Regional Agriculture Sector Training and Capacity Building Needs Assessment

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By:

World Learning Inc.
1015 15th Street, NW, Suite 750
Washington, DC 20005
Tel.: 202-408-5420 Fax: 202-408-5397

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LIST OF ACRONYMS

AAEA	American Agricultural Economics Association
AGORA	Access to On-line Global Research in Agriculture
ASARECA	Association for Strengthening Agricultural Research In Eastern and Central Africa
AFGRAD	African Graduate Fellowship Program
ATLAS	Advanced Training for Leadership Skills
AAI	African American Institute
BIFAD	Board for International Food and Agricultural Development
BIO-EARN	East Africa Program and Research Network for Biotechnology, Biosafety and Biotechnology Policy Development
CGIAR	Consultative Group on International Agriculture
CRSP	Cooperative Research Support Program
DAAD	German Academic Exchange Service
DANIDA	Danish International Development Agency
DIFD	Department for International Development (U.K.)
ECAPAPA	Eastern and Central Program for Agriculture Policy Analysis
EGAT	Economic Growth, Agriculture and Trade
FAO	Food and Agriculture Organization
FORUM	Forum for Agricultural Research Husbandry
GMO	Genetically Modified Organism
HIV/AIDS	Human Immunodeficiency Virus /Acquired Immune Deficiency Syndrome
ICT	Information and Communication Technology
ICRAF	International Center for Research in Agro Forestry
IEHA	Initiative to End Hunger in Africa
IFPRI	International Food Policy Research Institute

IUC	Inter University Council
JIKA	Japanese International Cooperation Agency
JKUAT	Jomo Kenyatta University of Agriculture and Technology
KARI	Kenya Agricultural Research Institute
KBPS	Kilo Bits Per Second
MALISATA	Man - Land Interrelations in Semi-Arid Tanzania
MBPS	Mega Bits Per Second
NARI	National Agriculture Research Institute
NARS	National Agriculture Research System
NGO	Non- Governmental Organization
NORAD	Norwegian Agency for International Development
NUFFIC / MHO	Netherlands Organization for International Cooperation in Higher Education / Joint Financing Program for Cooperation in Higher Education
OECD	Organization for Economic Cooperation and Development
PCU	Project Coordinating Unit
REDSO	Regional Development Services Office (Nairobi)
SIDA- SAREC	Swedish International Development Agency - Department of Research Cooperation
TEEAL	The Essential Electronic Agricultural Library
UNDP	United Nations Development Program
USAID	United States Agency for International Development
USDM	University of Dar es Salaam

I. EXECUTIVE SUMMARY

The objective of the Regional Agriculture Sector Training and Capacity Building Needs Assessment was to identify training and capacity building needs for the university faculties of agriculture in Kenya, Tanzania, and Uganda. Over a period of four weeks in November 2003, the assessment team visited six faculties of agriculture and one faculty of science in the three countries as well as number of agriculture related organizations.

Findings

There has been significant growth of faculties of agriculture in the region with many of the characteristics and problems that are symptomatic of African higher education in general. The needs for training and retooling in the African university faculties of agriculture are great**.** Not only have the numbers taking the B.S. degrees in various aspects of agriculture greatly increased, but also most faculties have introduced M.Sc. and even Ph.D. degrees. The more senior faculty have retired or are on extended leaves of absence seeking more remunerative assignments. The burden of teaching/supervision is increasingly being borne by more junior, less experienced faculty, who often only have M.Sc. degrees. There is increased pressure for faculties to be more relevant, to be more engaged with solving national problems, and to produce graduates that meet the changing needs of agribusiness, demand driven research systems, and privatizing extension services. This is all taking place in the context of declining support for higher education from both national governments and donors.

New information and communications technology (ICT) have the potential to contribute to the upgrading and "retooling" of faculties of agriculture. However, the team found that access to the new technology is still inadequate. The computers available to faculty members are old and are unable to run the newest software; Internet connectivity is very limited, often with only one dial - up link in the faculty. However, two of the institutions visited, the University of Dar es Salaam and Makerere University, are investing, with donor assistance, in a substantial upgrading of the ICT infrastructure which should increase computer usage and improve access to the Internet.

