and encouragement. Build – don’t destroy - their confidence and they will repay a hundredfold. That is the help they need.”

While there is desperate poverty in the region, there is also a powerful urge to succeed. The need for further investment in both human capital and infrastructure is evident but there are real opportunities to exploit more effectively the resources which exist. A strategy which builds on the best and which is directed by farmers' needs and informed by the commercial, social, and ecological environments of the continent can provide gains, not only for the better off producers, but also for poor and excluded.

The time is propitious. The role of agriculture in development is being more widely recognised (see, for example, Snapp and Pound, 2008). In 2008, the IBRD World Development Report focused on agriculture for the first time in over 25 years. Agricultural development specialists are adopting an increasingly holistic/systems approach through the use of methodologies which include value chains, Agricultural Innovations Systems, and Integrated Agricultural Research for Development. Universities play a central role in encouraging and facilitating these changes - as providers of skilled and experienced graduates as well as sources of knowledge and innovation.

5.1. Employers, potential employers, and trends in employment

Traditionally the major employer of agricultural graduates has been the public sector. But the evidence from the survey shows that in all countries, public sector employment is declining. The growth areas are in civil society and, to a lesser extent, the private sector. The best quantitative evidence comes from a 2004 study by SUA in Tanzania (Iwega et al, 2005)¹³. The data show that macroeconomic policy changes (which are common across the region) have reduced public sector employment. Nevertheless, government (which includes both national and local levels) is a major employer, absorbing around half of graduates who were able to secure employment. The private sector and the NGOs were the growth area for new job creation for graduates. However the SUA data show that normally graduates take more than one year searching for employment. Self-employment was rare amongst recent SUA graduates¹⁴.

Importantly also, there are major changes which will impact on agriculture in the ASARECA and RUFORUM region. The data collected during this study show widespread dissatisfaction amongst both employers and graduates regarding the quality of the training given at university. Curricula are outdated and teaching materials poor. Major challenges – climate change, the role of biotechnology, the effects of globalisation – are poorly covered, leaving graduates ill equipped to contribute to the debates around such important issues.

5.2. Public sector employers

Although there are similarities this is not a homogenous group; agricultural extension, policy, research, and tertiary education sectors require different skills, absorb different numbers of graduates, and are going through different changes. Agricultural extension has traditionally employed the most staff but has often had the lowest status, often being in more peripheral areas. Across the region initiatives have attempted to make them more demand led, often

¹³ The data collected in this study coincide closely with the SUA Training Needs Assessments, Job Market Surveys, And Tracer Studies, Iwega A, Kaiza-Boshe, T, Kyomo M, August 2005

¹⁴ This may be attributed to lack of entrepreneurship skills or to the inability to raise the necessary capital. However, it is relevant to note that self employment (with the exception of working on family farms) is typically unusual amongst young agricultural graduates internationally,

through privatisation or giving the ‘service receivers’ a greater say in how extension operates. Increasingly agricultural policy is being developed within an environment that enables the private sector to operate in agricultural systems which are linked to international markets. Researchers are increasingly encouraged to spend as much time as possible ‘on farm’.

The overall consensus of public sector employers was that they were unable to absorb the numbers of graduates that they had taken on in the recent past. There was a major issue which had arisen as a consequence of macroeconomic reform of government expenditure in many countries. An embargo on the hiring of government staff has led to a clear ‘generation gap’ emerging in the public sector agricultural support services. To an extent, this has been offset in extension by encouraging NGOs and other agencies to take on greater responsibilities for providing extension services. In research, a serious problem is emerging as experienced senior staff (who benefited from significant additional training) come up to retirement without evident individuals to replace them. **There are also large gaps in the current and future establishment of many NARES which will need filling in the immediate or near future. This, if managed well, provides an opportunity to revitalize the research and outreach services of the region through the rapid introduction of fresh thinking – but this will require careful and tactful intervention, and support from experienced regional and international agriculturalists. There is a real opportunity for the regional university and research networks, such as RUFORUM and ASARECA, to provide leadership and vision to this change.**

The change to the emphasis of AET from diploma to degree level training that has occurred over the past decade is significant. Diploma holders conventionally have been employed, due to their recognized practical skills and knowledge, to work directly with farmers in the extension services. In the public sector, where public extension services are functional, this work is increasingly being undertaken by graduates. The evidence collected in this study shows that typically graduates lack the hands-on skills and capabilities that farmers value most. This situation has been exacerbated, in some countries, by the widening of the mandate of extension workers to include crosscutting issues such as health and nutrition. While no doubt competent in their main disciplines, graduates from disciplines other than agriculture are often unable to assist farmers with solutions to their agricultural problems and challenges. **Typical skills that government officials found fresh graduates lacked include farmer training skills, implementation of adaptive or on-farm demonstrations or trials, financial management, agricultural value chain addition skills, and business start-up advisory and entrepreneurial skills.**

Public sector employers are looking for specialised agricultural extensionists who can provide high quality hands-on and practical advice in crops, livestock and general agriculture. They need researchers who can run on farm trials and undertake participatory investigations to analyse farmer problems and to deliver improved and reliable technologies that are properly linked to market opportunities. And they require social scientists who fully understand farm issues and who can help direct and set priorities for policy that is efficient and effective in addressing major agricultural problems. All three groups need to be able to communicate effectively with farmers and to develop the participatory problem solving approaches required in an AIS framework. Government officials observe the importance of inculcating into graduates values beyond technical expertise and subject knowledge. They are also concerned at the lack of discipline and professionalism in current graduates, an obsession with ‘the quick money syndrome’, and an absence of commitment to career and professional development.

5.3. Private sector and NGO employers

As noted previously, the NGO sector particularly has taken over a significant load of extension as governments have withdrawn from this area. The growth in employment of agriculturalists by NGOs has grown concurrently – although not in such numbers as to totally take over previously public sector recruitment. However, looking to the future, as coordination between NGOs increases and this source of extension provision becomes institutionalised, a steady growth in employment can be envisaged. However, the demand is clearly for individuals with a strong practical bent – which currently is supplied mainly from diploma colleges.

The participation of the private commercial sector in agriculture varies enormously across the region. In all four countries, it is heavily involved in the processing of agricultural products – especially for export. Examples include cut flowers and export horticulture, coffee, tea, livestock products, and agricultural seed. ‘Adding value’ to agricultural products is a priority national objective in all the countries surveyed and the private sector is the major contributor to this aim. In all cases there is a steady (if modest) increase in employment. At the present time, the evidence suggests that much of the increase in employment in export led industries is taken up by skilled expatriates rather than local employees – mainly because the training of regional graduates is regarded as inadequate for the specialised demands of these markets. The input suppliers and ‘value adding’ companies make greater use of local graduates – but tend to take those with significant field experience.

In Kenya, where the private sector is well established, agricultural input suppliers have a clear vision of considerable potential market growth in the smallholder sector. Relationships with larger scale farmers are well established and there are limited opportunities for expanding market share in that subsector. But reaching and servicing the diverse and dispersed smallholder subsector is problematic for private sector firms. Several have made efforts to set up their own extension and promotion programmes but have found it difficult to justify the costs. For each company to provide the necessary support to stimulate the market involves duplication of effort, creates the potential for confusing (rather than informing) smallholders, and is costly. If only one does it, it risks either others freeloading on its efforts or else the absence of the needed complementary inputs makes the one being promoted become less effective.

Some NGOs are playing an interesting ‘honest broker’ role in breaking out of this constraint. Based on evidence from several sources (not just the company interested in sales of its product), they put together (using well designed protocols) farmer field schools to lay out demonstrations of options. For example, a seed/fertiliser/herbicide trial protocol has 10 plots. Farmers can evaluate how improved seed compares against conventional seed alone, with fertiliser, and with fertiliser and stover incorporation. The last option can be expanded to include herbicides to control weeds. Neighbouring schools can test out different improved seed varieties and compare experiences, thus encouraging farmer-to-farmer extension. TAP in Tanzania is also adopting the NGO ‘honest broker’ methodology which is recognised by private sector stakeholders as highly cost-effectiveness compared to investing further in promotion themselves. Some of the growth in employment by such firms, therefore, may actually occur within the NGO sector.

The seed industry provides a useful illustration of the potential growth for the demand for graduates in the region. The seed industry in the ASARECA and RUFORUM region can be

usefully divided into two broad categories (the titles below are used simply for illustrative purposes):

- **Full service seed companies** – companies with the capacity to develop and multiply their own improved germplasm using both public sources and their own breeding material (SODP examples include Western Seeds, MRI Seeds, and Progene).
- **Seed trading companies** – companies which rely on bulking up public germplasm and selling it on (this category represents a large seed suppliers in the region).

Recent data show these companies to be performing well – maize seed sales up by 54% between 2006 and 2007; full time employment increased by 19%; and sales revenue up by 35% (Blackie, 2008). Company sales data also show that the bulk of sales (more than 80%) go to smallholder farmers. The full service companies need skilled plant breeders, agronomists, and marketing specialists – and the evident growth in their performance will require additional staff to support this. Seed traders are able to reach the places larger companies do not go but currently rely on undifferentiated products based on public germplasm. The full service seed companies have high quality, competitively priced seed which, they will claim, outperforms the public germplasm which is the source of many of trading companies' products¹⁵. The seed industry, as a whole, needs skilled agronomists and marketing specialists who can build alliances and run demonstrations under a variety of situations. The full service companies also have a small, but significant, demand for researchers – plant breeders, plant protection specialists, agronomists – to continue to bring forward new products adapted to the requirements of the full range of farmers in the region.

At the 2008 Seed Trading Workshop in Lusaka, senior managers of regional seed companies unanimously expressed a need for assistance on specialist topics – some financial, but others technical. They are actively seeking links with regional initiatives such as RUFORUM to access regional expertise. In addition, participants were keen to supply opportunities for students from the region to become involved in developing case studies and other specialist inputs.

Almost all of the universities are introducing aspects of 'entrepreneurship' into their degree programmes. But without strong ties to appropriate business enterprises – to provide role models, case studies, and attachment opportunities – these efforts will be compromised. The Shambani case study cited in this report is one example where there are good and useful links with a business established by local entrepreneurs (in this case, actually SUA graduates). In each country visited, there were other examples that could be used – Malawi Country Wines for example where a retired university professor is making quality fruit wines from a wild hisbiscus plant that grows as a weed on farmers' fields; Mavuno fertiliser in Kenya where a local business producing agricultural lime has moved into the very successful blending of fertiliser aimed at the smallholder market; small independent seed houses are setting up across the region. All, with imagination, could be tapped for expertise and to motivate students to see employment models beyond the public sector. The Seeds of Development Programme (SODP) links international business expertise to African seed companies and provides business training, advice, and counselling. The model could readily be adapted to suit the needs of the university communities.

¹⁵ The full service companies have high quality, competitively priced seed which, they will claim, outperforms the public germplasm which is the source of many of trading companies' products. There is considerable interest in developing licencing agreements with seed traders to increase the 'reach' of the full service companies.

5.4. NGO requirements

NGOs do little basic research (although they are actively interested in learning of new income opportunities for their target farmers and actively seek research outputs for use in on-farm and adaptive trials). Their major requirement (as employers) is for skilled extensionists who are familiar with participatory methods and fully acquainted with the principles of agricultural production. Their employees need to be comfortable in working in partnership with farmers and with collaborating agencies, and they need to understand value chains and how to assist in developing reliable and profitable interventions for target groups of farmers. NGOs do significant on farm verification work and adaptive trials - they need staff who are familiar with current on farm trial methodologies and who are confident in running on farm trials and doing the subsequent data analysis.

Of importance is the fact that many NGOs are small organisations relative to the public services they are increasingly substituting for – and therefore staff need to be able to take on multiple roles (extension workers, project analysts, programme developers). Graduates have to be able to work independently and be comfortable with operating remote from urban areas and facilities. They should have excellent communication skills – both verbal and written – and to be able to analyse and present data to policy makers.

5.5. Commercial private sector requirements

The export led sector recognises that the industry itself will need to provide much of the specialised training needed – although opportunities to collaborate effectively with universities are welcomed. Input suppliers and local ‘value adding’ companies emphasise the need for solid basic knowledge of agricultural principles, plus experience in (and a willingness to learn more of) hands on and practical skills. An evident concern is an apparent mind set amongst many graduates that they need greater remuneration than the employers feel can be justified. There are income earning opportunities outside agriculture that are attractive to graduates and significant numbers of graduates do leave the industry (there are no reliable figures beyond the SUA tracer study to quantify this). But the SUA study also shows that many graduates wait a year or more before obtaining their first job – and, in the current economic climate, alternative jobs are going to be even more difficult to find.

6. A Plan of action

The proposed plan of action is based around the following key points:

- ‘Business unusual’ today, not tomorrow
- Focus on quality
- Broadening access to degree level agricultural education and beyond – creating a career structure in agriculture
- Understanding and addressing gender issues
- Building a constituency
- Enhanced governance

Each will be expanded in the sections below.

6.1. ‘Business unusual’ today, not tomorrow

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. For many of the rural poor on the continent, a severe lack of cash constrains the feasible options. In Malawi (admittedly at the extreme), the average cash income of a farmer is \$0.10/day (Conroy et al, 2006). 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 diarrhoea 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.

Nuns mug orphan! Soon we'll all be fighting for food

Extracted from The Economist May 6th 2007

NUNS mug disabled orphan for bag of crisps. As a headline, it certainly grabs the attention. This is the title of the latest note from the iconoclastic fund managers at Bedlam Asset Management, and it relates to a phenomenon that is sweeping the world—rising food prices. Merrill Lynch has also coined an eye-catching term for the process: agflation. The prices of rice, wheat, corn, barley, cattle and pork are all up by more than 30% since March 2005. In America, the annual rise in the producer-price index for finished consumer foods has picked up from a little over 1.5% last year to almost 4%. Food prices are rising faster, relative to other measures of core producer-price inflation, than at any time since the early 1980s.

At one level, the rising prosperity of India and China is ensuring higher demand. In the normal course of things, this would not be a problem. Farmers should easily be able to respond to higher prices by increasing output, particularly by bringing marginal land back into cultivation. Reports of increased corn plantings have pushed corn prices down so far this year, but wheat is substantially more expensive. Even so, markets may not be as responsive as they used to be.

The primary reason is climate change. The Australian drought is a clear case of unusual weather conditions having a direct impact on food production. But the indirect effects are probably more important, as land used for food production is diverted into use for ethanol, to provide an alternative to gasoline. In turn, land used to produce soybeans is diverted to higher-priced corn (until recently, this was forcing up soybean prices). And as animal feed grows more expensive, so do the prices of beef, pork and chicken. Tyson Foods, an American agri-giant, said that higher feed costs led to a 41% drop in poultry profits in the first quarter; the company will try to pass on those costs (processed chicken prices are up nearly 30% year-on-year).

Government interference in the system does not help. American consumers would be better off if Brazilian sugar, rather than Midwestern corn, were used to produce ethanol; high tariffs make that difficult. Across the Atlantic, grants from the European Union are designed to reduce the area of land under cultivation.

At the very least, higher food prices (rather like oil) will reduce the ability of consumers to spend money on other goods. Other things being equal, higher food prices should cause a poorer trade-off between headline inflation and growth. Agflation may also cause political problems around the globe. According to Bedlam, food accounts for 33% of China's consumer-price index and 45% of India's. Perhaps we are unlikely to see nuns stealing food. But we could see governments fall—bread riots are one of history's most recurring phenomena. And governments may start scrapping with each other over natural resources. That can lead to geopolitical tensions, and greater risk across all securities markets.

DeVries and Toennissen (2001) set the scene graphically:

“It is that of a single mother whose primary means of income is a one hectare plot of unimproved land on an eroded hillside.....From each harvest she must provide for virtually all the needs of her family throughout the year, including clothing, health care, education costs and housing. Because she can afford few purchased inputs, the yield potential of her farm is low.....perhaps 2000 kilograms of produce.....

In the course of a given season, innumerable threats to the crops appear....The impact of drought plus whatever combination of pests and diseases attacks the crop in a given year can often reduce the average harvest on her farm by perhaps 50–60%, to 1000 kilograms of produce. At this level of productivity, the family is on the edge of survival”.

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. A modest SWOT analysis of the universities which contributed to this study shows:

- **Strengths** – a core of skilled professionals who can lead ‘business unusual’. Many of the universities in Eastern and Southern Africa have a remarkably stable and well qualified staff. As the RUFORUM experience shows, when the right incentives are put in place (effectively the chance to do the job they were trained for), agricultural scientists respond with vigour. The universities can, and must, provide the leadership and guidance necessary to garner the resources essential to changing the agricultural sectors.
- **Weaknesses** – this study has confirmed the poor ‘image’ of agriculture amongst many potential students. Governments, sensing despair at the potential for change in their rural populations, look for quick solutions. Policy is poorly informed by data.
- **Opportunities** - the greatest human and scientific challenge on the planet
- **Threats** – the ‘non-implementation’ syndrome. African countries (as Easterly, 2006, so eloquently documents) are awash with plans that never came to fruition. The universities need, in concert with their key stakeholders, come up with a powerful and implementable plan of action – both for kick starting change in agriculture and for building the urgently needed new generation of doers and thinkers.

There is a clear consensus amongst university faculty, employers, and graduates that major improvements are needed in the graduate training process. It is also obvious that university staff are struggling to work with inadequate resources and excessive student numbers. Bringing about change cannot be done by the universities themselves – too often their funds do not even come from the national agriculture budget and their needs are marginalised at the agriculture policy level. While there are outstanding examples of good practice in terms of reaching out to farming communities, these are typically ‘islands’ rather than in the mainstream of practice. Universities are not widely regarded as sources of new information or advice, and are not in general seen as integral components of the agricultural information system¹⁶.

As Eicher, 2006, and others have noted, the land grant model, which worked so well in the US, has not transplanted well to Africa. Many commentators have come up with reasons for this but one stands out – in Africa, the farmer’s voice is muted so that practising farmers have little influence on the institutional framework of their sector. Where some groups within the agriculture sector have become powerful (for example large scale farmers in earlier days in Zimbabwe), they have positively changed the institutional landscape to their own benefit. But addressing the complex and interacting problems of African agriculture requires broad based development across the industry. Without a broad based expression of priorities across the sector, the individual institutions supporting agriculture will remain marginalised. We have seen in this report that at policy level (within Africa and internationally) there is a change of attitude – agriculture is recognised as important. Translating that change into action is fundamental to breaking the yoke of poverty in the region. The ASARECA and RUFORUM universities can – and must – play a central part in bringing this about. Two passionate comments from reviewers of earlier versions of this report set the scene:

“I think what we are lacking in SSA is support to private sectors so that it can be an equal partner in R&D. While most donor monies are going to NARS, I don’t see the same support to the private sector. Take for example, Ethiopia: the bank is coming up

¹⁶ Although, as previous sections have shown, there is considerable variability in practice.

with another program to assist the agric sector with USD300m for 5 years. The plan is to have this to US\$1 billion, with support from other donors - and many are ready and willing. But, there just isn't the capacity to spend this money in 5 years. So, yes, we can pump in all this money, but without support from the private sector, SSA will be where it was 40 years again, if not worse...Having said this, ASARECA and RUFORUM are trying their best to bring about change in the agricultural sector. They somehow manage to bring the NARS in the region together. But, don't forget this, donors know best. We shall always dance to their priorities. This is another culprit to SSA's agric R&D. Decisions and priorities are always set in the west and implemented in the south. The west knows all the problems the south is facing. I rest my case." *Key informant, African agricultural researcher*

"I have doubts concerning your confidence that 'the demand for graduates in agriculture can be expected to be strong in coming decades', unless some unforeseen earthshaking event would take place that would turn the perception of agriculture among politicians and decision makers upside down. I also wonder if you are not overestimating the role the private sector and NGOs will/are play(ing) in agricultural extension (and research), especially if Governments continue to abandon their inherent responsibilities... You quote Ruttan, ...however, you fail to point out the strong support by the Governments in Asia and the (almost total) absence of such long-term commitment or sometimes outright aversion found in most African countries.

Why these seemingly pessimistic views? It seems to me that two decades of preaching by many development experts including from the World Bank to decision makers in SSA countries that all that matters is education, health and infrastructure and that somehow agriculture will take care of itself will take a long time to be shaken off, if ever. I strongly believe that notwithstanding the growing private and NGO sector, the intensity and ultimate effect of the sub-regional efforts in agricultural R&D and AET will ultimately to a large extent depend on the strength of the NARES and I am becoming increasingly pessimistic about these institutions in the ASARECA and RUFORUM countries.

Let me explain where I come from... We think Uganda's NARO (and NAADS with some recent hick-ups) can be considered a model in the region. With regard to outputs in technology development, performance has enormously improved in the last six years. Finally, in information and technology dissemination, there is a lot to be proud of. Of course, as always, "the glass is only half-full" and much more remains to be done. Nevertheless, with these achievements, what will now happen next in Uganda? Well, again, unless some miracle happens, it is most likely that for the next six months to a year, NARO's operating recurrent cost budget will be reduced by about 80% due to the limitations of the Government budget and the absence of donor funding. What NARO hopes for then is that the germplasm collections will not get lost, electric power and water will not be cut off and the staff (who will be paid but will have little to do) will not walk away. This "on again/off again" is the sad story of agricultural R&D in Africa and is undermining all progress that is being achieved.

If this can happen in a country like Uganda after two decades of intensive World Bank and other development partner involvement and with a solid NARO track record, what can we expect in other countries in the region? You would think senior Government staff to be concerned under these conditions would you not? When the likely scenario was discussed with the Ministry of Finance one reaction was: 'well that clearly shows

that Uganda's agricultural R&D system is unsustainable'. *Key informant, international development agency*

ASARECA and RUFORUM need urgently to become a champion and to provide advocacy for agriculture with the sub-region's politicians and decision makers. The ASARECA and RUFORUM universities, through building partnerships with other development institutions, can provide the necessary expertise and depth to this process.

6.1.1. Action point 1- 'business unusual'

RUFORUM and ASARECA need to expose the findings of this report to decision makers at national, regional, and international levels. The take home messages are:

- Universities will lead the 'business unusual' agenda – but need the resources to do this.
- Concrete examples of effective change from RUFORUM and other university activities should be documented and made available as reports and briefing documents (see, for example, the Mbili system developed by Moi University or the doubled up legume system currently being developed at Bunda – both of which show increased productivity, substantially enhanced fertiliser use efficiency, and enhanced crop diversification and food security within the resource constraints of the poor).
- The impending skills crisis in agriculture unless strategic and effective investments are made.

Build a 'partnership task force'. ASARECA and RUFORUM need to create a cross university task force to examine and develop strategic partnerships with stakeholders and major development institutions across the region. These will include the NARES, farmer organisations, alumni and specialist graduate associations, innovative training exercises such as the Kulika Trust, and overseas institutions with a strong record of working with regional agricultural universities. Essential stakeholders must be the Finance and Planning Ministries, as well as the Ministries of Agriculture and of Natural Resources. Recent graduates should also be widely consulted. The task force will be composed of experienced and respected African agriculturalists with a strong chairman. All ASARECA and RUFORUM universities will be invited to contribute to the task force but appointments to the task force will be made by ASARECA and RUFORUM on the basis of thorough scrutiny of curriculum vitae. Members of the task force will work primarily in their home country and most communication will be by electronic means. Terms of reference for the task force will be established by ASARECA and RUFORUM, who may also second additional members (including from overseas institutions) as needed. The terms of reference would include institutional change within ASARECA and RUFORUM universities needed to facilitate and strengthen partnerships.

Hold a regional 'presentation meeting' of findings. Participation at this meeting would include the key stakeholders and development partners. Experienced international experts could be invited to assist in moulding the findings into a comprehensive strategy that will build the new African faculties of agriculture. The outcome from the meeting would be a clear vision of the role (and needs – financial, physical, and human) of quality agricultural education in the region for the next decade.

6.2. Improving quality and content of training

At the heart of so many of the issues raised during this study is the 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. The Shambani graduates case shows the potential that young graduates have to create change. **Improving the image of agriculture is 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.**

There are major issues with the quality and focus of undergraduate training available within the surveyed countries. Reservations were expressed widely and consistently by graduates themselves, employers, and farmers to the study team. As IBRD (2007) emphasises:

“Curriculum reform will be the most important initial undertaking. Infusions of new knowledge, technologies and hands-on learning are overdue. To be most effective curriculum reform should be linked to labor market surveys. To help graduates get a foothold in the “new agriculture,” various African universities encourage business development. The University of Swaziland and the Botswana College of Agriculture offer practical courses on entrepreneurial projects in which business plans put into practice using a revolving credit fund, with students retaining 75 percent of the profits. Projects have consistently generated profits since 1995 and reportedly students have been more motivated to start their own businesses after gaining confidence through these projects. In West Africa the Ecole Nationale Superior d’Agriculture (Senegal) provides three months of additional entrepreneurial training following graduation during which project plans are prepared. Financing is available for implementation of the plans for two years at 13 percent interest. In Mali, an agricultural research organization, Institut d’Economie Rurale, and a higher education institution, Institut Polytechnique Rurale, have joined hands to establish the “Mali Agribusiness Incubator” to help agricultural entrepreneurs integrate modern technologies into local agricultural practices. Beyond Africa, Costa Rica’s EARTH University prepares graduates to start up agricultural enterprises. Its program contains a strong emphasis on values development, environmental management, and community service.”

Within faculties, some departments are actively working to address these deficiencies. SUA, for example, has completed a comprehensive review of the key elements in all its degree programmes. The Stakeholders’ Teaching Quality Validation initiative at ISAE in Rwanda allows stakeholders¹⁷ to validate the quality of its programmes (which includes feedback and recommendations on how the institute can improve the quality of the graduate it is producing) through an annual Stakeholders’ Consultative Workshops. But, as the student feedback showed, this still requires further refinement.

¹⁷ local and central government authorities, farmers unions and associations, farmers’ co-operatives, agro-processors and other private investors in the agricultural sector, Ministry of Agriculture and Ministry of Education.

While RUFORUM has been successful in upgrading and extending the quality of postgraduate degrees in the region, the quality of those graduating with bachelors degrees is widely acknowledged as substandard. Two issues dominate:

- A widespread perception amongst employers is that agricultural graduates are weak in terms of problem analysis and solution skills. They may be receiving the theory in their coursework; they do not seem able to put the theory into practice.
- The emerging ‘over the horizon’ challenges to agriculture in the region (climate change, institutional reform, creating and sustaining indigenous entrepreneurship) are poorly covered in training.

6.2.1. Action point 2- enhancing the quality of the undergraduate degree

- **Develop a costed regional plan of action for rescuing the undergraduate degree.** Bachelors graduates are the public face of the university – they are the recruits for the public sector, private business, civil society, and for further training. As a matter of urgency, a comprehensive plan for improving the quality of the bachelor level agriculture degree needs to be developed. RUFORUM, together with ASARECA and ANAFE, need to develop a properly resourced and realistic plan for steadily enhancing and transforming the undergraduate degree in agriculture. Many of the needed elements are, at present, being implemented partially by different universities within the region. The experience and competence are there – they need to be coordinated and implemented within a common strategy across the regions.
- **Mainstream participatory research into undergraduate and postgraduate programmes.** Effective problem diagnosis requires careful information gathering and analysis. Students, therefore, need to learn how to collect high quality data as the basis for intervention in any farming system. Participatory research provides an ideal training ground for students to learn how to work with farmers, to respect farmers for their knowledge and survival skills, and to introduce students to the concept of the countryside as a laboratory full of interest and challenges – instead of as a punishment station to be endured until a ‘proper’ city based desk job can be found.
- **Require routine seminar presentations and other forms of public analysis and feedback amongst students at all levels.** This is where students learn the skills of communication and analysis, and where outside expertise can be brought in to complement and extend the routine coursework.
- **Enhance the quality of teaching at all levels.** Both employers and graduates (and, to be fair, many faculty) were concerned at the quality of teaching at the regional universities. There was widespread comment that curricula were outdated, and that access to up to date literature and research was inadequate. In many cases, the evidence suggested that enrolments greatly exceeded the capacity of the teaching facilities, resulting in poor teaching and supervision. There were few (if any) individual student practicals, with the alternative being either a group practical or a demonstration. Too often there was insufficient emphasis on interaction among students in the form of group discussions, tutorials, and seminar presentations. Students highlighted the huge gap between what is taught at universities and employers’ expectations. Students focus on theory so that they can pass exams with

good grades. But when they get employment they realise that employers are more interested in practical knowledge and skills. This closely reflected employer perceptions who were concerned graduates were too often desk workers who could turn out a standard answer but lacked critical and analytical skills. Extensive use needs to be made of resources such as Building Africa's Scientific and Institutional Capacity (BASIC) - a collaboration between African university, non-African university (to improve pedagogy) and agricultural research (to provide up-to-date and contextually appropriate course content) and the production of open access training resources¹⁸.

- **Develop a comprehensive attachment programme.** Too many of the attachment initiatives examined failed to meet their objectives. Monitoring was poor, and neither employer nor student (nor indeed the university) obtained much benefit. But, as the volunteering example from Bunda shows, students are keen to learn if provided with a conducive environment. Employers are discouraged when students are effectively 'dumped' on them and there is no feedback or review. The Food Science Department at Egerton finds itself regularly oversubscribed because students see the link between learning the needed skills and future employment prospects. It is probably not coincidental that that department is also one of the most innovative university departments in the region. ASARECA and RUFORUM need to provide guidance and help to this process. Therefore, some initial pilots to test out the new ways of doing business would be ideal. As we have noted in this study, a key growth area is in the NGO involvement in agricultural development as many of these agencies take over the slack left by the running down of public extension services. There is a real opportunity, and considerable mutual benefit, to a coordinated effort where the universities and the NGOs plan and implement a coordinated effort to develop a high quality agricultural educational system for the region. **ASARECA and RUFORUM, in collaboration with ANAFE, should, as a matter of urgency, link to, and plan with, agricultural development NGOs in the region a coordinated training and extension initiative based around making full use of university capacity and skills, while providing high quality attachment placements for students to participate and contribute.**

6.3. Broadening access to degree level agricultural education and beyond – creating a career structure in agriculture

Individual departments and university staff have shown themselves to be highly effective, particularly at the graduate level, in producing graduates of excellent quality that are in high demand by employers¹⁹. It is a fact that too few of the best qualified school leavers chose agriculture as a degree subject. It is also a fact that many children in Africa do not have adequate access to quality schooling – which restricts the pool of conventional entrants into the university system. There are several examples of top rank African agriculturalists who originally entered the job market with modest formal education and who subsequently,

¹⁸ For an example of a BASIC-type open access training resource, see <http://agtr.ilri.cgiar.org>. The approach advocated by BASIC involves the modules being developed and maintained by the users with a high level of ownership. It not only provides and up-to-date complete library but also helps up-date the trainers pedagogical approaches.

¹⁹ See, for example, Patel B.K., and Woome P.L., (2000), "Strengthening Agricultural Education in Africa: The Approach of the Forum for Agricultural Resource Husbandry" *Journal of Sustainable Agriculture*, 16:3, 53–74

through gaining access to scholarships, have advanced their careers (and their impact on agriculture). **The universities need urgently to develop and expand opportunities for this category of student to gain ready access through the university system at all levels. Importantly this would also at the same time increase female opportunities for advancement.**

The University of Zimbabwe, in the early 1990s, developed a highly successful programme to encourage experienced agricultural diploma holders to move forward in their careers through entering a carefully structured bachelor degree programme. Haramaya University in Ethiopia runs a BSc programme for diploma holders in either agriculture or forestry from accredited colleges who work in the public sector. The objectives of the programme are to upgrade the skills of front-line mid-career extension workers.

In another discipline, The African Institute for Mathematical Science (AIMS) is an educational centre in Cape Town, South Africa with the aim to:

- promote mathematics and science in Africa,
- recruit and train talented students and teachers, and,
- build capacity for African initiatives in education, research, and technology.

The Institute develops strong mathematical and computing problem-solving skills and is formally accredited by the three partner South African Universities and taught in association with the Faculty of Mathematics at the University of Cambridge, the Division of Physical Sciences at the University of Oxford, and the University of Paris-Sud-XI. It represents a concrete attempt to implement the New Partnership for Africa's Development.

"A brave and exciting project, that will expose some of the brightest people in Africa to scientific culture at the highest level and thereby help them acquire the tools to develop desperately-needed fundamental new technologies" *Professor Sir Michael Berry, Bristol University*

There are real opportunities to substantially improving the quality of new students enrolling in agricultural degrees through seeking to engage a wider constituency. A pool of mature, experienced, and motivated students would also serve to 'add value' to any cohort of undergraduate students, as well as providing a wider and more accessible career ladder for those concerned with agriculture.

6.4. Understanding and addressing gender issues

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.

However, 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.

Greater numbers of female students need urgently to be encouraged to participate in agricultural development at a professional level. 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. Agriculture is not a favoured subject amongst graduating high school students of either sex. 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. In addition, the experience of SUA in attracting female students at both graduate and undergraduate level should be examined.

6.4.1. Action point 3- reviewing and learning from experience in broadening access to agricultural education, especially for women

- **Particular efforts are required to broaden access to agricultural education overall. ASARECA and RUFORUM commission a special paper (or papers) that analyse the experience of Haramya University, the University of Zimbabwe, Sokoine University, and Bunda College in providing career development opportunities for diploma holders and other non-conventional entrants (especially women) into university level agricultural education.**
- **These papers should be considered formally by the various interest groups as a first step to developing options for ultimately increasing the total seeking a career in agriculture, the number of girls wanting to go into an agricultural career, competition for places at university, and raising the status of agriculture.**

6.5. Building a constituency

The countries visited as part of this study had very different educational and agricultural systems. That was integral to the design of the field programme. Nevertheless, there are many similarities in the underlying causes of disconnect between graduates and employers. We narrow these down to a clear need to strengthen and sustain relationships between employers, university faculty and students.

The universities, even before the current global financial meltdown, were operating in most cases with grossly inadequate resources. **The immediate future for increased funding for training in agriculture will remain bleak at best unless the universities make an active and substantial effort to build their constituency amongst employers of the graduates, and, as importantly, amongst the farming communities. It was disheartening during this study to learn how marginal most universities were regarded by most employers as sources of information and innovation.** This leads directly to the final action point –with which constituency building is intimately bound – enhanced governance.

6.6. Enhanced governance

The information gathered during this study has shown that, without exception, regional universities are making efforts to ensure that their training meets changing conditions. It also shows widespread dissatisfaction amongst employers, graduates, and faculty regarding the focus and quality of the training being provided to students. One commentator on an earlier draft of the report provides a useful perspective:

“I wonder if there is scope for suggesting a structure for universities listening to and getting ongoing feedback from employers rather as you do for the students themselves. I guess the other area which ... might be useful is to offer some possible routes for universities to bring about change. At the moment we are talking about turning big lumbering institutions which are averse to change (I guess I'm reflecting on my own university here) and whether there are some suggestions for establishing demonstration projects which are based around listening to farmers, employers and students and building that communication skill set that has been identified as missing. I really like the ideas of making farmers teachers and assessors of students to teach students agriculture, humility and communication skills and to give farmers status. This might tie in with another area that needs addressing which is the perception of agriculture as the undesirable course to study. Maybe branding and things like an elite post graduate course would help. But there maybe needs a wider government commitment to acknowledge how important (and increasingly so) agriculture will be for the country.”:
key informant, international NGO

This is entirely consistent with the recommendation by IBRD (2007) that the governance structures of AET institutions should be modified to provide increased participation by stakeholders. **AET institutions (and indeed faculties within those institutions), need distinct and real autonomy, with producers and stakeholders on their governing bodies. This will provide a powerful incentive to link training with market demand.**

This should not be the case. The key stakeholders need to have a greater say in the governance of agricultural faculties and universities. This will require giving these faculties much greater autonomy to respond effectively and speedily to the requirements of these stakeholders.

This requires the support and involvement of both teaching and decision making staff at the university to ensure changes are practically and financially feasible. It requires a consensus on the findings of this report on trends in employment and the major needs of employers. All stakeholders have to contribute to determining the best plan of action for each university. This is not a ‘one off’ activity. The job market is changing and it will continue to change. There is needed continuing interaction with employers so that they can feed into courses and course structures – the Rwanda Stakeholders’ teaching Quality Validation provides one

option that should be explored and developed further. The Department of Agricultural Economics and Agribusiness at SUA is attempting to gain greater autonomy within the university structure so as to be able to respond quickly to outside needs.

Universities will gain considerably from much enhanced use of student (both past and present) participation in governance. This is not advocating “handing the keys of the institution to the inmates”. As this study has shown clearly, students have important and valuable perceptions on the quality and content of their training. These voices need to be heard, and, where action is needed, change brought about. As importantly, a strong effort to undertake this overall governance task will serve to build the strong stakeholder constituency that is desperately needed to enable universities to establish the funding base that they need to support the training requirements so desperately sought by the development agencies of the region. Graduates (and potential students) will gain proper and comprehensive understanding job requirements, and career opportunities. The universities will take up their true role as leaders of innovation and as institutions which contribute directly and positively to national development.

6.6.1. Action Point 4: initiating a new governance process for faculties of agriculture

The process of gaining long term autonomy for faculties of agriculture will be a long and tortuous one.

We propose a stepwise ‘learning by doing’ process:

- **Review, modify, and agree the main directions of this report.** This can be undertaken as a consultation between ASARECA and RUFORUM, farming leaders, student leaders, and senior faculty at the agricultural universities of the region. The event might be held at one of the regional universities that has both the facilities to hold such a meeting and some interesting examples of best practice – the experiences of SUA and Egerton have been noted previously and both have good facilities. But possibly the universities might be invited to bid to hold the event against criteria developed by ASARECA and RUFORUM.
- **Establish stakeholder councils at all participating universities.** The ideal of autonomous colleges of agriculture is going to take time. In the interim, stakeholder councils can be established of core stakeholders. While these councils will have no executive authority within the university system, they need to be composed of committed individuals (including students) with a clear remit. The voice of the council should carry substance within the university community. Proper arrangements for information flow and feedback need to be established (and improved as necessary) to ensure that the inputs from these individuals are fully utilised.