The three countries in the assessment are all struggling with the impact of HIV/AIDS on their social systems and the economy. It is affecting faculties of agriculture in several ways: (1) Every faculty has both staff and students that are sick or have died from HIV/AIDS; (2) the collaborating partners in the national agriculture system (ministries of agriculture; research institutes) are also losing staff which negatively affects the ability to maintain linkages; (3) farming systems, particularly small holder agriculture, are changing as a result of the demographic changes in the labor supply; and (4) funding support to universities from national governments is likely to continue to decline as a larger share of the national budget is spent on health care.

Recommended Strategy

Improving the human capacity of the regional faculties of agriculture should contribute to the goal of ensuring regional food security. The faculties of agriculture have a key role to play

through teaching, research and outreach and without well functioning and effective faculties to train the next generation of agriculturalists, food security will be an elusive goal.

A capacity building program should be demand driven from the region and address issues of regional concern. It should develop long- term collaborative relationships between the faculties of agriculture and U.S. universities and increase the exposure of U.S. academics to Africa. A phased approach to program implementation allows the program to expand as funds become available. A management structure that ensures that regional representatives of the faculties of agriculture will have a strong voice in program design and implementation is recommended.

In developing the strategy, the assessment team has been acutely aware that the situation facing faculties of agriculture in Africa in the new millennium are very different form the situation in an earlier era of capacity development projects. There are many more trained people in Africa with clear ideas about what is needed and how to proceed. At the same time, the changing patterns of global trade, diminishing public funds, the ravages of HIV/AIDS, declining soil fertility, as well as a number of other issues pose real challenges to meeting the overall goal of food security. The complexity of the situation, the many unknowns, requires a flexible and genuinely collaborative approach in developing the capacities of faculties of agriculture to respond to the changing environment.

II. METHODOLOGY

The objective of the Regional Agriculture Sector Training and Capacity Building Needs Assessment was to identify training and capacity building needs for the university faculties of agriculture in Kenya, Tanzania, and Uganda. Proposed interventions will complement the objectives of the Initiative to End Hunger in Africa (IEHA), the Board for International Food and Agriculture Development (BIFAD), and the Regional Economic Development Services Office for East and Southern Africa (REDSO/ESA). This assessment report includes the following: documents reviewed by the team, individuals and institutions the team met while in the field, review of past programs along with successes and short-comings, existing and future regional programs, findings, three phase strategy for interventions that would contribute to building the capacity of the faculties of agriculture, and conclusion.

In consultation with USAID/EGAT, REDSO, and representatives of BIFAD, World Learning drew up a list of key contacts in the three countries which included the deans of the faculties of agriculture in the region, representatives from the Rockefeller Foundation, the Association for Strengthening Agricultural research in Eastern and Central Africa (ASARECA), the International Food Policy Research Institute (IFPRI), USAID missions, and REDSO. The list was then reviewed by USAID and BIFAD. The local team member based in Kenya arranged the meetings and developed the schedule for the visits to the identified key contacts in the region. The final schedule was reviewed and approved at a meeting held in Washington, D.C. that included David Simpson, World Learning, Art Love, USAID, John Thomas, USAID/EGAT, Dr. Carl Eicher, BIFAD (by phone), Sandra Blanchard, Team Leader, and Dr. Vitalis Musewe, assessment team member (by phone).

The team consisted of four members: Sandra Blanchard, senior consultant for World Learning; Dr. Adipala Ekwamu, professor of agronomy from Makerere University; Dr. Vitalis Musewe, the registrar for Jomo Kenyatta University who has worked with ICIPE for many years; and Dr. David Norman, agricultural economist from Kansas State University with extensive experience in Africa.

In each country, initial visits were made to the USAID mission to discuss the assessment and the scheduled meetings with the key contacts. The team visited the six faculties of agriculture and one faculty of science in the three countries as well as number of agriculture related organizations.[1] During the assessment, the university faculty went on strike in Kenya to demand higher wages and that affected the availability of key people.[2] This was particularly a problem at Moi University where all of the faculty scheduled to meet with the team were attending strike strategy meetings elsewhere. However, the team found one senior professor and that turned out to be a very candid and useful conversation.