7. The future can be different

A mere 40 years ago, the focus of the poverty discussion was Asia, not subSaharan Africa. The developed world then, as today, struggled with the moral dilemma of huge food surpluses while populations starved in Asia. It was evident then, as today, that food aid could provide, at best, temporary relief in emergency situations – food aid could not be a viable long term development policy. In the 1960s, the concept of triage amongst Asian countries (the emerging problems of subSaharan Africa, curiously, did not register) was actively being discussed (see Paddock and Paddock, 1967). In a carefully documented presentation, they argued that a population-food collision was inevitable. With science unable to offer sufficient increases in agricultural production, the hungry nations of the 1960s would inevitable become the starving nations of the 1970s. Their solution – which was presented in the name of reason, US self-interest, and true humanitarianism - was a famine-disaster version of the military medical "triage" system. The United States needed to divide the developing nations into three categories:

- those so hopelessly headed for or in the grip of famine (whether because of overpopulation, agricultural insufficiency, or political ineptness) that aid would be a waste; these "can't-be-saved nations" would be ignored and left to their fate (these included India, Egypt, and Haiti),
- those who could survive without aid, "the walking wounded" (Gambia, Libya), and,
- those who could be saved with help (Pakistan, Tunisia).

The deeply disturbing Paddock scenario did not come about. The reason is largely that they (in common with Meadows et al, 1972) underestimated the power of science. In India alone, wheat production increased sixfold from the 1960s to today; rice yields more than doubled; the percentage of undernourished people fell from 38% to 21% (Cummings et al, 2005). This was the celebrated Green Revolution. The model focused on improving the productivity of cereals through the development of crop varieties that could exploit intensive cropping systems. It was a child of its time – capital intensive, hierarchical, and based on the Schultz hypothesis of disruptive, rapid change to make things happen in what were perceived as deeply conservative peasant societies.

But, while there have been many and obvious gains from the Green Revolution, it was not a universal solution – most notably in Africa. The Green Revolution did not miss Africa; it failed to take root. The Schultzian ‘big bang’ approach, relying on the Asian combination of improved seeds and enhanced fertility management, was not sufficient to bring about needed change. In many (although not all) African countries, agriculture is the mainstay of the economy, with the majority of the population relying on cropping to feed themselves and their family – and to earn a little cash to buy clothes, pay school fees, and purchase medicines (Conroy et al, 2006). But the land is degraded, soils are exhausted and rainfall is erratic. Crop yields are low. Perhaps farmers could put part of their land down to cash crops and use the income to buy the inputs they need to improve their food security. High transport costs make it difficult to compete in agricultural export markets, and the terms of trade for many primary commodities continue to deteriorate. Rising international and local fertiliser prices make this essential input unprofitable to use except on very high value crops – which are typically too risky for the poor to grow.

So the poor (some 80%+ in the case of Malawi) become poorer, their food supplies dwindle, and national growth stalls. At the same time, the AIDS pandemic causes suffering and death in almost every family. African farmers know about improved varieties and are desperate for access to fertiliser. However they typically face a dreadful series of choices based on technologies which are incomplete, often uneconomic, and do not provide a reliable and effective road from poverty. The options offered to them as a route out of poverty are deeply flawed – and, unsurprisingly, the poor (who may be illiterate but are not stupid) reject them firmly. The Green Revolution fails to take off.

The stalling of the Green Revolution, particularly in Africa, has led to a decline in support for agricultural research, and for interventions that address agricultural productivity. However, there is an alternative approach which builds on a powerful partnership of scientists, farming communities, and development agencies (both private and public). We will term this a “Green Evolution”. The Green Evolution encourages the efficient and swift transformation of agricultural production through harnessing the best of skills in a collaborative, ‘learning by doing’ manner in which all feel ownership and pride. Existing structures are improved and enhanced to build change through an evolutionary rather than a revolutionary approach. This is cost-effective, brings the best of developing country and international expertise together in a problem solving format, and can be rapidly scaled up to reach the poor quickly and effectively.

A Green Evolution strategy is based around the highly efficient use of the right inputs used in the right way. This creates broad based opportunities for the poor to benefit directly from effective access to the improved seed, fertilisers and other critical inputs that are the foundations of the essential growth in productivity. Efficiency and consistency are the guiding principles to developing a productive, commercialised and profitable agricultural sector, with broad based participation, and specifically involving the poor and vulnerable in creating realistic and profitable options for change.

The Green Evolution, in common with evolution in nature, is efficient in selecting the best and encourages partnership and collaboration. Unlike the hierarchical and prescriptive nature of the ‘big bang’ revolution, an evolutionary strategy uses multiple channels and players, and allows choices to emerge and be tested - and the best to be adopted. It fits comfortably into the increasingly practiced participatory framework for development which facilitates the empowerment of the poor and disadvantaged. Such a strategy, with a foundation of good science, directed by farmers’ needs and informed by the commercial, social, and ecological environments of developing countries, can provide gains, not only for the better off producers, but also for the poor and excluded. It can be done.

Annex 1: Detailed country studies

7.1. Kenya

The agricultural sector directly contributes 25% of the Gross Domestic Product (GDP) and indirectly contributes a further 27% through linkages with agro-based industries. Overall, the agriculture sector employs about 75% of the total labour force, generates about 60% of the foreign exchange earnings and provides 75% of the industrial raw materials and 45% of the Government revenue. Of the 80% of the population living in the rural areas, about 75% of the people are engaged directly or indirectly in agricultural activities.

Overall the sector performed poorly over the past two decades recording a decline in average annual GDP growth from 3.5 percent during the 1980s to 1.0 percent during the 1990s. The decline has variously been attributed to external factors such as climate shocks, poor commodity prices, and negative effects of globalisation and trade liberalisation, poor sequencing and incomplete implementation of reforms, bad governance, and the increasing incidence of HIV/AIDS. The results have been increased rural poverty and food insecurity, decline in competitiveness, and reduced public and private investment in the agricultural sector. The challenge facing the government is how to address these constraints to exploit the country's enormous agricultural potential, to achieve the set national policy goals of food security, poverty reduction, and employment creation without compromising sustainability of the natural resources. However horticulture, driven by the private sector has been growing year on year and in 2008 became the biggest earner in the Kenyan economy. This is a specialist sector with a high requirement for well trained employees.

The Government's development strategy to address these issues is articulated in the Economic Recovery Strategy for Wealth and Employment Creation (ERSWEC) for the period 2003 – 2007. The strategy identifies agriculture, trade and industry, and tourism as the prime movers of the recovery programme, and places particular emphasis on sustainable agricultural growth as a critical element in poverty reduction. The Strategy for Revitalising Agriculture (SRA) over the 2004-2014 period "provides the framework and the roadmap through which the agricultural sector will respond to the Economic Recovery Strategy (ERS). This strategy aims at providing policy and institutional environment that is conducive to increasing agricultural productivity, promoting investment, encouraging private sector involvement in agricultural enterprises and agribusiness.

Under the strategy the following five critical areas requiring public action in the modernisation process of the sector were identified:

- Reform of the legal and regulatory framework governing agricultural operations in order to make it fair and just for all farmers, processors, and others involved in agro-related activities.
- Promotion of research and technology development.
- Reform of the extension service system to create a more effective linkage between research, extension and the farmers as the ultimate beneficiaries.

- Establishment and development of a market-based agricultural credit and inputs system.
- Promotion of domestic processing of agricultural produce in order to provide increased opportunities for value adding, employment creation and foreign exchange earnings.

In each of these focus areas, there are considerable requirements for skilled and experienced technical expertise to guide both the design and the implementation of the strategy.

Limited availability of productive land is a major constraint to increased agricultural production. About 84% of Kenya is arid and semi-arid and not suitable for rain-fed farming due to low and erratic rainfall, even though there is limited cultivation of some crops. The dry areas are used by ranchers, semi-pastoralists and pastoralists as rangelands. It is widely accepted that agricultural growth must be led by intensification and substitution towards more high-value products rather than by expansion of the cultivated area. The high rainfall zone, zone occupies less than 20% of the productive agricultural land but is home to approximately 50% of the country's population. Most of the food and cash crops as well as livestock are produced in this zone under semi-intensive and intensive systems. The zone accounts for all the tea, pyrethrum and potato production and nearly 75% of milk, coffee and vegetables production. The medium rainfall zone between 30%-35% of the country's land area and is occupied by some 30% of the population – although land pressure in the densely populated high rainfall zone to results in significant immigration from there to the medium rainfall zone. Farmers in this zone keep cattle and small stock, and grow drought-tolerant crops. The low rainfall zone accounts for about 20% of the population, 80% of the country's livestock and 65% of the country's wildlife.

Kenya's agriculture is predominantly small-scale farming, mainly in the high potential areas. Large-scale farming (defined as those farming areas of 50 hectares and above) accounts for 30% of marketed agricultural produce - typically tea, coffee, horticulture, maize, wheat, and commercial livestock. The small-scale farming subsector accounts for 75% of the total agricultural output and 70% of the marketed agricultural produce. Small-scale farmers produce over 70% of maize, 65% of coffee, 50% of tea, 80% of milk, 85% of fish and 70% of beef and related produce. Production is carried out on farms averaging 2-3 hectares mainly for subsistence and commercial purposes. Currently, the subsector's uptake of improved technologies is modest, in no small part because too many of the options which they are encouraged to follow are simply not profitable. Poverty persists as a direct outcome of this failure. Blackie (2005) reports the evaluation of the cost/benefit ratio of the seven 'best bet' technologies recommended to farmers in Western Kenya which found that over half were either economically unviable or else there were no data to support their adoption. The increases in productivity needed in the smallholder subsector will simply not happen unless these farmers are given robust, reliable, and profitable alternatives to their current farming practices.

7.1.1. Agricultural Education and Training in Kenya

Agricultural education and training (AET) is provided by tertiary agricultural training colleges, farmers' training colleges or centres (FTC)²⁰, and universities. With the exception of the universities, AET is the responsibility of the Ministry of Agriculture and the Ministry of Livestock and Fisheries Development. There are eight agricultural training colleges scattered throughout the country. Seven of the eight offer certificates for extension and animal health workers who traditionally have been the frontline extension staff together with diploma holders. One of the colleges offers a general diploma in agriculture. Most have been run down and some are not operational, largely because of budgetary constraints. This sad and unfortunate development has largely contributed to the poor state of extension services in the country.

AET is provided at undergraduate and graduate degree levels by the five public universities²¹, and recently there has been growth in private agricultural education and training institutions offering AET at different levels. **The consensus of opinion from both within universities (staff and students) as well as from employers was that the quality of graduates and postgraduates being produced by Kenyan universities has deteriorated in recent years.** In part this is related to increases in student numbers (without concurrent rises in budget allocations and infrastructure) and the resultant pressure on facilities such as lecture halls, laboratories and equipment – noted eloquently a decade earlier by Eicher (1999). As important, however, is the widespread acknowledgement that courses have failed to keep pace with changes in technological advances and the farming environment, and, in addition, are not focused on priority farmer priority areas²².

7.1.2. Key demand aspects for agricultural graduates in Kenya

e) Government observations

In the public sector, the Ministry of Agriculture is the major employer. The staff complement of the entire ministry for agricultural graduates is some 8000 professionals and there are 3000 vacancies – mainly in extension. However, due to a government embargo, no recruitment of additional staff or capacity building in critical skills is taking place. In the public sector agricultural research service there are 575 professional scientists employed by Kenya Agricultural Research Institute (KARI), although the desired establishment is 627. The Ministry of Livestock and Fisheries Development is the major employer of vets in Kenya but, of 300 vets who have graduated from Agricultural and Veterinary College of Nairobi University in the past five years, only 20 have secured employment in the ministry.

While in the past, diploma holders in agriculture with practical skills and knowledge would interface with farmers in the extension services, this work is increasingly being undertaken by graduates. These graduates typically lack the hands-on skills and capabilities that farmers value most. This situation has been exacerbated by the recruitment of graduates from disciplines other than agriculture (nutritionists and dieticians, for example) to complement traditional mainstream agricultural extension – but who are unable to assist farmers with

²⁰ The 34 FTCs are not functional although some were rehabilitated in the early 1990s. FTCs were the main interaction points and source of knowledge for small-scale farmers

²¹ The Agricultural and Veterinary College of the University of Nairobi is one of the oldest in East Africa.

²² For a full analysis of AET at university level in Kenya, see Blackie M and Woome P., “Challenges and Opportunities of the Regional Universities Forum for Capacity Building in Agriculture in Kenya, Malawi, Mozambique, Uganda and Zimbabwe”; a report to the RUFORUM Board, 13 August 2005

solutions to their agricultural problems and challenges. Typical skills that government officials found fresh graduates lacked include farmer training skills, implementation of adaptive or on-farm demonstrations or trials, financial management, agricultural value chain addition skills, and business start-up advisory and entrepreneurial skills.

The Ministry of Agriculture has a particular priority for specialised agricultural extension training which provides high quality hands-on skills in crops, livestock and general agriculture that enables all levels of agricultural support service staff (from researchers to field extension workers) to communicate effectively with farmers and to develop the participatory problem solving approaches required in an AIS framework. Government officials observe the importance of inculcating into graduates values beyond technical expertise and subject knowledge. There appears a general lack of discipline and professionalism in current graduates, which is combined with an obsession with ‘the quick money syndrome’ and an absence of commitment to career and professional development.

Agriculture is recognised as an unattractive career pathway among the Kenyan youths. They are less likely to become farmers because of land ownership issues, poor income opportunities from farming, lack of start-up capital and credit options, and the risk of exogenous events (drought, price interference, market collapse). Government is concerned by the decreasing numbers of young people applying to study agriculture at university and other tertiary institutions and has several initiatives of its own to try and counter this trend. These include a Youth in Agriculture Programme and Young Farmers Clubs (4K Clubs) for youth in schools and out of schools.

As further efforts to improve effectiveness of its programmes, the Ministry of Agriculture is developing a National Stakeholders’ Forum for key stakeholders to make a meaningful contribution towards AET and agricultural development in Kenya. It also runs professional group meetings for staff development which involve an intensive induction programme to familiarise young staff with the functioning of the ministry, followed by secondment for periods up to one month of new recruits with experienced members of staff.

f) University staff and administrator observations

Egerton University staff noted that the most popular preferences among new university entrants were Bachelor of Commerce related degrees, Medicine, Engineering, Law and Information Communication Technology (ICT). Agriculture was typically a last resort, and, furthermore, the popularity of the subject had fallen even further in recent years. This is consistent with the observations of both Eicher (2006) and IBRD (2007). Conventionally the public sector (Ministry of Agriculture and other government ministries and departments) is the major employer but is associated with poor remuneration and career prospects. However, Egerton University is widely perceived as an agricultural university and benefits immensely from its reputation for producing quality agriculturalists – which helps the university to attract the best of those school leavers who chose agriculture. Student intake interviews are rigorous, and test the aptitude and attitude of students beyond just the academic potential and ability. The intention is to send a clear signal to aspiring students in terms of what to expect if they were successful in securing a place.

The two most popular degrees are food science and agribusiness management. Both are significant in terms of this study. The annual intake for food science is normally 35 students but there are years that the intake is doubled because of overwhelming demand. This demand comes from the perception that the degree prepares students for self employment and

entrepreneurship on completion. Students, through working in the pilot food plant on the campus, gain firsthand experience in adding value to, and the marketing of, perishable foods. The Food Science Department is highly regarded by the Kenyan food industry. The top food manufacturing companies recruit from Egerton and which serves to expand the department's network in terms of offering best attachment opportunities for students. The agribusiness management programme is also popular because of wide-range of opportunities which go beyond the agricultural sector – such as general management, accounting, and business practice.

There are numerous continuous professional development programmes and short courses (both locally and overseas) for staff to keep update with the latest developments. Staff are highly motivated and proud of their work – which is confirmed by an excellent staff retention record (most have served 10-15 years). This has helped the university in fostering good industry networks and contacts. But staff need more exposure in the form of industry visits and on-job training to assist in keeping pace with changes in the industry.

The university is well equipped with resources to mount practicals in most fields. Nevertheless, the lack of “hands on” skills is recognised as a major challenge and one which is constantly demanded from employers in both public and private sectors²³. To address this issue, Egerton included intensive practical sessions in the newly introduced agricultural degree programmes but this had to be discontinued. Students were so enraged at this imposition that the university had to be closed for a whole year.

The student perspective was that practical training reflected the needs of “the inferior and less educated diploma students and they expected more lectureship type of learning as they were training to become managers and officers”. The evidence from the Food Science Department suggests that this impression is somewhat misleading. All students have to do an eight week attachment at the end of their third year and fourth year²⁴ as the university recognises the need for improved practical agricultural training and for more interaction with the industry. What the students were objecting to was not practical training *per se* but the type of meaningless labour which adds little to the learning process. Where, as in Food Science, practical assignments are focused and linked to real problem solving, students respond positively to the opportunity to learn further skills.

An important source of income to public universities in Kenya comes from self-sponsored students (who pay fees double those received from publically funded students) - also popularly known as “parallel programmes”. This, however, has led to overcrowding of courses and compromises in terms of quality. The Kenyan secondary school programme has also been changed which staff feel has meant poorer entry qualifications (especially in the sciences) and the need for top up courses. These typically mean that previously 3 year degrees are now four year programmes²⁵.

²³ Also private sector employers believe that graduates have unrealistic expectations of remuneration.

²⁴ During attachment the welfare of students is responsibility of their parents and they have to meet their own living expenses with the help of their parents.

²⁵ Makerere University in Uganda has been through similar change and has managed it well. In Kenya, the initial implementation of the new school system was inadequate, with the result being one which is widely perceived as being inferior to the old system. For example, during the first year at university, in addition to the top-up in the basic subjects, students were also to be equipped with life skill courses like ICT, entrepreneurship, business management and other practical experience - but this never happened because of resource constraints.

Comments from the University of Nairobi noted that the universities needed to be significantly more proactive in increasing stakeholders' involvement in their programmes. While it is important to impart practical skills to graduates, the universities need also to emphasise scientific theories and concepts as this is the foundation of experimental science and agriculture - and the driver of a knowledge economy. However, it is recognised that much needs to be done in terms of practical teaching - both laboratory and the hands-on operational and technical practical skills required by employers. In the case of the latter, this

can be achieved through more (and better organised) industrial attachment and secondments.

A comment on 'parallel' programmes

Self-sponsored (parallel) students serve to boost university finances. These students have special privileges. They can choose their first preference degree programmes while normal entry students may be assigned to programmes of little interest if their first choice programmes are over-subscribed or they do not meet the minimum entry requirement. Parallel students can retake the entry exam while normal entry students have no second chance. Parallel students can enrol to start their degree programmes a year earlier than the normal entry student. An important outcome is that the enrolment of parallel students becomes a priority so as to maximise on income earnings – and education quality suffers. It is common to get directives on student numbers from university administration which ignores available resources and capacity.

“More theory than practical is taught at universities to preserve the tradition and trade mark of professors of putting on smart jackets and ties”: *key informant, University of Nairobi*

Staff express concerns regarding quality - some practicals are not taught due to lack of equipment and facilities, including human resources. Often

classes are too large for effective teaching, and staff are subject to increasing litigation by students due to unacceptable conduct.

“There have been cases where a class of almost 100 students almost all get the same exam results (marks). This unbecoming behaviour on the part of teaching members of staff must be condoned. It must never be tolerated. It must not be allowed to spread - must be nipped on the bud as it further dents the reputation of universities and the quality of education”: *key informant, University of Nairobi*

An interesting (and significant) development at the Jomo Kenyatta University of Agriculture and Technology is the proposal to re-brand their programmes to mask the word agriculture to make them more attractive among young people and school leavers. Even where courses or departments or faculties are not re-named, the university will adopt some other more attractive names for promotional and marketing purposes – and ‘agriculture’ may be dropped from the name of the university.

g) Student observations

Egerton University: the group comprised of a total of 11 postgraduate students who had taken their first degrees from the following universities: Moi University, Nairobi University, Egerton University, Jomo Kenyatta University of Agriculture and Technology, Makerere University, and University of Zimbabwe. The first degrees studied included food science, dairy technology, animal science, crop science, agricultural engineering and agri-business

management. Only one had made agriculture his first choice degree at university. The rest wanted to study either engineering or medicine, but did not score the required grades to enrol on these programmes.

Several confessed that they enrolled in agriculture just to get into university. It is pertinent to note the issues raised by students (including those who had studied initially outside Kenya) were similar regardless of which university they had attended. They noted the lack of information on agriculture in secondary schools. In addition, agriculture is seen as having poor employment opportunities, with low salaries and limited career progression prospects.

With respect to the training they received, it was seen as too theoretical. The attachment was too short and their courses did not meet the expectations of their employers. The university emphasised theory and formal examinations, while the industry requires strong practical skills. There was an evident lack of trust between private sector attachment employers and university agricultural graduates in general. Many of the students felt that employers made little effort to help students gain real experience and they felt deliberately sidelined and prevented from knowing and learning essential information and skills.

Most students felt ill-equipped for their first job after completing their first degree. They recommended more practicals, including longer period of attachment (they suggested a minimum one year). The attachment needed to be more formally structured, with proper feedback and follow up between universities and industry to enhance the effectiveness of attachments. Attachments should be formally and collaboratively assessed by both the universities and industry. In terms of formal courses, too much teaching was out of date, there was insufficient emphasis on critical IT skills, and access to literature was poor. Students also noted the deleterious effect of over-enrolment as a result of the self-sponsored students' programme which severely compromised the quality of training.

An important observation was the fact that graduates felt there were very limited opportunities associated with smallholder agriculture which was one of the major reasons for lack of motivation. They highlighted what they termed "land ownership related-problems" where family and social needs override the commercial and economic use of land. The perception of the societies they came from was that farming is just part of their culture and an important social security net for family members.

ILRI: the group comprised 10 postgraduate students with degrees in veterinary science, agricultural biochemistry and zoology, computational biology, fisheries, and agricultural education from Egerton University, Moi University, Jomo Kenyatta University, and the University of Nairobi. There was common agreement that enrolments greatly exceeded the capacity of the teaching facilities, resulting in poor teaching and supervision. There were few (if any) individual student practicals (with the alternative being either a group practical or a demonstration). There is no interaction even among students themselves during studies in the form of group discussions, tutorials, and seminar presentations. Providing such platforms for students to share experiences would be very beneficial. The students highlighted the huge gap between what is taught at universities and employers' expectations. Students focus on theory so that they can pass exams with good grades. But when they get employment they realise that employers are more interested in practical knowledge and skills.

Attachment and internship schemes are in disarray. They are not focussed and planned – and cases were cited of attachments with no relevance to agriculture (such as being a hotel assistant receptionist). During attachment there is no supervision or interaction between students' institutions and those providing attachment or internship to students.

“There are no opportunities in for vets in Kenya and this is very sad considering what it takes to become a vet doctor. Despite the difficulties I went through studying veterinary medicine (lessons starting from 8 am and finishes 5pm from Monday to Friday), I came out of Nairobi University Veterinary School knowing very little in terms of veterinary practice. When I came to ILRI everything was new, yet I had spent five years studying veterinary medicine. Facilities were simply not there. I feel very bad when my peers who were not as bright as myself throughout my student life, from primary school right through to university now drive nice cars, own houses and other assets and many of them wonder where I got it wrong.”: *2007 veterinary graduate*

“There was not even a single relevant module or course that I had covered on fishery at university as far as employment in the fishery sector is concerned.”: *fishery graduate*

Nairobi University: the group comprised of 13 final year students in veterinary medicine, food science, crop science, animal science, agricultural economics and agri-business management. They reported limited access to internet and modern computers. There was no inter-library loan facility and the university library was poorly stocked. The training involved too much theoretical teaching and few practicals. Field trips were rare and often did not take place. Most agricultural graduates moved out of the sector and took a different professional qualification such as accounting.

h) Private sector observations

Perspectives were sought from a number of private sector sources – these included Kenyan seed companies, horticultural producers, and NGO development agencies. The responses were consistent across all three groups, with the key factor being that the training provided by Kenyan universities needs considerable supplementation before graduates can play a full role in their jobs. The Chief Executive Office of the Fresh Produce Exporters Association of Kenya (FPEAK) – which represents some 140 members producing both fresh produce and flowers – estimated that it took a minimum of two years additional training before graduates were up to the required standard. With horticulture a major industry for both local consumption and export, there was inadequate consideration of horticulture in the university curriculum. For many positions, they preferred training staff from scratch rather than retraining university graduates; often using overseas institutions to provide specialist inputs. In addition, in a joint venture with the Netherlands and Kenyan governments, the horticultural industry was setting up its own a state of the art training institute²⁶ on the former KARI Macadamia Research Centre for this centre.

7.2. Tanzania

Since 1990, the percentage of people living in poverty in Tanzania has declined but in real terms it remains widespread, particularly in rural areas. About 17 million people – half the population – live below the poverty line of US\$0.65 per day. Approximately 80 percent of the poor live in rural areas where about 70 percent of the population lives. Despite these improvements, Tanzania is lagging in its progress towards its poverty reduction and Millennium Development Goals’ (MDG) target of halving poverty by 2015.

²⁶ Specialised training provided will include basic horticultural needs such as greenhouse management and integrated pest management.

The 2007 Household Budget Survey (HBS) showed that there had been an acceleration of growth (up to 7% per annum) but the benefits to the household were limited and the number of people living in poverty had increased. Greater pro-poor growth and greater equity in service delivery is required. In addition, this will require further acceleration in rural economic opportunities – both farm and non-farm – and management of Tanzania’s rich natural resource base. Agriculture remains the largest sector in the economy and hence its performance has a significant effect on output and corresponding income and poverty levels. The sector accounts for about half of GDP and exports, and its importance is amplified through backward and forward linkage effects. Sale of agricultural products accounts for about 70 percent of rural household incomes. Over the 1990s, agricultural growth was 3.6 percent, which was higher than in the 1970s and 1980s. The government believes that agricultural growth needs to reach 10% Food crop production has grown at about the rate of population growth and accounts for about 65 percent of agricultural GDP, with cash crops accounting for only about 10 percent. The 2007 HBS suggests that there has been a decline in the consumption of quality food such as dairy products. National data show significant progress towards the objective of a sustained 5 percent growth rate with an increase of the five year moving average agricultural GDP growth rates from about 3.3 percent from 1991 to 2000 to 4.3 percent over the 1999-2003 period.

Agricultural productivity has improved but not yet to levels to achieve Tanzania’s agricultural growth targets. While agricultural (land) productivity growth (using the crude measure of cereal yields) in Tanzania has been higher than sub-Saharan Africa in aggregate, it lags other world regions. Much of the past growth in Tanzanian agriculture was the result of area expansion and improvements in the incentive regime. Agriculture is still relatively under-developed, 70% of all farms are cultivated by hand hoe. Women constitute the main part of the agricultural labour force.

Raising farm productivity and product value require better management of agricultural (natural) resources, in particular land and water, and access to improved technologies. Access to markets remains a problem as does access to inputs and credit. Other constraints include: low levels of education in rural levels, a rapidly growing population with swift rural-urban migration and competition for both regional and international trade. Improving the efficiency, relevance and effectiveness of the process of technology generation and dissemination is advocated as a key priority by the government, while turning the private sector into an engine of growth and poverty reduction.

To guide this process, the Tanzania Government has developed an Agricultural Sector Development Programme (ASDP). The ASDP states that: “ *while the majority of Tanzanian farmers will remain at a subsistence level in the near future, poverty reduction will only be achieved by breaking out of the subsistence cycle.*”. Thus, the ASDP calls for the sector actors to **aim for more than subsistence** and to **understand the essential need for profitability**. The ASDP emphasises long-term reforms, particularly with respect to markets, institutions and investments as well as improved institutional functioning and service delivery, technology adoption, infrastructure development and greater commercialisation among smallholders.

The role of the universities is seen as one of working in partnership with others (most importantly farmers themselves) to create major change within the agricultural sector. A broader and deeper impact on the agricultural problems of Tanzania is believed to be possible through a focused effort across institutions, with the universities playing a crucial role. Through a process of coordination and collaboration, improved use may be made of existing

facilities and resources. Research teams can be put together from a number of NARS institutes as specialist task forces to focus on major problem areas. Strategic networking with other agencies and bodies involved in serving the clients of research needs to become standard practice so as to make best use of limited human and other resources necessary to deliver enhanced technology options to farmer/clients.

7.2.1. Agricultural Education and Training in Tanzania

In the first fifteen years from independence, agricultural training expanded rapidly. This took place at schools (primary and secondary), farmers' education programmes (for example, Farmer Training Centres or FTCs²⁷), technical training programmes (Ministry of Agriculture technical institutes), and universities.

School level education in agriculture was hoped to increase self-employment opportunities for young people who leave school. It was felt that a formal education at school would make a positive change in students' attitude to agriculture. Despite the introduction of Education for Self Reliance, the objective of changing students' attitudes towards education was never achieved. This was because agriculture was not appreciated as a school subject, teaching facilities (e.g. school farms) were poor, and there was a lack of qualified agriculture teachers. In addition, the teaching of agriculture was not taken up by private secondary schools.

By 1994 there were 16 Ministry of Agriculture technical institutes offering short courses, certificates, diplomas and farmer training. Certificates are gained after completing secondary education plus 2-3 years of technical training. Diplomas are obtained after completing high school plus 2 years of technical training. In the past the government hired 95% of certificate graduates and 70-80% of diploma graduates. But in 1991 the government suspended employment of new staff, and it was anticipated that the private sector would employ a significant percentage of the graduates.

Sokoine University of Agriculture (SUA) is the major graduate agricultural training institution in Tanzania. Uniquely it has benefited from consistent and enlightened financial support over many years. In particular, the Norwegian Government, through various agreements with the Government of Tanzania, has been supporting SUA for the past 30 years. Over this period, national priorities and policies have changed, and the SUA/NORAD collaboration has shifted accordingly. The benefits to both partners in this long term association are evident. SUA now has a substantial core staff of highly skilled professionals in a wide range of agricultural and natural resource fields. It has an extensive campus, with good facilities, and trains the bulk of the future natural resource and agricultural scientists, outreach workers, and technicians in the country.

In 2001, the regular consultation meeting between SUA and NORAD noted the major policy changes that had taken place in Tanzania - in particular, the poverty focus of national policy. Specific issues in SUA activities which needed improvement included:

- Inadequate incorporation of socio-economic, problem solving, and market factors into SUA's core activities.

²⁷ Soon after independence, Farmer Training Centres were established to teach 'modern' farming skills to 'progressive farmers'. The ultimate goal was to have one FTC per district (at that time numbering 65). By 1967 By 1967, 10 FTCs had been completed, each one serving about 400 farmers (of whom 20% were women) per year. Over the years their responsibilities and management changed and their effectiveness declined.

- Greater awareness was needed of gender and other cross-cutting issues (such as HIV/AIDS) in SUA's core activities.
- The need for a university-wide comprehensive technology development and outreach programme to build on an earlier NORAD funded project.
- Improving the job skills of graduates
- Improving the income generation and networking aspects of SUA's programme

SUA has moved quickly to introduce activities which address these issues, largely with NORAD support. In 2004 SUA commissioned studies to assess training needs and conduct tracer studies in relation to the current and future job markets (see Iwega et al, 2005). The studies noted that generally SUA programmes meet the basic skills and competencies required by the job market. However, the graduates lacked value-adding skills in such areas as communication, problem solving, management and the use of ICT in their work. Findings included:

- The curriculum did not enable the graduates acquire adequate hands-on computer and communication skills. Graduates were inadequately equipped with skills in entrepreneurship/business management which are important particularly in self employment. Graduates unable to communicate their ideas to others are limited in their job opportunities. Skills required by employers are good verbal communication and presentation, good written communication skills, analytical and problem solving skills, team working and dependability
- Almost all of the studies noted overcrowding in classrooms, lecture halls and laboratories, poorly equipped lecture halls, laboratories and library facilities. The increase in workload for students and instructors had not been balanced by an increase in resources. It was noted that SUA graduates have very low level of practical experience probably due to the limited time allocated to practical work and attachments and lack of improved laboratories. This makes induction training necessary in employing organizations. More emphasis was recommended on field practicals and work attachments. There is also a negative notion that graduates should have white collar jobs.
- Many employers in the Local Government Authorities (LGAs) and the private sector organisations indicated that they were not familiar with the skills and capabilities of SUA programmes.

Figure 1 gives a summary of the major employers of SUA graduates. The figure shows that, although the macro-economic policy changes have reduced public sector employment, the government (Central and Local) is still the main employer, absorbing more than 55% of graduates who were able to secure employment. The private sector and Non Governmental Organisations (NGOs) are a new frontier for job creation for graduates (Figure 1). Unfortunately it was not possible to measure how this sector has grown since 2004. It is also conspicuous that self-employment is yet to be realized by SUA graduates. This could be attributed to lack of entrepreneurship skills and/or start up capital.

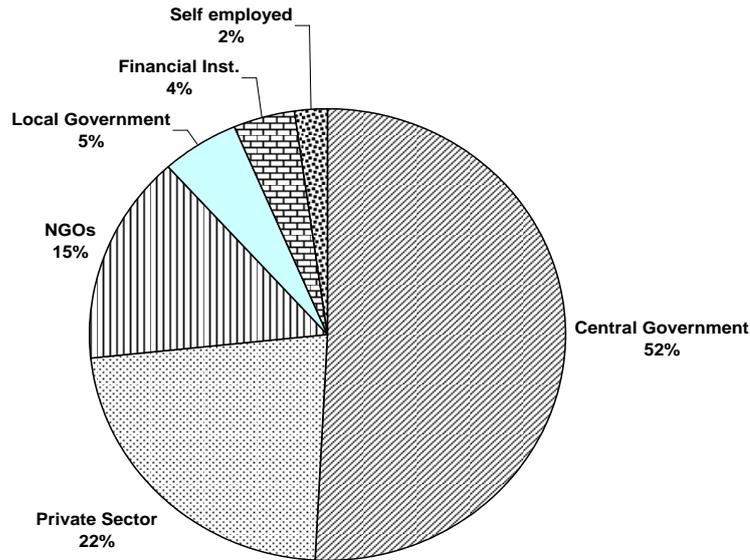


Figure 1: Major employers of SUA graduates by 2004/05 in terms of percentage response

Shambani Graduates

Three university friends conceived Shambani Graduates when they were visiting Morogoro rural district in 2003. They noted the lack of a link between the demand and supply of milk and signed up for a course on milk management. Together they conducted consultancies to generate initial capital for the company which became a limited liability company in December 2006. The business is based on the collection and selling of pasteurised milk. Milk is bought from Masai women who are trained to comply with quality standards. Today they are sourcing milk from over 200 farmers and the trust in the dairy system has given Shambani the security to expand into the Dar es Salaam market.

Their business endeavours have been acknowledge and augmented through the Technoserve award and the Dutch Business in Development Network award in 2006 and the 2008 Yara Prize. These have provided training as well as financial benefits which have enabled them to develop their capacity. This is of particular note as loans either cannot or have not been accessed. However, the operation is still at a relatively low level and is nowhere near matching demand. Further work is required to ensure increased supply in terms of quantity and quality.

Not only is this becoming a thriving business but the farmers, particularly Masai women, are reaping the benefits of a steady and reliable income from their milk which was previously considered a by-product. Consumers are also benefitting from a reliable supply of quality milk. The team are now keen to diversify the range of products that they supply.

However, there has been some success in the development of companies by the private sector (see case study on Shambani graduates). This group maintain their contacts with Sokoine to

encourage students in similar ventures. New companies are also supported by Technoserve as well as finance provision being made, particularly stemming from the Financial Sector Deepening Trust.

7.2.2. Key demand aspects for agricultural graduates in Tanzania

An initial pilot of the questionnaires in Tanzania provided a poor response, even amongst people known to the investigator. The majority of information was sought electronically or by telephone, and then this was backed up with face to face visits. Short questions were used to stimulate some response and those who responded were also asked to complete a questionnaire. Information on the recruitment of staff in the public sector was obtained from the Ministry of Agriculture in Dar es Salaam, and this was complemented by feedback from IARCs based in Tanzania. For additional information on the private sector, a list of companies who had contributed to a comprehensive private sector study conducted for the ASDP was used and this was augmented by personal contacts. Graduates were contacted through the SUA alumni association and the discipline societies, but the results were modest.

d) Government and public institution observations

As in Kenya, the public sector has conventionally been a major employer of graduates. However, in the past several years (again reflecting a recurring problem in the region), a freeze on recruitment has meant that many senior staff are approaching retirement with few trained young professionals to succeed them. The Ministry of Agriculture has started recruiting again and is also supporting the further training of its staff. It was reported that 6 of the 10 staff currently undergoing PhDs were women. There are increasingly links between public sector research and the private sector.

A number of respondents commented on the lack of interaction between students and the private sector (which reinforces the findings of the 2004 SUA tracer study). It was pointed out that such links in rapidly changing areas like export horticulture are vital. While the consensus is that the quality of training suits the needs of employers (or can be upgraded relatively easily with additional focused training) there are comments on analytic and problem solving ability, as well as surprising weaknesses in both written and numerical skills.

“There have always been some students who are just interested in ‘putting on a suit and picking up a suitcase’ but the numbers have become more now. There is a lack of interest in science in general. Girls seem more interested in the social sciences but not sure why.” *Dr Eli Minja, senior agricultural researcher*

There are good career opportunities for young people in agriculture but until the attitude issue (regarding agriculture and working with farmers as an inferior career choice), progress in terms of improving the lives of the poor will remain modest. This does not start at university and to address it may need action at school and other levels.