At several of the universities, the deans had arranged for one group meeting with the department heads and the team was unable to meet with individual faculty members. At other institutions, there were both group meetings as well as opportunities to meet individually and privately with faculty. Prior to the meetings, the team developed a list of topics to be addressed. Given the nature of the meetings, these were not rigidly adhered to but rather were used as guidelines. The meetings had two purposes. The first was to provide the team with the faculty perspective on the capacity gaps and needs at their institution. These capacity gaps were similar at each faculty of agriculture (see below). The second was to encourage the faculty to think creatively about capacity development in an era of limited resources and to take a regional perspective. All of the recommended activities in the report were a result of these discussions.

III. REVIEW OF PAST TRAINING PROGRAMS IN THE REGION

One of the largest USAID-funded capacity development programs in Africa was the African Graduate Fellowship Program (AFGRAD) and the follow-on project, Advanced Training for Leadership Skills (ATLAS). USAID suggested that the team contact AFGRAD/ATLAS alumni to get their feed back on capacity building efforts. The Africa-America Institute (AAI), which had managed the projects, provided a brief questionnaire. Unfortunately, due to the shortness of time, the team was unable to contact any alumni.

The team took another approach to gathering feedback on capacity building efforts. Many of the academics that the team met were beneficiaries of long-term capacity building programs sponsored by a range of organizations: USAID, the World Bank, Rockefeller Foundation, and various European donors. Academics had undertaken their graduate work in the U.S. and Europe. In informal discussions, the team asked them about their experiences: what worked;

[1] See Annex E for a list of contacts and Annex B for background information on the faculties of agriculture. The six faculties of agriculture and one faculty of science visited were University of Nairobi, Egerton University, Moi University, Jomo Kenyatta University, Sokoine University, Makerere University, and University of Dar es Salaam Faculty of Science.

[2] The allowance for a parliamentarian's domestic help is higher than a university professor's salary!

what problems they encountered; and given their experience, how they would design current training programs.
It should be noted that only those that returned to their home countries and continued to teach at the university level were interviewed. The non- returnees or those that left academia were not represented. Nevertheless, the team felt that some useful insights were gained from these discussions. These insights were incorporated into the suggested training program (see Annex G).

Most of these capacity building programs had funded both M.Sc. and Ph.D. level training. The model used was similar to USAID's standard "participant" training model in that students undertook all of their coursework, conducted their research, and wrote their theses at the foreign university. Some students spent as long as four to seven years at foreign institutions before returning to their home countries. While some students were accompanied by family members, others were separated for long periods of time.

All of the faculties that we spoke to were very grateful for the education they received through these programs. They felt that the training contributed to their intellectual development, exposed them to new thinking, and aided in their professional advancement. Many, especially those that went to the U.S., had very warm feelings toward their host country. As one senior researcher put it, "America's best ambassadors are not at the U.S. Embassy. They are the people who trained in the U.S. and have returned to Uganda."

That being said, the faculty felt that there were a number of problems with the old capacity building programs. The long separations from their home institutions led to difficult re-entries. They spoke of colleagues that had become depressed and subsequently left the universities after returning to their home countries. Research specialties were cited over and over as particularly problematic. The research that they undertook at the foreign institution was often irrelevant to the problems faced by Africa and/or it required research equipment that was not available at their home institution. Most had to refocus their research, develop more appropriate specializations, and learn how to operate in a resource poor environment. It was painful and often demoralizing for graduates who returned home.

Follow-up for returning graduates was limited. While some of the USAID-sponsored participant training programs did try to provide support to graduates through alumni associations, none of the faculty mentioned these programs. This could be because the traditional alumni programs do not provide the sort of follow-up that is of most interest to scientists: access to funding for research, opportunities to attend professional meetings, and assistance with publications. Several faculties approvingly mentioned the SIDA-SAREC BIO-EARN[3] program, which provides a "resettlement" grant for research to returning graduates, as a good model for training follow-up.