Opinions were also expressed on a more regional vision to tertiary agricultural education. It was felt that this could provide graduates with pertinent experiences, particularly in terms of an understanding of business requirements. Harmonisation throughout the region was suggested as one opportunity to bring benefits and reduce duplication to the region.

e) University staff and administrator observations

Discussions with SUA staff opened up very interesting perspectives. As noted previously, the university has had a long and stable relationship with NORAD and the Agricultural University of Oslo. This has provided a very outward looking and aware faculty which has shown itself constantly to be seeking innovation. In the biological sciences, enrolments, and the quality of students at entry, were tending downwards. To a large extent, this was credited as an outcome of the declining job opportunities in the public sector. By contrast, in the social sciences, particularly agricultural economics and agribusiness, the demand for student places was constantly rising. Less than half of the 'good' applications could be enrolled due to lack of facilities. Despite this, the department of agricultural economics contributes 700 students to the university's total of 4,000 and the standards of students coming to the university are improving year on year.

Within SUA was an evident feeling that the conventional university hierarchical structure did not allow departments adequately and in a timely fashion to respond to changing demand patterns for students. **Questions of changes to curricula, engagement of specialist staff, and other factors which could transform the educational experience for students at all levels were held back by the cumbersome and top heavy administrative structure of the university.** The example of the University of Dar es Salaam, where the Faculty of Commerce had become a semi-independent college was cited as the way in which a dynamic and focused university initiative could be developed. This model has now been copied at other faculties at that university and at the University of Dodoma. The restructuring facilitates a private sector vision of employment of graduates, and also results in important non degree activities, such as short courses, workshops and seminars, which encourage direct inputs from, and collaboration with, private sector and other stakeholders.

f) Private sector observations

After failing to get a response from the Tanzania Chamber of Commerce, Industry and Agriculture the study focused on individual companies and the Tanzania Agriculture Partnership. Discussions with TAP resulted in the following key emphases:

- Most graduates look towards a public sector career as the university curriculum is not orientated to the requirements of the private sector and does not promote independent working.
- Students should have the opportunity of gaining experience through placements but there are problems of the availability of sufficient numbers of quality placements.
- Students are not adequately informed on employment options, which, at present, are not sufficient employers in the private sector to take all the graduates on offer. NGOs are increasingly employing graduates, although they tend to prefer experienced rather than fresh graduates.
- Graduates typically do not like working in remote areas, and one estimate is that only about 30% of SUA graduates actually work in agriculture.
- The universities are seen by the private sector as a source of consultants more than an active resource of new ideas.

- Children at school tend to avoid science and maths, and those that do study these subjects often choose medicine rather than agriculture.
- The ‘job readiness’ of graduates is diminished by a culture that favours passing exams rather than the acquisition of knowledge. This also leads to a culture which is unwilling to explore new ways of solving questions, to adapt new techniques, and to challenge assumed wisdoms. In addition, on this last point, other private and NGO sector respondents expressed concern that there was almost an arrogance amongst graduates which constrained their effectiveness once employed²⁸

The Tanzania Agricultural Partnership

The Tanzania Agricultural Partnership (TAP) is an innovative public private partnership to support agricultural development, profitable commercial activities and poverty reduction. Coordinated by the Agricultural Council of Tanzania, TAP is a grouping of local, national and international partners willing to work together to respond to the major challenges and opportunities in agriculture. The Partnership combines commercial and development goals. And by doing so, it aims to provide increased choices and more efficient services to Tanzanian farmers. This will establish a sustainable, business-based foundation for small scale farmers to move from subsistence agriculture to profitable and diversified commercial farming.

The specific outcomes of the Partnership include:

- Profitable agricultural production is increased
- Markets and small farmer capacity is strengthened
- Appropriate inputs are affordable and accessible to small holder farmers throughout Tanzania
- Private sector investment is stimulated, and
- Benchmarks for best practices in development and commerce are established

The Partnership uses and builds on existing skills, knowledge and institutions. It focuses on informal efficiency, operational linkages and effective communication between partners. In developing new approaches, TAP takes some risks to overcome long-standing problems and to develop new solutions. It tries to learn from both errors and success. TAP makes progress by forging linkages and improving trust and understanding between key public and private sector operators.

7.3. Rwanda

Agriculture contributes 40% of GDP in Rwanda and employs some 70% of those in formal work. 75% of the population relies on agriculture for a living, and 70 % of foreign exchange earnings come from agricultural exports – mainly coffee, tea and pyrethrum. Major

²⁸ SUA does have a course on ‘ethics at work’ which could be a foundation from which to address this issue.

agriculture sector challenges include a severe skills shortage²⁹, land tenure problems, very high population density, and soil erosion³⁰. Rwanda's education system is still recovering from the tragedy of the genocide but is reasonably well funded. There is a major initiative to hire a large number of expatriate teachers for various subjects and disciplines including agriculture to cater for the massive skills gap in both schools and tertiary institutions. Expatriate staff are mainly from the east Africa region, although some come from as far as Zimbabwe. There some competency problems with individual expatriates as opportunists and confidence tricksters fake qualifications.

7.3.1. Agricultural Education and Training in Rwanda

Only 20% of those that complete primary school proceed into secondary education. HIDA has established that, in the short term, it is more cost effective to concentrate on strengthening local institutions to train the urgently needed hands-on people (technicians) than to send people outside the country for training (further education). Science study is encouraged through differential funding. Science students (including those taking agriculture) receive US\$3000 per student for science disciplines and US\$2800 for arts disciplines from the state (compared to US\$1375 and US\$1175 in Kenya). Rwanda agricultural students on internship are paid US\$2 per day - their Kenyan counterparts are paid nothing. In addition students on internship in Rwanda are followed-up by members of staff of their universities to assess progress, whilst in Kenya internship assessment is based on a student's own report.

7.3.2. Key demand aspects for agricultural graduates in Rwanda

f) Human and Institutional Development Agency (HIDA)

HIDA estimates that the cost of training 300 000 technicians locally would be the same as training 10 graduates in the United Kingdom. A severe shortage of hands-on skills (technicians) in agriculture has been identified. To meet planned economic growth and to achieve targets in the horticultural strategy plan, the sector requires 47 000 technicians by 2010. Large numbers of technicians are also required in the coffee, tea and livestock sectors

HIDA estimates that NGOs are better able to impart hands on skills to the agricultural sector than government agencies – and these NGOs also have a major demand for agricultural technicians.

The National University of Rwanda and all other tertiary institutions (including agricultural colleges) are under the administration of the Ministry of Education. It could probably help to involve the Ministry of Agriculture more in the running of agricultural colleges. Some of the challenges faced by agricultural colleges are a result of misinformed directives from the Ministry of Education. For example, agricultural institutions would prefer a different enrolment or selection criteria with some practical component. But this request has not yet been granted by the Ministry of Education as it sees no value in it.

g) Government and public body observations

²⁹ Shortages of trainers have been exacerbated by adopting the policy of making both English and French compulsory in schools.

³⁰ The terrain is mountainous terrain in most rural areas, the rainfall is high, and the population dense.

The Permanent Secretary in the Ministry of Agriculture noted that Rwanda lacked a harmonised skills' plan for the agricultural sector. The country's agricultural extension strategy had already been adopted by the cabinet and has contains elements of improving AET. It was important that the university curricula were regularly updated and revised. Besides general agricultural knowledge, graduates needed extension work experience to be able to work effectively with farmers, be dynamic, and have excellent report writing, training and facilitating skills.

Rwanda has a total of approximately 1 500 agricultural professionals, of whom approximately 80% are employed by government and the balance by NGOs and the private sector. 60% of Rwanda agricultural professionals are trained locally (Rwanda National University and agricultural colleges) with the remainder³¹ going to training institutes in the region.

The managing director of the Rwanda Tea Authority felt that universities were producing office people, with modest practical skills. He expected agricultural graduates to be acquainted with common and modern agronomic practices and would like an apprentice (workplace) type of training for agriculture graduates. As a consequence of poor practical skills as well as unfamiliarity with the important tea crop, many companies resorted to hiring expatriates from Sri Lanka and India, especially for the processing end of the industry. These issues were raised also by senior staff of the Rwanda Coffee Authority – who noted that coffee was Rwanda's main export, earning US\$21 million in 2008. Practical skills were needed to produce high quality processed coffee and there were major problems in getting these from local graduates. There was strong demand for quality Rwanda coffee and highly skilled technical support was required at all levels – from nursery production and provision of coffee seedlings through agronomy and disease management to packaging, marketing, and financial management. The authority found that diploma holders typically had the range of skills needed or else were willing and fast to learn.

These observations were common across the parastatal sector. Universities needed to give real life assignments, projects and other practical tasks to students, together with adequate funding and supervision. Soft skills, such as familiarity with the use and application of participatory methods would help graduates tap into farmers' knowledge and skills so as to fill in deficiencies in formal training. Clearly most farmers have more practical knowledge and skills than graduates but really respond to the chance to pass on what they know – which can then be perfected and replicated. In the first instance, graduates needed to be all-rounders if they are to grapple with the many challenges that Rwanda smallholder farmers are facing.

h) University staff and administrator observations

National University of Rwanda

Dean of Agriculture at National University of Rwanda (NUR) observed that about 20% of the teaching staff (the total teaching staff complement was 500) were pursuing further education at various universities outside the country on a staff development programme. The typical staff:student ratio for the university was 1:20, with a generally satisfactory level of staffing (although there was a severe shortage of agricultural economists). The national aim is for

³¹ Most specialists in the following priority areas are trained outside the country - biotechnologists, plant breeders, irrigation engineers, agro-foresters, and agricultural economists.

10% of population to be graduates, which is widely regarded as the minimum for a knowledge economy³².

Presently there are 273 undergraduates. Agriculture is now a 4 year programme and students decide in year 1 which one of the four options they wish to pursue. The four options in order of popularity are Crop Science, Agricultural Economics and Agribusiness Management, Soil Science and Animal Science. In terms of overall science degrees, students' preference agriculture comes after medicine and pharmacy.

The overall ratio in terms of time between theory and practical teaching is 60:40. Students go for a one month attachment at the end of the third year. The attachment must be relevant to the student's degree option. In the final year students are taught courses and skills that prepare them for the work place. These include extension, project management, co-operative management, land use planning, entrepreneurship, time management and IT skills. Feedback from past students in employment indicates their final year was particularly valuable in terms of preparing them for work. Most of the things they find useful at the workplace were learnt in the final year.

Postgraduate programmes are in their infancy with MScs planned in plant breeding, crop protection and agribusiness management. The joint MSc in Soil Science and Agro-forestry will be split into two stand alone degrees. There should also be a BSc and an MSc in Environment.

Funding is mainly from the government and is adequate although delays in disbursement can disturb the smoothing running of the university from time to time.

Higher Institute of Agriculture and Animal Husbandry of Rwanda (ISAE)

This institute started in 1987 to train agricultural diploma holders with practical agricultural skills (called 'technicians' in Rwanda). The first degree students graduated in 2009. The institute has three faculties:

- **Agriculture and Rural Development** (Department of Rural Development and Agribusiness, Department of Agro-forestry, Department of Crop Production and Department of Animal Production)
- **Agricultural Engineering and Environment** (Department of Agricultural Mechanisation, Department of Basic Sciences, Department of Soil Science and Agricultural Engineering, Department of Food Science and Technology)
- **Veterinary Medicine** (Department of Pre-Clinical Studies, Department of Para Clinical Studies, Department of Pathology Studies and Department of Clinical Studies)

Between 1991 and 2008 a total of 1647 diplomates graduated from ISAE, of which 319 (19.4%) were female. The ISAE flagship qualification is a three year advanced specialist diploma. This includes a three month internship as well as a special study project in the final year. Only those students who pass the higher diploma with a distinction can proceed to the degree programme – where they have to do an additional internship.

³² Most developed countries have achieved 20% graduates as a percentage of the total population

An innovation at ISAE is the Stakeholders' Teaching Quality Validation (started in 2006) where stakeholders validate the quality of its programmes (which includes feedback and recommendations on how the institute can improve the quality of the graduate it is producing). The validation involves an annual Stakeholders' Consultative Workshops with inputs from local and central government authorities, farmers unions and associations, farmers' co-operatives, agro-processors and other private investors in the agricultural sector, Ministry of Agriculture and Ministry of Education.

i) Student observations

Students from ISAE gave a less sanguine picture. The group comprised of 10 students studying crop production, animal production, agro-forestry, food science and technology, rural development and agribusiness. Students complained that practicals were not adequate and poorly conducted. Only a quarter of the teaching time was spent on practicals and there was an issue with the competence of laboratory technicians in conducting lab practicals. Students reported a problem of reference materials, with much of it out dated. Food science students were particularly concerned at the quality of both theoretical and practical teaching. Second year food science students reported that although they were nearly half way the academic year they had not yet had a single practical – and they were less than a year away from completing their higher diploma programme. Forestry students reported that only one member of staff in the forestry department had a relevant forestry qualification. The rest had no relevant qualifications in forestry. Even the head of department had no forestry or forestry-related background both by qualification and experience. They regretted having enrolled on the programme and felt it was a substandard.

Most students expressed the view that by the time they complete their studies they would only have 20-30% of what they anticipated. They felt the institution was rushing to introduce degree programmes without adequate resources (financial, human resources and facilities) and preparation and this was likely to damage its reputation as it would be producing substandard graduates.

j) Private sector, NGO and International Agency Observations

The country director of Heifer International stated they only recruit experienced personnel (not fresh graduates) because they only have a short term funding and cannot afford the time involved in additional training beyond the intensive three months orientation for new staff. He found that fresh graduates lacked essential veterinary skills and the teaching they had had at university was very basic and poor. World Vision Rwanda and Plan International Rwanda needed all rounders. They preferred agriculture diploma holders who were more hands-on and were able to be effective faster. They estimated it took two years for a fresh graduate to gain essential skills to deliver efficiently and effectively.

The country coordinator of FAO Rwanda had a view that today's NUR graduates were less practical than those of a decade ago. This was attributed to the poor quality of lecturers³³ as well as inadequate training facilities such as laboratories and equipment. The curriculum lacked practical business and entrepreneurial courses. Rwanda graduates had specific skill

³³ For example, it is possible that a recent graduate can move into lectureship with full responsibilities and without induction or mentorship.

problems in writing and reporting in both French and English. To address these problems, FAO runs a Young Professionals Scheme in Rwanda which involves 2-3 young professional officers annually. Participants undertake real life project analysis. For example, young professionals are given tasks under the Telefood Project (a US\$10000 project). The Telefood funds are raised during World Food Day (16 October) fundraising activities.

7.4. Ethiopia

Ethiopia is considered an area of one of the oldest human settlement. It is one of the largest countries in east Africa, with a population of around 85 million. A series of famines, which first gained international prominence in the 1980s, have affected directly around 10% of the population. Ethiopia now has a tiered government system consisting of a federal government overseeing regional states, zones, districts (*woredas*), and neighbourhoods (*kebele*). The regional states have considerable autonomy and an elaborate structure of council, executive, and sectoral public institutions is replicated to the woreda level. *The Economist* classifies Ethiopia as one of the fastest growing economies in the world and the fastest growing non-oil dependent African nation in 2007 and 2008³⁴. However, urban and rural poverty remains a major and widespread problem.

Ethiopia is an ecologically diverse country, ranging from the deserts along the eastern border to the tropical forests in the south to extensive Afromontane ecologies in the northern and southwestern parts. There are three main climatic zones:

- **the cool zone** above 2,400 metres where temperatures range from near freezing to 16 °C,
- **the temperate zone** at elevations of 1,500 to 2,400 metres with temperatures from 16 to 30 °C,
- and **the hot zone** below 1,500 metres with both tropical and arid conditions and daytime temperatures ranging from 27 to 50 °C.
- Deforestation is a major concern for Ethiopia resulting in widespread soil erosion, loss of nutrients in the soil, loss of animal habitats and reduction in biodiversity. In the last century, the forested area has declined from 35% of Ethiopia's land area to around 12% - a matter of particular concern as the country is one of the seven fundamental and independent centers of origin of cultivated plants of the world.

Land is defined by the constitution as belonging only to "the state and the people", but citizens may only lease land (up to 99 years), and are unable to mortgage or sell. Land may be leased for a maximum of twenty years to encourage productive use. Agriculture accounts for almost 40% of GDP, 80 percent of exports, and occupies 80% of the labour force. Production is overwhelmingly by small-scale farmers and enterprises and a large part of commodity exports are provided by the small agricultural cash-crop sector. Principal crops include coffee, pulses, oilseeds, cereals, potatoes, sugar, and vegetables. Livestock contribute about 15% of GDP. The country is becoming one of the top flower and plant exporters in the world.

³⁴ The economy showed 10% yearly economic growth from 2003-2008

A 1975 Land Reform programme was intended to provide incentives for people to stay in rural areas but urban growth continues with an 8.1% increase from 1975-2000. Poverty is severe with about 16% of the population living on less than US\$1 per day in 2008. 65% of rural households in Ethiopia consume the WHO minimum standard of food per day (2,200 kilocalories), with 42% of children under 5 years old being underweight. While access to education at all levels is problematic in many rural areas, 69% of urban children are enrolled in primary school, and 35% of those eligible for secondary school attend. Recent reforms have expanded schools to rural areas, together with providing teaching in the local language. The sequence of education is six years of primary school, four years of lower secondary school and two years of higher secondary school.

Will it ever be able to stave off starvation?

Jun 12th 2008 | HARAR

From *The Economist* print edition

GORU GUTU is perched in the misty heights of the steep hills above Harar, in eastern Ethiopia. For the poorest, life here is still akin to serfdom—minus a tsarist order. The government owns the land; a banner over its local office proclaims “the people” to be “the base of all development”. Yet labourers get by in Goru Gutu district much as they have always done, tilling soil by hand, digging ditches, doing whatever it takes to buy a few cups of grain to keep their families alive. This year, however, their efforts have been in vain. The land is green but hailstorms, rains that came too late, then rains that fell too heavily, as well as infestations of insects, have left Goru Gutu starving. As you head deeper into the hills, the animals get thinner, the children more listless. The food in the market is too expensive, and there are no informal sales on the roadside. No one is eating. Where wheat and maize should have been growing in the terraces that slice back and forth along the slopes, there is nothing. The average daily labouring wage, equivalent to 80 American cents, is not enough to survive on. So it is across much of south and east Ethiopia. In the highlands the rain was erratic; in the lowlands it fell not at all. The result is that an extra 4.5m of Ethiopia's 80m people need emergency food, on top of the 5m or so who already get it, according to the UN's World Food Programme. If Goru Gutu district is an indicator, things will get far worse; many people will starve to death.... “This is a revolving door,” explains an aid worker. “Next time we'll have nothing for these children.”