Another concern was that the traditional capacity development programs were "top down" with limited consultation with faculties of agriculture. It's hard to say if that was an issue to them as

[3] BIO-EARN is the East Africa Program and Research Network for Biotechnology, Biosafety and Biotechnology Policy Development. It is sponsored by the Department of Research Cooperation (SAREC) of the Swedish International Development Agency (SIDA). The program focuses on Ethiopia, Kenya, Tanzania, and Uganda and includes support for graduate training and research.

young graduate students, but it is very much a concern now that they are senior faculty members and deans. The faculty of agriculture at Makerere University has a presentation that they use with potential partners which critiques previous training efforts for this "top down" approach and urges a more "demand driven" and collaborative approach for future capacity development programs.

When asked how they would design training programs for today's young faculty, there was virtually unanimous agreement that "sandwich" programs were the preferred model.[4] Faculty felt that sandwich models give young faculty the benefits of rigorous course-based training while still keeping them attached to the home university (and the African realities). They also spoke of the need to involve U.S. faculty as research supervisors. Ideally, this could be combined with teaching short courses or conducting workshops. One of the concerns voiced was the importance of having research supervisors who were familiar with Africa.

An alternative to U.S. training that was frequently mentioned was training in South Africa. The training is less costly than sending students to the U.S. and it is perceived to be more attuned to the African reality. There was also strong support for programs such as FORUM and the new collaborative masters degree in economics (see Annexes C and D for details on these programs). It was felt that FORUM significantly improved the quality of research and level of training for M.Sc. students. The drawbacks that were noted is that it doesn't provide for Ph.D. level training and there are some fields that are excluded, such as mainstream animal science and agricultural engineering.

The assessment team was urged not to forget the training needs of staff that already hold Ph.D.s. It is not just the younger faculty that need training. There is also a need for short courses delivered in the region that can be used for specific skills development; these are a cost and time effective way to "retool" older faculty in new techniques and methodologies.

While far from an exhaustive review of the impact of previous capacity building efforts, these informal discussions were helpful to the team in developing a strategy for a new effort.

IV. FINDINGS

Background

There has been a general decline in the state of higher education over the past two decades in Sub-Saharan Africa. Rapidly increasing student populations, deteriorating economies, structural reform programs, and decreased donor support of higher education which started in the 1980's and continued throughout the 1990's, has created major challenges for higher education. The real spending per student in Africa has fallen from an average of $6,300 in 1980 to $1,500 in 1988 (World Bank 1994). The results are evident in deteriorating buildings, antiquated laboratory facilities, and inadequate libraries.

[4] Six to eighteen months of course work at the foreign institution with research conducted in the home country.

Faculties of agriculture have been no exception to the general decline, which has adversely affected both teaching and agriculture research. Enrolment in postgraduate agricultural related degrees *decreased* by 21% between the early 1980's and early 1990's (Beintema et al, 1998) while at the same time, the number of undergraduates *increased.* The inevitable consequence of a reduction in M.Sc./M.Phil. students, together with an increase in undergraduate numbers, is a reduction of resources and time available for research. Not surprisingly, by 1991, only 10% of the public agricultural research and development (R&D) in twenty-one African countries was done by universities (Pardey et al, 1997 and 1998). Reductions in resources, time, and money has inevitably had a negative impact on building up the human capital of faculties of agriculture. The end result is staff potentially less effective as both teachers and researchers.

The situation is of particular concern in faculties of agriculture in Sub-Saharan Africa (SSA), including Kenya, Tanzania, and Uganda. This is due to the continuing significance of agriculture in these economies, in terms of its contribution to the national incomes and as an employer of people. Failure to promote the development of agriculture will have a negative impact on the development of the overall economies of each country and the region.

Faculties of Agriculture in the Region

There has been significant growth of faculties of agriculture in the region[5] with many of the characteristics and problems that are symptomatic of African higher education in general. What follows is a brief overview of the problems and issues faced by faculties of agriculture in the three countries. More detailed information on each of the faculties can be found in Annex B. Generally, the situation differed little by country although there are some issues that are particularly serious in Kenya and those are discussed below.

1. Most of the faculties of agriculture have introduced not only a range of B.Sc. degrees, but also a variety of M.Sc. degrees and almost all, if not all, have Ph.D.s usually with no compulsory course work.