Because of the failed harvest, more food has to come from outside. Prices have been pushed up by rising fuel costs as well as by scarcity. Potatoes, maize and sorghum cost three times more in the market than they did last year, yet wages have hardly budged. The communal spirit that encourages people to share food, especially when it is scarce, may start to break down. People in Goru Gutu who have buried grain in pits by their huts get at it only by night for fear of begging neighbours. A famine on the scale of 1984...is still unlikely... Yet, sadly, some of the conditions that created that famine have not really changed. Ethiopia still has too many people eking out a living on too little land, depending on rains that can never be relied on... After several good harvests since the last big famine, in 2003, Ethiopia ... dithered over reforms... Aside from coffee, qat (a narcotic leaf chewed by Somalis), horticulture and a little tourism, Ethiopia is one of Africa's very few countries that still has virtually no serious private business—and thus few jobs—outside the state sector. Almost three-quarters of the population may be under- or unemployed. So few families have a chance to save anything for hard times...

Ethiopia understandably yearns to shed its reputation as the world's poster child for famine. Some foreign agencies do seize crudely on images of emaciated infants to secure extra funding. But the government's attitude comes close to denial; it will not help the people of Goru Gutu. “The only future is resettlement,” blurts out a local official. Even so, if the population of the district were to stand still, some 4,000 people a year would have to be resettled from Goru Gutu to more fertile land; the government has a budget to shift a few hundred. With its population increasing so fast and farming methods still too basic to sustain it even when the rains are good, Ethiopia's chances of making real progress any time soon look slim.

7.4.1. Agricultural Education and Training in Ethiopia

Tertiary education in agriculture is dominated by two main universities – Addis Ababa and Haramaya. At Addis Ababa, the Science Faculty has departments in Biology, Chemistry, Physics, Earth Sciences, Mathematics and Statistics and four programmes in Biotechnology, Food Science, Computational Science, Materials Science and Environmental Science. To encourage cross disciplinary studies, an Institute of Environment, Water and Development (IEWD) has been set up within the College of Development Studies (CDS) to promote integrated science, planning, policy, and development, and for encouraging sustainable development. The CDS and its five institutes undertake a multidisciplinary development oriented research in the areas of rural development, food security, natural resource management, regional and local development, gender and development, and population and development.

The Rural Development Institute (RDI) was set up in 2007 to provide education, research and community services in the areas of rural development. The focus is mainly on poverty, livelihood and food security, agricultural-agro-pastoral-and-pastoral development, non-farm sector, infrastructure and social services and associated policies and institutions. The Institute of Regional and Local Development (IRLDS) is a collaboration with the Institute of Social Studies (ISS) in The Hague. The general objective of the Institute is to produce highly qualified persons, competent in promoting and managing socio-economic development at sub national levels in Ethiopia, through the development of interdisciplinary education and research. In the long run it is envisaged to broaden the program to development studies for the countries in the Horn and Eastern Africa.

Haramaya University College of Agriculture (originally the Alemaya College of Agriculture) was established in 1954 with support from Oklahoma State University in the US, Alemaya College of Agriculture was a college of Addis Ababa University until 1985 when it was upgraded to a full-fledged University of Agriculture. It then became a multi-disciplinary University in 1996, and it was renamed Haramaya University (HU) in 2006.

Since 1997, HU has run a BSc programme for diploma holders in either agriculture or forestry from accredited colleges who work in the public sector. The objectives of the programme are to upgrade the skills of front-line mid-career extension workers. HU is the only higher institution in Ethiopia that has been offering MSc training in the major specialities of agriculture, and launched PhD programmes in 2002. HU used to have the national mandate for both agricultural research and extension³⁵. Currently, HU's research and extension activities operate under the umbrella of the Ethiopian Institute of Agricultural Research (EIAR).

HU has ambitious plans for new degrees in specialized at the BSc, MSc, and PhD levels. In addition, in collaboration with the International Food Policy Research Institute (IFPRI), a Center for Agricultural Research Management and Policy Learning for Eastern Africa (CARMPoLEA) is being established. This regional centre will serve as a home of a capacity building initiative to improve the management, organization and leadership of agricultural research and policy making and ultimately support the Agricultural Innovation Systems (AIS) of the region and of Ethiopia. The current phase involves organizing a series of workshops

³⁵ These mandates were transferred to the Ministry of Agriculture (MOA) and Institute of Agricultural Research (IAR) in 1963 and 1966, respectively

which are aimed at responding to regional knowledge and skill needs in the areas of agricultural research management and policy. The plan is to provide face-to-face and virtual courses, as well as targeted follow up services, for researchers, policy makers, and other stakeholders in the east Africa region.

7.4.2. Key demand aspects for agricultural graduates in Ethiopia

The field programme for Ethiopia had two major emphases. The first was planned around using the CARMPoLEA initiative as the entry point for interacting with both the government and the university systems. In the event, the programme had to be changed when a key collaborator was summoned for an overseas assignment at the start of the activity. The other major component to the field work was a detailed examination of the requirements of non governmental development agencies as these are increasingly moving from a relief focus (which was the priority in the immediate aftermath of the recent famines) to development. With famine and continuing migration to the cities, there is a general recognition that increased food production is fundamental to alleviating poverty and improving health. Rather than fixing the problems of degraded land and water resources, people move to cities in hopes of a better life. If nothing is done about the problem, the capacity to grow food will decrease as populations continue to increase, while poverty and health conditions get worse. Many NGOs are directly working in this area but there is criticism that many work in an uncoordinated fashion, in isolation, and with no effective mechanisms for them to relate with other NGOs.

Save-a-Cow Ethiopia (SAC) and partner NGOs have developed a coordination mechanism based around an Annual Review meeting (ARMing). This is an event which is designed and practiced by SAC to assess performance level of partner projects on the ground once every year, and to build capacity of project holder partners through meaningful partnership, while emphasising shared responsibilities and joint learning. ARMinG is used as a tool to identify and analyse critical issues, to learn lessons from existing practice, and to make meaningful decisions on the way forward for further partnership and improved performance. The goal is higher and sustainable impacts on the lives of rural communities and so to contribute positively to the process of helping them get out of poverty traps. From the perspective of this study, it allowed the team detailed interaction with an experienced group of agricultural development specialists over an extended period, and the opportunity for in-depth discussions on the complex structures which comprise the Ethiopian agricultural sector.

Participants in the 2009 ARMinG included both Ethiopian and international specialists, and a range of backgrounds from government service (both in Ethiopia and elsewhere in the region) to practicing farmers. Some thirty participants from a range of development agencies attended the event. The two preceding ARMinG meetings took place in 2007 with 16 participants and in 2008 with 17. The outcomes included improved learning and understanding between partners, and valuable sharing of experiences through:

- helping existing partners review strategy and activities,
- assisting new partners to avoid repeating mistakes and to build on current experience,
- improved design of new projects and partnerships appraised based on field level observation and discussions with the target communities,

- better coordination and building of joint strategies and approaches based on understanding, and,
- improved strategic direction linked to field level realities, sustainability, and impact

c) Employer and graduate observations

The employer and graduate observations surveyed during the 2009 ARMing review mirrored exactly those of the preceding three countries. Graduates from Ethiopian universities lacked hands on experience and were, at least initially, reluctant to work with farmers and to recognize the value of farmer knowledge. To counter this, as part of the employee recruitment process, some ARMing partners required that a potential employee spend several weeks working with one of their model farmers. Interestingly, this had not proved a significant disincentive to recruitment – although some potential employees were discouraged.

There were strong feeling expressed that the universities made little effort to engage effectively with field development agencies – which made collaborative programme development difficult. The ARMing participants had all gone through a hard learning process in building effective partnerships involving some very disparate organizations and recognized the very real costs incurred in building effective joint programmes on the ground. Universities were typically perceived as being useful suppliers of occasional consultants rather than as sources of knowledge and technology for development.

There were important observations regarding both the international agricultural research institutes (IARCs) based in Ethiopia and regional networks. **In both cases, given the major contributions that the NGO community was making both in terms of relief and development in the country, the NGOs found it time consuming and difficult to build links with both the IARCs and regional networks. Both seemed to be somewhat formulaic in the way they interacted with development agencies (focusing on workshops and meetings planned by themselves rather than showing interest in contributing to existing partnerships and activities), and relied on providing packages of assistance rather than actively determining what was needed on the ground.** Most primarily worked with government agencies regardless of the contribution which other non government groups might be making.

Graduates noted that, in Ethiopia, except for what they termed ‘sensitive areas’ such as medicine, students were assigned to programmes of study rather than being allowed to make their own choice. This meant that many entrants into agriculture degrees had little knowledge of, and often little interest in, the industry. The NGO sector was a major employer although government continued to run a substantial national programme. However, one of the difficulties in a government position was that there was little job stability – employees were moved regularly and frequently so it was difficult to become properly familiar with local circumstances. This made working in remote areas even less attractive as building relationships with farmers and local agencies was problematic. Graduates also felt that the practical training they received at university was inadequate – they did not have the chance to learn needed practical and participatory skills and were insufficiently prepared for the very challenging tasks facing them once they moved into employment.

7.5. Malawi

Development strategies and policies in Malawi since independence have been heavily biased towards agricultural development but the impact of these policies has been limited. Substantial resources have been devoted to the agricultural sector for the development of both estate and smallholder agriculture. Malawi has benefited from substantial donor programmes over many years but, until very recently, has suffered from chronic food insecurity at both household and national levels. Agricultural exports have remained undiversified, with little value added. Most Malawians are desperately poor, with 52.4 per cent of the population living below the poverty line (MK44 per person per day) with 22.4 per cent barely surviving. Socio-economic indicators illustrate the depth and intractability of poverty. For example, the levels of malnutrition remain high, with 43.2 per cent of under-five children stunted and 22 per cent underweight in 2004 (NSO, 2005). The infant mortality rate and morbidity remain high with 104 deaths per 1,000 live births in 2004/05 and 1984 deaths per 100,000 births in 2004, respectively (NSO, 2006). There is also high prevalence of HIV and AIDS, estimated at 14 per cent.

Agriculture is the most important sector of the economy considering that it employs about 80 per cent of the workforce, contributes over 80 per cent of foreign exchange earnings, accounts for 39 per cent of gross domestic product (GDP) and contributes significantly to national and household food security.

The agricultural sector has two main sub-sectors - the smallholder sub-sector that contributes more than 70 per cent and the estate sub-sector that contributes less than 30 per cent to agricultural GDP. Smallholders cultivate mainly food crops such as maize, the main staple grain, cassava and sweet potatoes to meet subsistence requirements while estates focus on high value cash crops for export such as tobacco, tea, sugar, coffee and macadamia. Smallholder farmers cultivate small and fragmented land holdings under customary tenure with yields lower than in the estate sector.

Crop yields have been too low to provide adequate national growth. Furthermore there has been low uptake of improved farm inputs and smallholder agriculture remains unprofitable. This is exacerbated by weak links to markets, high transport costs, few and weak farmer organizations, poor quality control and inadequate information on markets and prices. Due to high risks in agricultural production and poor access to credit, investment and re-investment have been poor. Most studies show that the performance of the Malawi economy and the agricultural sector was much better in the first fifteen years of independence, a period that was characterized by active state interventions in markets (but there were also important negative effects which will be discussed later). The growth in per capita agricultural output averaged 1.9 per cent in the 1970s, compared to -2.3 per cent in the 1980s, 5.5 per cent in the 1990s and 0.36 per cent between 2000 and 2005. However, these aggregate figures disguise the fact that growth was narrowly confined to the estate sector and to smallholders with larger landholdings. The poor were excluded from many development programmes – leaving a legacy of desperate poverty which troubles Malawi today.

The drag of the rising numbers of the poor today is a serious constraint to agricultural growth. The track record of past development programmes has dramatically changed with the introduction of broad-based initiatives which began with the 1998 starter pack programme and has been further developed into the bold Input Subsidy Programme of the past two years i.e. 2005/06 and 2006/07. These programmes have explicitly recognised that the dominating factor in holding back adoption of more productive and diversified agricultural technologies is the absence of purchasing power amongst the 60% of Malawians who are classified as poor. Farmers have been crying out for access to the inputs that they need to lift themselves

out of poverty. There is now incontrovertible evidence to show that where Malawians can get the inputs they so desperately need, their response to production technologies is fast and substantial.

7.5.1. Agricultural Education and Training in Malawi

Bunda University College of Agriculture was established in 1966, with a planned enrolment of 400 students - today there are 900 students, of whom 250 are in their first year. The college has 1200 hectares farm, of which 400 hectares are run as a commercial farm, 100 hectares are set aside for students teaching (practical work), and then each department has own land allocation for practical work. The college has a total academic staff complement of 160 – 40 hold PhDs, and 40 have Masters degrees. Of the remainder, some 20 are studying for their PhD students and the rest have at least a first degree.

The college has an outstanding reputation in the provision of agricultural education in Malawi, demand for places is high, and it has an impressive alumni network. The other 80% cannot be accommodated. Although, in common with other agricultural faculties in the region, prospective students favour medicine, ICT related programmes, pharmacy, law and some commerce degrees to agriculture, the college is still able to attract high quality talent.

Challenges and issues:

- **Class size:** Classes sizes are too large. For example, in the first year a good number of subjects have to be taken by all the 250 students and this means a class size of 250 students. This is exacerbated by the fact that sometimes the college just gets directives from the authorities to enrol more students than it can cater for.
- **Teaching staff:** Bunda's ambition is to be among the best university agricultural education providers in Sub-Saharan Africa and uses Makerere University in Uganda to benchmark its standards. For example, the College is trying to emulate Makerere by ensuring that every lecturer has a PhD.
- **The ratio of lecturer to technician** is 1:10-15, and the plan is to reduce it to :5
- **The technician to student ratio** is 1:50 against a target of 1:20-30.
- **The staff to student ratio** is good (1:7) but there remains a need to upgrade experience and qualifications in some junior staff.
- **ICT:** Computer to student ratio is 1:50. The major challenge with provision of internet and ICT services to students is the cost. The internet service provider to the university is charging US\$4000 per month, currently funded through a donor project. Student internet access is good, with some students' halls of residence even having a wireless internet network.
- **Library:** while there is room for improvement, especially in terms of the range of agricultural journals available. However, the library is one of the best university agricultural libraries in the SADCC region.
- **Budgetary constraints:** the budget allocation only caters for running expenses and even for this is not adequate. There is no allocation for infrastructural development to cater for the increasing number of student and as a result infrastructure growth is low

and in some cases in a poor state of repair. There is also no allocation for research. The budget deficit, just to meet running expenses, ranges from 40-60%.

- **College development:** donor support has been largely confined to student accommodation, with few resources provided for training facilities such as laboratories. Infrastructure is well below the needs of the college – facilities (laboratories and classrooms especially), designed for intakes of 40 students are now coping with three times that number.
- **Fieldwork:** Maize, beans, groundnuts, cotton, tobacco and a wide range of the traditional horticultural crops such as cabbage and tomatoes are grown at the college but a wide range of important crops to Malawi's economy are not grown due to resource limitations and these include wheat, paprika, flowers, sugarcane, tea and coffee, among others.
- **Transport:** Field visits are hampered by transport problems. Many times education tours have to be cancelled, sometimes on the last minute.
- **Change of AET System:** Bunda has moved away from offering a general agricultural degree to a wide range of more specialised degree options. The college is almost completing the transition from being to becoming a semi-autonomous College of Agriculture within the University of Malawi system. This has been accompanied by increasing specialisation at the undergraduate level, which is causing some misunderstandings amongst potential employers – who still expect the conventional all-round graduate from Bunda. The college is making effort to market its new AET system to stakeholders through career talks and workshops. The agribusiness and management degree programme is very popular. The college is endeavouring to ride on the popularity of the programme and to maintain an edge by constantly updating the curriculum through stakeholder consultations. There are also plans to re-design the programme along the lines of a similar programme offered by the Earth University in Costa Rica which has earned itself international reputation and recognition. The unique thing about the agribusiness programme offered by Earth University is that students undertake a project which they have to convert into a real life business venture. One of the assessment criteria of the business project is that it is good enough to be funded by banks-it meets financial institutions criteria for funding. Bunda is also trying to learn from other good agricultural universities in Sub-Saharan Africa such as Makerere in Uganda and some South African and Zimbabwean universities.

Building experience: Bunda volunteers.

Students typically wait about three months after finishing final exams before they get their results. In 2007, the college introduced, in collaboration with NGOs and other potential employers, an opportunity for graduating students to join these agencies as volunteers (and to gain additional practical experience) while awaiting the outcome of their finals. In 2008 three quarters of the graduating class chose to join the scheme (which is now run by a small office staffed by students themselves). Non graduating classes are also asking to join the scheme.

7.5.2. Key demand aspects for agricultural graduates in Malawi

The agricultural sector is seen as the country's primary driver for both enhanced economic growth and poverty reduction. However, high levels of poverty, chronic food insecurity and malnutrition remain Malawi's greatest challenges and have not been satisfactorily addressed by the previous policies. The Government of Malawi, as articulated in the Malawi Government Development Strategy (MGDS), is committed to increased investments in order to achieve a minimum target of six per cent annual growth rate in the agricultural sector while eliminating food insecurity and malnutrition. These objectives coincide with the country's commitments to the African Union, NEPAD and CAADP.

The guiding policy document is the Agricultural Development Programme (ADP) which seeks to provide a framework for harmonized government, donor and private sector investment in the pursuit of a prioritized development agenda. This will involve programme management, planning, implementation and monitoring through existing government structures and collaboration with other stakeholders including other line Ministries (Irrigation and Water Development, Local government and Rural Development, and Trade and Industry Development), the District assemblies, the private sector, NGOs and producer organizations.

Malawi data show clearly that broad-based food security has only been achieved with widespread access to inputs by the poor. This, among other issues, entails efficient planning, timeliness in the procurement and delivery of inputs, greater involvement of the private sector, efficiency in targeting of beneficiaries, efficiency in delivery of input supplies to various markets and appropriate use of inputs by smallholder farmers. The sustainability of the ADP initiative depends essentially on the availability of profitable, reliable, and ecologically sound production options being widely available to the poor.

Lessons learned from Neighbouring Countries³⁶

The main lessons learned from neighbouring countries (e.g. Tanzania and Mozambique) which adopted similar programmes and sector-wide approaches during the last decade are: (i) ownership is a key element of the process; (ii) slow institutional reform process and lack of leadership tend to impede adoption, (iii) tensions between sector vertical programme and decentralization especially with regard to planning and financial management complicates implementation; (iv) little involvement of the private sector and civil society constitutes a challenge for a public sector programme when agriculture is mainly a private 'enterprise' activity; (v) there must be an initial focus on financial management, fiduciary aspects, setting up systems, processes, software, procedures and guidelines at the expense of programme implementation at field level; (vi) there are unrealistic expectations that some changes could occur only in the lead Ministry without strong involvement of cross-sectoral ministries, such as public service reform, decentralisation, economic planning and public finance management; and (vii) transaction costs do not go down in the short run.