2. Although the number of faculty increased, teaching loads increased at an even greater rate, accompanied by large increases in the sizes of undergraduate classes.

3. In contrast, the sizes of many M.Sc. level classes are often small and not cost effective. The lack of scholarships or sponsorship for students is a factor as well as the proliferation of programs. The problem is more serious in Kenya than elsewhere in the region (see below).

4. Many faculties of agriculture appear to have reasonable numbers of faculty, but a closer look at the composition gives a less satisfactory picture. Many of the senior faculty have Ph.D.s and are close to retirement. The more able senior faculty are on leaves of absence working elsewhere. As a result, in many departments, much of the teaching load is carried by faculty with only M.Sc. degrees.

[5] In the context of this report the term "region" refers to Kenya, Tanzania, and Uganda.

5. Curricula needs to be revised to develop the skills and orientation that graduates will need in a private-sector driven agriculture environment.

6. Faculty at all levels feel the need to re-equip themselves with some of the more recent teaching methodologies and analytical techniques.

7. Research output is low on the part of many faculty. There are a number of contributing factors including high teaching loads, the lack of post-graduate students, the limited availability of research funds, and efforts to supplement inadequate salaries with incomes from other sources.

8. Low salaries are a factor in the retention of the more able faculty, but equally important are the opportunities for professional development through supported research, sabbaticals, post-doctoral fellowships, and sponsorships for Ph.D.s. These have become much scarcer in recent years because of dwindling donor support for human capacity development in higher education, particularly in agriculture.

9. Financial exigencies in the universities in the region have created additional problems making the working environment of faculty less than optimal, thereby further contributing to low morale and inhibiting their productivity. Major issues include:
    - Technicians are aging; hiring freezes makes it difficult to replace them and virtually no capacity building programs target the technician level.
    - Equipment (e.g., laboratory, computers and software) is often old and outdated and as a result becomes increasingly difficult to maintain, and inhibits both the effectiveness and scope of teaching and research programs.
    - Electronic connectivity and access to current literature and textbooks is woefully inadequate in most faculties.

Faculties of Agriculture in Kenya – Particular Problems

While all of the faculties of agriculture in the region have introduced new undergraduate and graduate degrees stretching resources to the maximum, the situation is exponentially worse in Kenya. During the previous regime, there was a proliferation of new, public universities with faculties of agriculture and a concomitant increase in inadequately funded undergraduate and graduate programs. Certificate granting agricultural colleges were upgraded to university status with a full range of undergraduate and graduate programs. This shows every sign of continuing under the current regime. There is intense popular pressure to expand the number of degree granting institutions since a degree, any degree, has become a requirement for advancement in Kenya.

The method used for calculating the amount of funds that universities and departments receive encourages the expansion of undergraduate programs. Universities receive funds based on the number of undergraduates (a capitation fee); the amount per student is the same whether the student is in the liberal arts or the sciences even though the costs in the sciences are much higher. This has lead to a substantial expansion of liberal arts programs (even at institutions that formerly focused only on agriculture) because they are less expensive to run. In order to

compete in this environment and to get their share of the funding, faculties of agriculture have all added new degree programs to lure students. On the one hand, that has resulted in degree programs that are more responsive to the need to produce graduates who will be employable. On the other hand, the funding mechanism does not recognize the real cost of educating agriculture students so there are dramatically insufficient resources for laboratories and fieldwork. The result has been a growth of duplicative programs competing for students and experienced faculty across the faculties of agriculture, all of which are characterized by an insufficient number of trained faculty and woefully inadequate laboratory facilities. The competition between faculties of agriculture also undermines collaborative efforts.

There has been a similar growth in the number of graduate programs. Many, if not most, of these graduate degree programs have only one or two students which makes them very costly to run. Yet faculty strongly lobby for them and see them as essential to their own advancement.[6]

In private discussions, deans and other senior faculty members will admit that the situation is out of control in Kenya and that there needs to be some rationalization and consolidation of programs. However, they also think this situation is unlikely to change. No department and no university wants to voluntarily cut back on its programs. Consequently, the number of under resourced faculties of agriculture is likely to increase.