The ADP will encourage broad-based agricultural growth in order to achieve 6 per cent annual growth rate as prescribed by CADDP with the assumption that it will be supported with an allocation of at least 10 per cent of the national budgetary resources as per the

³⁶ Source: Agricultural Development Programme, Malawi Government, 2008

Maputo Declaration. Omamo et al (2007) in their analysis of strategic priorities for East and Central Africa noted that milk emerges as the most important commodity subsector for growth-inducing investment in agriculture, based on simulated cumulative contributions to overall GDP to 2015. Oilseeds, cassava and fruits and vegetables also rank highly. Viewed together, the staples sub-sector results in the largest GDP gains, followed by livestock products, fruits and vegetables, and oilseeds. The priorities for Malawi match those of the region but need further interpretation.

IFPRI data modelling for ADP show that at national level, tobacco and maize based strategies will bring more additional agricultural growth relative to other agricultural commodities. This will be followed by other export crops (cotton, sugar and tea), pulses and horticultural crops. In terms of farm sizes, it is important to note that additional agricultural growth is likely to come from small-scale farmers particularly resulting from a maize-led strategy while tobacco is likely to be the main commodity that will bring additional growth among large-scale farmers. It is important to note that ecological zones matter in the importance of commodities in agricultural growth. Maize is an important contributor to additional growth in Machinga, Lilongwe, Blantyre and Karonga ADDs. On the other hand, other export crops particularly cotton is the dominating commodity that will lead to additional growth in Salima and Shire Valley ADDs while tobacco dominates in Lilongwe, Mzuzu and Kasungu ADDs.

In order to achieve the targeted 6 per cent agricultural growth rate, the ADP recommends an increase in government spending on agriculture of 23 per cent per annum, resulting in 33 per cent of the total budget allocated to the agricultural sector by 2015. This spending will focus on key activities such as promotion of increased use of inputs (fertilizer, improved seed, pesticides, herbicides) development and dissemination of economically viable technologies and options, irrigation development and infrastructure development. Agricultural growth will originate from the smallholder sector, particularly due to potential productivity gains expected from improvements in crop, livestock and fishery management. This will require investments in both food crops and commercial crops for exports and import substitution. Growth in both food and commercial crops will contribute to improved food security at household and national levels while at the same time generate broad-based agricultural growth. However, in order to maximize benefits from food and commercial production, there is need to manage land and water resources in a sustainable manner. In addition, both food and commercial production will require vital support services such as research and development, extension services, institutional strengthening and capacity building.

A second major thrust of the MGDS is agricultural commercialization, with the medium term goal of increasing the value added to agriculture and productivity of farmers, and reorientation of smallholder sub-sector towards greater commercialization and international competitiveness. The government seeks to broaden participation of smallholders, including farmers whose households are headed by women in commercial crops, livestock and fish production by promoting contract farming (principally of tobacco and cotton), out-grower schemes (e.g. sugar, tea, horticultural crops) and farmer cooperatives (such as in smallholder coffee). Most of the export crops are grown on commercial estates and expansion of smallholder participation will ensure that the benefits to agricultural growth trickle down to the poor.

At present, most of Malawi's agricultural exports are relatively low grade, undifferentiated primary commodities - although others such as coffee and tea are gaining their own brand recognition at the international market. In order to offset the high transport costs associated with Malawi's position as a landlocked country, efforts are needed to produce higher quality

products targeting higher value export markets. This requires the adoption of better technologies such as quality seeds and planting materials, access to appropriate inputs, and the pursuit of higher quality standards in production and grading systems including packaging and presentation. Ensuring that the right inputs are available in a timely fashion will require imaginative improved alliances and partnerships with the private sector (importers, local and multinational input suppliers, and agrodealers), and better planning in terms of the budget cycle.

To compete on international markets, Malawi needs to upgrade the quality of export commodities for higher unit value on international markets and to pursue niche markets (e.g. paprika, chillies, fruits) of commodities for which it has a comparative advantage. This will require a significantly enhanced research and development programme, closely linked to emerging and changing market needs. There are also opportunities for import substitution by promoting local agro-processing industries oriented towards food and feed production such as cassava starch and flour, poultry feed, canned fruits and vegetables, fruit juices, dried fish, milk and milk products, meat and meat products.

In order to increase commercial farming revenues at national and household levels and to contribute further to the targeted sectoral growth, the ADP will focus its priorities on the following:

- Promoting higher productivity leading to increased production volumes of key export commodities such as scented rice, chillies, paprika, macadamia, coffee, tea, sugar, tobacco, cassava, soybeans, groundnuts, and seed maize.
- Enhancing contract farming and out-grower schemes, and improved cooperation between value-chain stakeholders.
- Promoting higher unit values of export crops by improved product quality, processing, and compliance with market demand and standards.
- Promoting high value crops, livestock and fish production, leveraging agro-processing investments, (mainly addressed at the best opportunities for import substitution), and improved access to input markets.
- Providing financial and non-financial services to increase the unit value of commodities through vertical (agro-processing) and horizontal (market information, infrastructure) market integration, and facilitating access to credit for small and medium agro-processors through assistance with credit/grant application, business plan preparation and matching grant schemes.
- Promoting producer organizations such as cooperatives, associations, and clubs
- Building partnerships and alliances with local and regional markets for inputs and outputs.

The ADP intends that capacity strengthening of management and staff at field delivery levels will be based on a review of roles, assessments of training needs and the identification of core competencies required across all staff categories at district levels and key support at Agricultural Development Division (ADD) level. All managers and staff will participate in orientation programs in pluralistic agricultural service systems. This will include processes

for stakeholder participation in shaping demand, identifying and coordinating service providers, and assessing the appropriateness and impact of service provision.

The plan is that stronger decentralised partnerships between research and diverse extension systems will be facilitated and supported to improve shared approaches to problem solving, mutual learning, and more appropriate adaptive technology development for farmers. Annual district review workshops involving management and staff from research, extension, NGOs and farmers will be organised by District Agricultural Extension Co-ordination Committee (DAECC) to exchange experiences, explore and refine farmer demand agendas, identify and collaborate on innovation/service responses needed, and agree on key processes and indicators to assess effectiveness and impact of services and training with farmers.

In addition to the ongoing renewal and upgrading of capabilities (so called hard skills) in technical areas, district teams, to be effective, will also need specific competency development in broad organisational areas (so called soft skills). For example, to effectively spearhead the management and delivery of services in a pluralistic system, district managers District Agricultural Development Officers (DADOs) will require competency development in leadership, management, team development and facilitation.

Given the continuing national trend of dwindling overall numbers of field extension staff in the public system, there is a need to strengthen alternative approaches and systems of local knowledge management, accessibility and peer learning for farmers. Three initiatives will be undertaken to respond to those needs:

- First, through District and EPA information resource centres using ICTs and the network of Residential Training Centres (RTCs) available in 23 of the 28 districts across the country, district managers and staff will be trained in the set up and use of those resource centres.
- Second, the promotion of farmer-to-farmer extension through the mentoring/training of lead farmers in given localities (in areas such as commodity/value chain development, local agri-enterprise promotion and crop production and productivity campaigns) is an effective way to help compensate for the reduced numbers of field extension staff.
- Thirdly, lead farmers will also be equipped with information material (fact sheets, flyers, extension materials, crop production guides, manuals, etc.) to be used for farmer/group training.

Modular training programs, including annual refresher courses as appropriate, will be provided for managers and staff. The programme will support in-service training for extension, research and technical services officers at national, ADD, district, EPA and lead farmer levels on the base of the annual work plan (on-farm-trials, farmer try-out plots) and local demands, selected priority technical subjects (fertilisation, cropping practices, sustainable land management, post-harvest losses) will be integrated in to the annual training work plan.

Implementing the ambitious, but achievable, objectives of the ADP will require a substantial body of skilled technicians and analysts at all levels and across the public and private sectors. Malawi already struggles to meet its human resource needs and, therefore, the demand for agricultural graduates into the medium term future will be high. The critical issue, as elsewhere, becomes then of the quality of graduates being developed.

d) Employer observations

Bunda College has made serious and significant efforts to engage with employers as it has developed its training programme. In the interviews that informed this study, some of the difficulties in applying adequately to stakeholders became apparent as some major stakeholders held clearly contradictory perspectives.

Agricultural Research and Extension Trust (ARET): ARET is a levy funded commodity research institute, with a programme focused on tobacco (but with a vision of a broader mandate). While it recruits graduates in plant breeding, entomology, agronomy, plant pathology, seed technology, and agricultural engineering, Bunda graduates are seen as holding a general agriculture degrees, without a specialist knowledge of tobacco. Key skills include good communication skills and hands-on tobacco growing knowledge. In addition, outreach staff (which include research scientists) need to be well versed in agribusiness management, and natural resource management, and have the capacity to make decisions, conduct surveys and to grapple with assorted rural community-related issues beyond tobacco growing.

Seed Co Malawi: SeedCo is a private sector seed supplier. Somewhat contradictorily the company was unhappy with Bunda College for moving away from a general agriculture degree to specialist options, while at the same time, seeking specialist skills in sales and marketing, agricultural engineering and processing engineering, business and financial management, and entrepreneurship. Most of the graduates employed have a crop science degree background – typically plant breeding and agronomy. Plant breeding is weak at the graduate level. These views matched closely those of the Seed Trade Association of Malawi.

Monsanto: Monsanto is both a seed producer and supplier. Key skills sought in graduates include a knowledge of seed technology and agronomy, laboratory analytical skills, interpersonal and decision making skills (which are important in dealing with different type of farmers with different levels of education), and good competence in ICT - Monsanto is an international organisation and a key responsibility of staff is to write reports for the company's senior management based overseas. Typically, the company employs individuals with prior seed industry-related experience rather than fresh graduates.

The company interview came up with the interesting observation that it is not the training that is the problem in Malawi (and in other places in Africa). Rather, the environment serves to mask the enterprising spirit of graduates. Universities need to become much more proactive in creating a policy environment (facilitating changes in land tenure, credit and market access, and attitudes towards subsistence or peasant agriculture).

Press Agriculture: Press Trust is the largest (in terms of hectarage) single agricultural business in Malawi. The company notes that most graduates prefer employment in urban areas, and do not want 'hands on' field based work. Students are attached to Press farms but the attachment is too short, follow up is poor, and students benefit little.

National Smallholder Farmers Association of Malawi (NASFAM): NASFAM was established in 1997 to promote farming as a business among smallholder farmers. NASFAM sits on boards of agricultural institutions to influence the curricula; the NASFAM Farm Services Manager sits on the Bunda College board and curricula review task force. The introduction of an agribusiness management programme at Bunda is a welcome move. There is now a need to ensure that graduates have a wide technical and agronomic knowledge of a

wide variety of crops (previously there has been an overemphasis on maize and a few food security crops).

Agricultural Trading Company (ATC): ATC is a supplier of agricultural inputs and finds graduates with a good combination of agriculture and business management plus marketing skills in short supply. For example, a recent MSc Plant Pathology graduate had excellent understanding of crop pest control technologies but lacked the interpersonal and marketing skills which are important to the company. However, it was observed that some of the problems are self-inflicted as the agricultural private sector is committed to invest in human resource development; rather firms prefer to poach the few experienced people from each other. But there is a need to help students gain a proper appreciation of the opportunities in a company such as ATC – which is often perceived as merely a ‘sales’ firm rather than a full service provider to farmers.

Civil Society Agricultural Network of Malawi (CISANET): This is a grouping of civil organisations in the Malawian agricultural sector. It lobbies for an adequate budget allocation to agriculture, as well as promoting improved agricultural practices through its member organisations. The general agricultural degree is seen as not producing good agricultural analysts (policy analysts) with the analytical skills to review policies and make recommendations. But the major demand in the agricultural job market in Malawi is for multi-skilled people.

The statistics on the current situation of the country’s human resource base and needs are unreliable and there is no comprehensive human resource development plan for the agricultural sector.

CISANET has contributed directly to the curriculum reform at the diploma Natural Resources College (NRC) because NRC is a constituent member. But there is an urgent need for a detailed national skills audit to be carried out for the entire agricultural sector.

World Vision: World Vision operates in 26 out of Malawi’s 28 districts. The country Agriculture and Food Security manager noted that Bunda had moved from offering a general agriculture degree to several specialist agricultural-related degrees. This gives the graduate deeper subject knowledge at the cost of losing the all-rounder agriculturalist. There was a continuing demand for the all-rounder agricultural degree. The key competencies that World Vision looks for on recruitment of graduates include organisational skills, as well as experience in collaboration, partnering, teamwork, and networking. Most Bunda graduates have good ICT skills which are also important.

World Vision felt that Bunda (in common with other diploma and certificate training institutes) did not interface adequately with stakeholders to learn how to improve the quality of their graduates. For example, World Vision used to take 20 students every year on attachment but stopped due to logistical and administrative problems and these were exacerbated by lack of cooperation from the authorities of the concerned institutions. There were discipline problems among some of the students, and the organisation was worried that this would tarnish its image. Some students started to make uncalled-for demands. These issues should have been easily resolved.

But, importantly, he observed that the government allocation of funds for Bunda was inadequate. Areas for improvement included:

- **Leadership:** this important in today's multifunctional work environment, especially in rural Malawi.
- **Communication skills:** report writing and presentation skills are critical. Poor report writing can jeopardise support.
- **Entrepreneurship:** graduates should have support to set up their own business using the example of Costa Rica's Earth University where graduates propose and develop a fundable or bankable project during the course of their studies and implement afterwards.
- **Collaboration** between all agricultural training institutions and other stakeholders, led by a nationwide SWOT analysis of the training sector

The manager noted:

“something must be fundamental wrong with African agricultural education which prevents or discourages graduates to take up commercial agriculture as a career. It is strange that graduates are not interested in becoming farmers (practicing agriculture) and want to be administrators - unlike vets, pharmacists, engineers, medical doctors, accountants, lawyers and others who end up in practice in their respective professions. This involves a lot of hard work and the same must be inculcated in agricultural graduates.”

Action Aid: Action Aid is shifting its strategy from being mainly a service delivery NGO to trying to influence policy using advocacy on the basis of practical issues and evidence. It requires graduates who have the capacity to evaluate, and then promote, suitable non-conventional or alternative technologies. The training graduates receive is insufficiently practical, nor does it allow for adequate exposure to new ideas and participatory methodologies. The curriculum should be dynamic, built on experience, and constantly evolving in response to the fast changing demands. Key gaps include poor analytic skills and report writing, combined with a general absence of creativity and imagination. However, IT skills are generally very good.

Other NGOs, such as Africare, had similar perspectives to World Vision and ActionAid and are not repeated here

e) Graduate and student observations

The group interviewed comprised of 12 final year and postgraduate students in the following programmes: crop science, animal science, agricultural economics, agribusiness management, aquaculture and extension. Of the final year students, only two had selected agriculture as a first choice (and in both cases because they knew someone who had studied at Bunda) but of the others, several indicated that, in the end, agriculture had been the right option for them. A postgraduate who was at Bunda in the early 1980s was concerned that standards in training practical agriculture had declined significantly. Equipment was no longer working and students no longer received any intensive practicals in machine maintenance and operation, or in livestock husbandry. With the larger class sizes, good attachments were hard to find and supervision had become poorer. Bunda no longer hosted national farming events and field days

The degree has students in a common first year, and then they specialise, The first year class is very large, with inadequate support. They quoted a first year intake of 250 students with just one practical technician in one of the courses. Class sizes are driven in part by the parallel programme (about one third of students enter through the parallel programme). Accommodation is at premium, with many students living off campus in squalid conditions which do not lend themselves to studying.

However, the aquaculture and fishery programme was highly regarded. There are excellent learning opportunities (both practical and course based) and Bunda is recognised as a centre of teaching excellence in aquaculture and fisheries in the SADCC region.

7.6. Mozambique

Mozambique has an estimated population of just over 17 million inhabitants, most of whom live in the rural areas. The country is recovering from years of war and is also adjusting to a free market economy. The country is blessed with a good climate and soils. The population lives in extreme poverty, most of it in isolated rural areas with no, or very limited, access to roads, public transportation, health services and schools. Widespread poverty is indicated by the fact that more than half of the population is undernourished, infant mortality is 129.3 per thousand live births, and 40% of the general population (71% of females) is illiterate, On the positive side, the average growth rate in the GDP of 7% between 1991 and 2000 combined with political peace has provided a real opportunity for change.

7.6.1. Agricultural Education and Training in Mozambique

When Mozambique attained independence, it inherited a very conservative Portuguese education system and a tiny capacity in agriculture (two graduates at the BSc level). Important features of university training included an overloaded curriculum and an extended study period. The typical degree took 6 years to complete and incorporated many subjects of marginal significance to agricultural practitioners. The degree required completion of as many as 90 individual courses (some, such as mathematics, were studied to a level unnecessary for most agriculturalists) and the time taken was some 9000 hours (compared to an average of 4000 hours in other SADCC countries). Of those 9000 hours, only 500 were assigned to practical work. War caused further issues. Between 1984 and 1994 the university farm could not be used because of landmines, and field work in the countryside was dangerous and impossible.

University-level agricultural education is provided by Eduardo Mondlane University (UEM), and the Polytechnics, under the Ministry of Higher Education, Science and Technology (MSCAT). Higher education programs in agriculture (Educação Superior) have been initiated at the Cuamba campus of the Universidad Católica de Moçambique (UCM).

Under the Ministry of Higher Education, Science and Technology (MSCAT) a completely new system of polytechnical education similar to the South African Technikon has recently been instituted. This will involve a three year course of study beyond the secondary level, providing a practical curriculum that will respond to the business community, encourage self-employment, and act as incubators to new businesses. Students will enter after completing grade 12. Because these schools are located outside of Maputo, they serve both the provincial student population and the surrounding business community as a resource.

In 2006 a major curriculum review was rolled out which serves to align Mozambican degrees to those of SADCC. Once the review has been completed, 75 commonwealth universities are to recognise Mozambican degrees which will be based on the ECTS-Bologna System. This system put emphasis on competencies rather than qualification. It is also envisaged that the dropout rate will be substantially reduced. Under the old system only 5-10% of the initial enrolment in science degrees graduated.

7.6.2. Key demand aspects for agricultural graduates in Mozambique

Before independence Mozambique had an effective system of support to farmers based around three levels of expertise – the assistant agricultural technician, the agricultural technician, and the agricultural extension officer. The first two were had strong hands-on practical skills, but little (if any) theory. The third category had a good balance of practical and theoretical agriculture. At independence, this was replaced by one based on central planning. The colonial system had a very narrow focus in terms of skills, but was working, effective, and well resourced. It was staffed by practical skilled and knowledgeable agricultural cadres.

The central planning model which replaced it was hierarchical and insensitive to local needs. Unfortunately, much of the structure of the central planning model remains in place. Today the system has many highly qualified agricultural administrators at the top but few who can interact effectively with farming communities. Government institutions lack capacity (financial and human resources) to deliver sound, strong and effective agricultural development programmes. The overall consensus amongst many interviewees of this study was that the country requires “how to do things” type of education and training in agriculture. Government institutions could benefit from collaboration with private education institutions endowed with resources like the recently established Roman Catholic University in Niassa Province – which are able to support improved training and has good staff stability. The focus of human resource capacity building needs to shift from supporting central planners in the capital to grass root institutions, including hands-on training of frontline extension personnel.