Information and Communication Technology (ICT) / Distance Education

ICT is seen as having the potential to upgrade the course offerings available to students, to make available on-line journals and research findings; and to facilitate research collaboration both within Africa and between African institutions and institutions in the U.S. and Europe. However, the reality falls considerably short of the vision. [7]

Due to time constraints, the team was unable to obtain complete information on the status of the technical infrastructure at each of the institutions visited.[8] The team, however, asked each of the faculties about the availability of computers and Internet access for their staff and students. The same story was heard repeatedly: computers are old and cannot run the newest software. There are not enough computers to provide adequate access for students and faculty. Internet connectivity is very limited, often with only one link-up in the faculty.

Two of the institutions, the University of Dar es Salaam (USDM) and Makerere University, are in the process of significantly up-grading their infrastructure with donor assistance. USDM will have three fiber optic backbone networks that will link computers throughout the university; the

[6] Faculty are promoted solely on the basis of the number and quality of their research publications. No weight is given to their teaching, outreach, or departmental support activities. This is a problem for universities throughout the region.

[7] In the course of this assessment, the team experienced difficulties contacting faculties both by telephone and email. Although all of the institutions visited in this assessment have "connectivity" and even web pages, basic communication remains a problem.

[8] The Inter University Council (IUC), based in Kampala, has just completed a survey of ICT capability of universities in Kenya, Tanzania and Uganda. The report is being finalized and should be available shortly.

Internet linkage will be upgraded from 128KBPS to 1 MBPS.[9] Makerere University has been quite successful in enlisting donor support for developing infrastructure. The African Development Bank will fund the networking of the main campus. USAID, through the Leland Initiative, is financing the installation of a wireless backbone; and NORAD is providing an $11 million grant for ICT-activities. Makerere University's second strategic plan identifies five priority areas for the application of information and communications technology including implementing a specific ICT-based applications for teaching and research. In 2002, it began implementing an on-line component for ten campus-based courses in political science, gender studies, and sociology (Till 2003).

The World Bank, through its Global Development Learning Network, also has training facilities with good connectivity and video conferencing capability in Kampala, (located at the Uganda Management Institute) and Dar es Salaam (Institute of Financial Management). These facilities, which are used by the Bank for in-country training programs, are available to other institutions on a fee basis and could be potentially used for distance education programs by the universities.

Access, however, is only one component of distance learning. The second component -design of the course materials and local support for learners- is often overlooked in discussions that focus on access and connectivity. As Graham Till points out, there is a difference between providing a delivery mechanism and enabling the creation of appropriate learning experiences (Till 2003). Good distance-learning will require courses with material that is specific to Africa and uses learning modalities that are adapted to African preferences. It will also require on-site student support, a component that is often missing or poorly thought out in many distance-learning initiatives.

Despite the caveats, the team believes that there is enormous potential for the new technologies to contribute to the upgrading of research and teaching in Africa. But at this point, designing good distance learning opportunities will require realistic assessments of the situation within individual faculties of agriculture.

HIV/AIDS and the Impact on Faculties of Agriculture

At each of the faculties of agriculture visited, the team brought up the issue of the impact of HIV/AIDS on the faculty and the larger agricultural community and how it might affect any long-term capacity building initiative.

Until quite recently, HIV/AIDS was viewed as a health problem with programmatic responses coordinated through Ministries of Health and focused on community awareness, prevention, and care. It was assumed that it would have minimal impact on the economy, including the agriculture sector. As late as 1999, a major World Bank-funded study calculated that the decline in the annual growth rate of GDP was only about 0.3% in the 20 most seriously affected

[9] This is a substantial increase, but it is still well below the standards for the US. For example, the University of Maryland has three T3 lines (each T3 line has 44.736MBPS for a total of about 134 MBPS) and students still complain about the slowness of Internet downloads during peak usage hours. A typical broadband connection to an individual household in the U.S. has a capacity of between 1-3 MBPS.

countries in Africa. Those figures have been rapidly revised upwards as the extent and the impact of the pandemic in east and southern Africa becomes apparent.

Kenya, Tanzania and Uganda all have relatively high rates of HIV/AIDS prevalence variously estimated at: Kenya-14%; Tanzania- 8.1%; and Uganda-8.3%.[10] In all three countries, the epidemic is considered "mature", that is people are not only infected but the impact of prolonged illness and premature deaths are affecting the society and the economy. It is important to realize that the full impact of HIV/AIDS on the economies and the social systems is still to come.

It is likely that faculties of agriculture in the region will be affected in at least four ways:

1. Every faculty that the team visited has members that are thought to be sick with HIV/AIDS. There are, however, no HIV/AIDS reliable figures. In a few cases, people are open about their HIV/AIDS status, but often faculty assume that a colleague is HIV positive based on the pattern of their illness. Staff are being lost prematurely which will further exacerbate the inadequate staff situation. It also has implications for the effectiveness of training efforts. The Rockefeller Foundation estimates that as many as 20% of the students trained through the FORUM program have since died from AIDS.[11]

2. The collaborative partners and institutions with which the faculties of agriculture work are also losing staff. These include the ministries of agriculture, extension services, research institutes, and NGOs. For example, a survey of Ministries of Agriculture (MOAs)[12] found that absenteeism due to illness and time spent going to funerals was seriously affecting the ability to implement their programs. Maintaining effective linkages between the constituent institutions of the agricultural system is going to become increasingly difficult as the human capacity of institutions is eroded.

3. The farming systems in the region are changing, but this is not yet reflected in either the curriculum or the research of the faculties of agriculture. Labor is now in short supply in many rural areas. There have been projections that Tanzania and Uganda will lose 13-14% and Kenya will lose 17% of the agricultural labor supply by 2010 as a result of HIV/AIDS (2001 cited in Drimie 2002).[13] Low labor subsistence crops are being substituted for labor intensive cash crops. For example, in the Bukoba District, Tanzania the banana/coffee/bean system has been replaced by the low labor cassava/sweet potato system (Rugalema 1999 cited in Topouzis 2003). Families also reduce the amount of land under cultivation. Up to

[10] Figures are from the U.S. Census Bureau and are available at www.census.gov/ipc/hiv. In each of these countries, there are areas and populations with rates of prevalence that are much higher than the average. So for example, Nyanza Province in Kenya has rates hovering around 35%.

[11] This was discussed at a meeting with Rockefeller representatives at their New York offices on September 9, 2003.

[12] The survey was conducted in 2000 in Namibia, South Africa, Tanzania, Uganda and Zambia (Topouzis 2003).

[13] Both the elderly and children are assuming a greater role in farming. The elderly often don't have the strength for farming; and the young are not well versed in farming skills. In a study in Kenya, only 7% of orphan-headed household had sufficient agricultural knowledge to run a farm while more than 80% didn't even know where to get information on farming. (Topouzis 2003).

25% of the households in the districts of Rakai and Masaka in Uganda are cultivating less land as a result of the loss of a family member.

4. Over the next several decades, national governments are going to spend an increasing amount of the budget on health care even as revenues from taxes are likely to decline. This is going to leave a smaller share of the budget for university support.

The institutional response to HIV/AIDS has been almost entirely limited to some awareness programs for students and staff except for a few M.Sc. students conducting research on nutrition-related issues.[14] These findings are not surprising given that the public discussion on HIV/AIDS is still focused largely on prevention and care and is dominated by ministries of health and health-oriented NGOs.

The assessment team found, however, that just raising the issue stimulated thinking on the subject as the faculty realized that well designed research could contribute to more effective national and regional responses for mitigating the impact of HIV/AIDS in both small holder and commercial farming. Faculty members agreed that at a minimum, graduates who will be employed by Ministries of Agriculture, extension services, and NGOs have to be prepared for this changing environment.

V. STRATEGY

Purpose of a capacity building program

Improving the human capacity of the regional faculties of agriculture should contribute to the goal of ensuring regional food security[15] in support of the Initiative to End Huger in Africa (IEHA). The initiative focuses on promoting agricultural growth and increasing rural incomes rapidly and sustainably. The faculties of agriculture have a key role to play through teaching, research, and outreach. In fact, without well functioning and effective faculties to train the next generation of agriculturalists, food security will be an elusive goal.