The agriculture sector, as a whole lacks, basic skills and access to information and improved technology. Farmers are served by a tiny extension service (of about 700 persons, the majority of whom have a low technical education level). While NGOs are picking up some of the burden, there is a critical need for adequately trained extension staff. Business skills and entrepreneurship have been smothered by years of central planning and, even more devastating, by the effects of conflict. Basic numeracy and literacy, simple bookkeeping, carpentry and mechanics as well as orientation to running a business are all needed at the local level to improve private sector performance. Graduates lack practical experience adequately either to fill these gaps through providing training or by moving into business on their own account. Few Mozambicans have had exposure to examples of successful business ownership and thus do not aspire to ownership and, even less, entrepreneurship.

There is a limited number of university trained staff capable of structuring and carrying out research in specific relevant areas. Excluding support staff, there are fewer than 500 professional level employees in the research system – of whom just over 100 have degrees. Very few have graduate level training adequate to formulate and supervise research studies. Training extension workers is a priority for increasing smallholder productivity. The recently reorganised extension service under the Ministry of Agriculture and Rural Development (MADER) is beset with staffing problems. It was started in 1988 and presently has

approximately 600 extension workers, most with low academic and professional training (Tanzania has 5,000 and Zimbabwe 8,000 extensionists.) An important institutional problem faced by most agencies within MADER is that as specialists become trained, be they scientists or technicians, they are quickly hired away by one of the NGOs who offer better salaries and equipment

Eduardo Mondlane University: Overall at UEM, student enrolment has risen to 20000 from 3000 in 1998. But in Agriculture, the increase over the same period is 200 to a total of 700 students. There are 1221 university academic staff, of which 133 have PhDs and 190 masters degrees. Currently there are two undergraduate options in the Faculty of Agriculture - BSc Agriculture and BSc Forestry. After the curriculum review is implemented, a total of four options are envisaged - BSc Environment, BSc Agronomy, BSc Forestry and Natural Resources and BSc Agricultural Economics. The degrees will be completed in 4000 hours within three years. Each student will produce a monograph or special report based on three months fieldwork rather than the previous thesis which required a full year to finish. In each year of the three years of study students have two months of internship, plus three months in the final year to do their investigation for the monograph or special report.

The country requires about 28000 trained and experienced agriculturalists, while it currently has some 1500. At the current rate of graduate output, it would take Mozambique a minimum of 250 years to meet its needs. Only about 20% percent of academic members of staff in the faculty of agriculture at UEM have PhDs.

In addition, public universities are on average only allocated 40% of running expenses, and there is no budget for capital expenditure. There are few private farms in a position to offer meaningful practical to training students and, although there has been an MOU signed recently between the private sector and UEM so that the private agricultural sector can assist with offering students attachment places, the outcome remains unclear.

High Polytechnic Institute of Gaza (Instituto Superior Politecnico de Gaza): the Polytechnic has a total of 327 students, 15% female and 85% male, with its first intake in 2006. The curriculum is competency-based (CBT). The curriculum is rated as good but difficult to implement because of inadequate resources. In each semester specific competencies have to be learnt but in most cases these is not possible because there are no means to make students practice. As part of the CBT process students have to draw up an internship/attachment plan and present and defend the plan. This makes students take the initiative and helps develop their negotiating skills. Students are required to produce an assessed attachment report, which they have to present and defend before a panel comprising of an external assessor, the attachment employers, and members of staff.

At the end of the third year student present a business plan using the knowledge they have acquired from their business management and accounting classes. The business plans are presented and assessed by a panel of judges which include people from financial institutions. The plans are required to be good enough to be fundable through a bank loan.

A Comment on the Competency Based Training System at ISPG-High Polytechnic Institute of Gaza and Objective (Generic AET) System at University of Eduardo Mondlane

The Polytechnic Institutes in Mozambique are seen as a new way of delivering agriculture education and training at higher level. The principal aim is to overcome the problem of how to establish an acceptable balance between theory versus practical

education and training. The curriculum documents of two institutions that represent both the old (UEM) and the new (ISPG) education delivery approaches were collected. The UEM focuses on objective based approach, while the ISPG focuses on competence based approach.

“For each course or subject they try to define the practical skills or competencies that the student is expected to acquire. Then they define specific activities that must be carried out to acquire these competencies. The difference from the generic and this one is that in the generic (like UEM) they are guided by objectives to be achieved in each course. The competency based approach adopted by the new universities adopts a more practical approach of teaching, guided by the need to show achievement in specific competencies. When I talked to a student group at the competency-based institution, they said "we are not like those students at UEM who know nothing, we are true agriculturalists.", and the UEM students on the other hand indeed confessed that, in terms of practical, "we learn 5-20% of practical", and one guy even shouted "its just 1% practical". I could see the students at UEM are quite concerned about the poor quality problem.” Maxwell Mutema, field notes for this study

The table below tries to pick up common course subjects and present information on specific approaches.

Subject/year	Institution	Approach	Description
Vegetal Physiology	UEM	General objectives	<ul style="list-style-type: none"> • Understand vital processes at cell and organism levels • Understand the principal metabolisms in a plant
	ISPG	Competences	<ul style="list-style-type: none"> • Measure and make diagnosis at different phases of growth and development of plants. • Select the most adequate crops taking into account the relationship between environmental conditions and the botanic and physiological conditions of the plants.
Botanic	UEM	General Objectives	<ul style="list-style-type: none"> • Understand the structure and the functions of a plant • Recognize taxonomic groups and vegetal species on the basis of their morphological characteristics
	ISPG	Competences	<ul style="list-style-type: none"> • Identify the anatomy and plant reproduction. • Classify plants: crop, forestry specie, forage, and infectants. • Select crops on the basis of their nutritional and economic value.
	UEM	General Objectives	<ul style="list-style-type: none"> • Determine the physical and chemical parameters of soil management • Manage the soil water • Do soil classification • Evaluate the quality of soil for agriculture
	ISPG	Competences	<ul style="list-style-type: none"> • Determine, characterize and evaluate soil properties and relate them to appropriateness for agriculture production. • Interpret maps and information related to soil classification.

			<ul style="list-style-type: none"> • Select soil conservation methods. • Design land use plan, based on geographic information systems. • Design land use plan, based on geographic information systems.
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Subject/year	Institution	Approach	Description
Agriculture equipment and machinery	UEM	General Objectives	<ul style="list-style-type: none"> • Describe agriculture operations • Characterize and select agriculture equipment for each operation • Characterize and use simple agriculture products transformation machinery • Use and control agriculture products conservation equipment and processes • Apply principles of compression and traction in agriculture soils. • Interpret technical specifications of agriculture equipment.
	ISPG	Competences	<ul style="list-style-type: none"> • Operate and maintain with efficiency and safety all agriculture and livestock machinery and equipment. • Determine the needs and select applicable agriculture and livestock machinery and equipment accordingly. • Manage the operation and maintenance of agriculture and livestock equipment.

c) Employer observations

National Peasant Farmers Union of Mozambique (UNAC): the union has a total membership of 19000 members, which is only about 5% of the total number of peasant farmers in Mozambique. Union members observed that the current study was very important to the country and the first of its kind and wished it had been done as soon the country attained her independence because stakeholders' consultations were badly needed in this area. This statement could be interpreted to signal serious lack of consultation and conservatism of not just the AET sector but the Mozambican education authorities in general. There is no platform for formal consultation between AET institutions and farmers, and consultation is erratic.

The union is worried that 99% of students from rural areas who get a qualification in agriculture do not go back to rural areas after completion. They prefer to start a new life in urban areas. In terms of practical agriculture, they learn very little, and it is not surprising to see agricultural graduates being taught practical skills by their parents. UNAC is running a joint project with the Swedish Co-operative and the Faculty of Agriculture of the Catholic University in Kwamba District in Nyasa Province whereby students and farmers meet at least twice a month to discuss modern farming methods. But overall, the Mozambican agricultural sector has a very poor research-extension-farmer linkage. Sometimes, there is an even

unhealthy rivalry between public agricultural research and extension at the expense of farmers. There is need that these two complement each other in a harmonious working relationship. A general observation is that most foreign large scale agricultural operators bring their own expertise from outside, including sometimes even the general farm workers, and what they want from Mozambique is land and a local partner.

Association for Agriculture and Livestock Technicians: the association was established by a group of unemployed agricultural and livestock technicians (diploma holders in agriculture and livestock) as a platform for lobbying and mobilising resources to start commercial agriculture projects for members of the association and other projects to benefit poor communities. Today, about 20% of the membership is university graduates. The association feels it has largely been successful in attracting the attention of policy makers and is also recognised by employers from government, private sector and NGOs.

The association strongly believes that agricultural education and training provided by state institutions is not market-led. There is little curriculum review which, at a minimum, should occur every 5 years. Immediately, entrepreneurship, employment generation and agrobusiness should be incorporated into the curriculum. In addition, the review should link market expectations and human resource development priorities with practical steps to mobilise resources.

Technoserve-Mozambique Country Director and Deputy Director (Jack Waters and Juma Juma)

Tertiary agricultural education in Mozambique provides some good theoretical and technical teaching but is very poor on practical teaching. There is resistance to introducing fundamental changes to make the education responsive to the market. Increasingly, Mozambicans travel to South Africa for university education. Acquiring practical skills is difficult as there are so few places for meaningful attachment. Lecturers are inexperienced. It is possible to be appointed a senior lecturer straight from university (on joining an institution soon after completion of first degree).

The universities should also on soft skills such as entrepreneurship and inter-personal communication. There should be an active process of exploring and evaluating other models of education, such as Earth University, and learning from the best regional experience.

Former Director of the Centre for Agricultural Training in the Ministry of Agriculture (Dr Kazembe):

Challenges in Mozambique are driven by the poor budget for agricultural education. At UEM there are three well established major specialisations - agronomy, forestry, and agricultural engineering - and there is scope for improvement. But there is a growing distrust between the public and private sector. This is driven by a perception that the private sector is largely extractive and is ploughing little back into capacity development in Mozambique.

Director of Mozambique Agriculture Research (IIAM): graduates have poor scientific research reporting, statistical analysis and writing skills in general. Poor remuneration contributes to a lack of motivation. There has been a tendency for government to focus more on numbers than rather than quality in education generally. This is compounded by the fact that when individuals are sent overseas for further education they sometimes study different programmes to the ones they had been sent by the institute. There is very little stakeholder consultation on curriculum development and other matters to do with improving the quality

of agricultural training at the university. The only significant consultation effort by the university so far is the Masters Degrees Council, which comprises of public sector, private sector and the NGO sector.

d) Student and graduate observations

Student Group Discussion: High Polytechnic Institute of Gaza: there were nine fourth year students in the group, and most had chosen agriculture because they came from a farming background. The efforts by the polytechnic authorities to give quality and hands on training were enthusiastically acknowledged. They proudly compared themselves as more superior in practical agricultural knowledge than UEM graduates, as illustrated by this quote from one of the students,

“we are true agriculturalists who learn how to farm. We are not like those from UEM who know nothing about the real agriculture.”

They had individual crop plots to care for, and managed various crops from planting to harvesting. More needed to be done in improving livestock and farm machinery practical work. They also went on regular study tours where they learnt a lot. There were limited IT facilities. There were only 15 computers for over 300 hundred students, and only two were connected on internet. The library had few books, journals or agricultural periodicals. The labs were poorly equipped. Some teaching staff were not fully conversant with the CBT approach and lacked the practical competencies required. Students suggested staff professional development programmes to address this deficiency.

Students were routinely asked to contribute towards curriculum improvement through evaluation forms which they were made to complete at the end of each academic year. They took the evaluation as a genuine effort to involve them in improving the institution. But the curriculum was very well received by students. With improvement in availability of training equipment, they had no doubt that their institution was going to emerge as the premier agricultural universities in the country. They would also appreciate exchange visits among similar institutions in the country such as High Polytechnic Institute of Chimoio so that they could exchange notes and experiences.

Student Group Discussion: University of Eduardo Mondlane: the group comprised of 20 students. Concerns expressed by the students were:

- absence of practical work.
- little interaction between the students and stakeholders in the agricultural sector to understand the opportunities, and to know what is wanted or expected of them when they finally leave university to take up employment,
- the attachment that the students do in the final year is insufficient to build students' confidence for the workplace challenges,
- insufficient efforts are made to visit private farms or the green belt horticulture farms around the city of Maputo,
- poor access to IT facilities, and the library services were described as “chaos”,
- statistics, and communication and scientific writing were inadequate, and,

- the curriculum is outdated and overloaded.

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List of Respondents

Kenya

1. Stephen Mbithi- Chief Executive Officer of Fresh Produce Exporters Association of Kenya (FPEAK)
2. Richard Musangi (Founder of Nairobi University Faculty of Agriculture and Former Vice Chancellor of Egerton University)
3. P.L. Shalo, Faculty of Agriculture at Egerton
4. Professor of Food Science at Nairobi University
5. Professor of Agriculture, Jomo Kenyatta University of Agriculture and Technology
6. Managing Director-Lake Flowers (Private Flower Export Company)
7. Mrs Charity T. Mariene-Deputy Director of Agriculture (Technical Training Division)- Ministry of Agriculture
8. Human Resources Department- Ministry of Livestock and Fisheries Development
9. Head of Human Resources Management-Kenya Agricultural Research Institute (KARI)
10. Paul J. Mbuni-National Chairman-Kenya Society for Agricultural Professionals (KESAP)
11. Mr James Mutonyi-Country Director-Citizens Network for Foreign Affairs (CNFA)
12. Kithinji Mutunga-Programme Support Officer-Food Agricultural Organisation of the UN (FAO)-Kenya
13. Tobias Takavarasha-Director Strategy, Monitoring and Evaluation-Alliance for a Green Revolution in Africa
14. Leah Ndung'u-Research Management Officer-International Livestock Research Institute (ILRI)

Rwanda

15. Permanent Secretary-Ministry of Agriculture
16. Norbert Sendege -Director of Rwanda Agricultural Development Authority (RADA)
17. Charles M. Karake-Director of Human and Institutional Development Agency (HIDA) of Rwanda
18. Daniel Rukazambuga-Dean of Agriculture at National University of Rwanda (NUR)
19. Patrice Kakizimana-Vice Rector (Chancellor)-Academic-Higher Institute of Agriculture and Animal Husbandry of Rwanda (ISAE) Vice Chancellor Academic
20. H. Shaka-Head of Department of Administration and Human Resource Development-Rwanda Tea Authority (Managing Director)
21. Managing Director-Rwanda Coffee Authority
22. Eric Kabayiza-Head of Rwanda Horticulture Development Authority
23. Chief Executive Officer-PAIGELAC
24. Jean de Mathat Ouedraogo- Country Director-SNV
25. Dr Charles Kayumba- Country Director-Heifer International
26. Lawrence Oroma-Manager of Development Activity Programme-World Vision
27. Agricultural Projects Manager-Plan International
28. Laurent Gashugi-Representative Assistant and Coordinator-FAO Rwanda

Tanzania

29. John Bamzi, Planning Officer, Division of Research and Development, Ministry of Agriculture
30. Chris Flowers, General Manager Tea, Mufindi Tea & Coffee Ltd
31. Bill Harris, Taylor Winch

32. Aichi Kitalyi, World Agroforestry Centre (ICRAF), Dar es Salaam
33. James Legg, IITA, Dar es Salaam
34. Jeffrey Lewis, Korongo Consultants and Tanzania Agriculture Partnership
35. Mark Magila, Tanzania Agricultural Partnership
36. Susan Masagasi, Tanzania Agricultural Partnership
37. Victor Mfinanga, Shambani Graduates, Njegere, Morogoro
38. Eli Minja, Consultant, ex-researcher (Tanzania NARS and CIAT)
39. Hussein Mongi, Company Director of Research and Development, Alpha Seeds
40. John Monyo, Chema ltd, Kagera
41. Leonard Mtama, Tancert, Dar es Salaam
42. Louis Mtenga Department of Animal Science and Production, Sokoine University of Agriculture
43. Mohammed Msabaha, Director of Research, Ministry of Agriculture
44. Brigitte Nyambo, ICIPE, Kenya
45. Andy Perkin, Tanzania Forest Conservation Group
46. Ephraim Sekundu, Head of Department, Department of Agricultural Economics and Agribusiness, Sokoine University of Agriculture
47. Andrew Temu, Department of Agricultural Economics and Agribusiness, Sokoine University of Agriculture
48. Anna Temu, Deputy Head of Department, Department of Agricultural Economics and Agribusiness, Sokoine University of Agriculture
49. Abdou Tenouano, Director AVRDC, Regional Centre for Africa, Tengeru, Tanzania

Ethiopia

50. David Bragg, SAC UK,
51. Ida Hadoto, SAC UK
52. Sheila Taylor, SAC UK
53. Alex Kirui, HPI
54. Girma Dalu, SEDA
55. Ibrahim Kasso, SEDA
56. Medekso, SEDA
57. Amare Kebede, SUNARMA
58. Getie Asfaw, SUNARMA
59. Shiferaw Dibaba, SUNARMA
60. Tamene H/G, AKAM
61. KoSuLP staff, AKAM
62. Hussein Wata, ROBA
63. Tadesse Masresha, ROBA
64. Dereje Lemma, ROBA
65. Mulugeta Dejenu, Tearfund
66. Tesfaye Falaha, WKHC
67. Cheru Tessema, SAC Ethiopia
68. Selamawit W/G, SAC Ethiopia
69. Wondwossen Teshome, SAC Ethiopia
70. Beminet Mathewos, SAC Ethiopia
71. Aklilu Dogisso, SAC Ethiopia
72. Mesfin Abebe, field coordinator HiCoDeP
73. Belay Bekele, field coordinator HiCoDeP

United Kingdom

74. David Bragg, Send-a-Cow (UK)
75. Chris Garforth, University of Reading, UK
76. Martin Long, Send-a-Cow (UK)
77. Ruchi Tripathi, Concern Worldwide (UK)
78. Rebecca Wray, University of Bristol, UK

Mozambique

79. Dr. Jorge Tinga, Project Assistant, Market Oriented Small Holder Agriculture Project, Ministry of Planning and Development
80. Dr. Jake Walters, Director
81. Eng. Juma, Deputy Director, Technoserve Mozambique
82. Mr. Simiao Mahumana, former Director Manica Development Agency
83. Dr. Albino Mazembe, ex-Director, Centre for Agriculture Training
84. Dr. Calisto Bias, Director National Institute of Agriculture Research
85. Eng. Jose Gaspar, National Director, Directorate for Agricultural Extension, Ministry of Agriculture
86. Dr. Roberto Mito, Director, Centre for Promotion of Agriculture (CEPAGRI)
87. Dr. Custodio Mucavele, Country Officer IFAD
88. Dr. Orlando Quilambo, Academic Vice-Rector, Eduardo Mondlane University
89. Dr. Fernando Songane, Director PROAGRI, Ministry of Agriculture
90. Dr. Florencia Massango Cipriano, National Director, National Directorate of Veterinary Services
91. Prof. Firmino Mucavele, Director Unit for the Reform of Higher Education.

Malawi

92. Dr Moses Kwapata, Principal, Bunda College