Issues and Constraints

The team is conscious that training by itself will not be sufficient to ensure that goal. There are a number of issues that influence whether or not food security is attainable, many of which are outside the purview of what can be done through a human capacity building effort. It is worth outlining some of these:

[14] One of the few exceptions was at Makerere University where research on the impact of HIV/AIDS on the smallholder dairy sector was being conducted with support from DANIDA.

[15] Meeting the goal of food security involves the ability of households to produce enough food to meet their consumption requirements and/or earning enough money at the individual/ household level to purchase the necessary food requirements.

1. Regional (global) level

Visits with faculty in the region revealed considerable concerns about issues that are regional or global in character. They are well aware that global issues have an effect on the region's agricultural economies, but they feel ill equipped to respond to them. These concerns related to governance and transparency; regional and international trade agreements; the reduction of support in the public sector and the increasing significance of the private sector; and biotechnology advances, particularly the development of genetically modified organisms (GMOs.)

Many, though not all, of the issues at this level involve policy decisions of national governments that are anxiously trying to respond to a rapidly changing global environment. Individual faculties of agriculture have limited capacity to affect the issues at the global level. Where they can have an impact is through contributing research findings and informed analysis to the policy debates.

2. National (mesa) level

At this level, there are two different sets of issues. The first includes issues that affect the national agricultural environment. These include efforts to transform and commercialize agriculture, the privatization of extension services, the decrease in soil fertility and the increased farming activity in semi-arid areas. As the HIV/AIDS pandemic deepens, it will affect the agricultural economy in ways that can't be fully anticipated. Faculties of agriculture can contribute to policy formulation through their research and analysis; develop and disseminate better agricultural practices through research and outreach; and prepare a new generation of agricultural professionals who have the skills needed by both business and public sector institutions.

However, the capacity and effectiveness of faculties of agriculture to do these things is limited by the second set of mesa issues: those concerning government policies with respect to tertiary education, university funding, governance, and performance. As a result of good leadership, Makerere University in Uganda is probably the furthest along in developing and implementing a long-term strategy and policies that create a positive environment for teaching and research. Kenya has the farthest to go and the current clash between faculty organizations and the government over salary adjustments is just the latest manifestation of the long standing problems.

3. Faculty (micro) level

At the faculty level, one of the critical but often overlooked issues is the importance of developing linkages. Nurturing linkages between faculties of agriculture in the region exploits the comparative advantages that different universities possess; linkages with agricultural faculties outside the region exposes the faculties to new thinking and methodologies and provides opportunities for research partnerships; linkages with other agriculture stakeholders (i.e. research and extension services) maximizes the impact of faculty and student research; and linkages with the private sector /industry helps ensure that graduates will have the skills needed

by industry. Without effective linkages that reach beyond the faculties, capacity building is an isolated activity with limited impact.

Most capacity development programs focus on the faculty level - the need for assistance at this level is so painfully obvious. However, the degree to which assistance will pay-off is highly dependent on whether or not the issues at the two higher levels are considered. If, for example, government policies are not supportive of universities, then investments in human capacity development will have limited pay-off. Or if the national agricultural policies are not well thought out, this will undermine any contributions that faculties of agriculture make to the goal of achieving food security. Failure in the past to consider higher level issues, particularly those at the mesa level, has reduced the impact of training at the faculty level.

Strategy Characteristics

In coming to a conclusion as to what was desirable and indeed feasible in terms of building human capacity in higher education, the team took into account a number of considerations. These considerations are based on the fundamental notion that the world and the region today is very different from the situation that existed during the sixties to eighties period. These considerations are the following:

- Any capacity building program in higher education needs to be ***demand driven from the region*****.** Currently many more trained individuals exist in the universities in the region than was the case twenty years ago. Also, many faculties of agriculture have come of age in the sense of having very clear ideas about their training needs, priorities, and preferred strategies for capacity development. Thus, a genuine commitment to a demand driven approach to the design and the implementation of capacity development activities is essential.

- The proposed activities should address ***issues of regional concern*****.** The team has interpreted this broadly to include:

  - issues with which the region is grappling (e.g. trade agreements, biotechnology);

  - similar problems that are of critical concern in each of the three countries that could benefit from collaborative linkages and research agendas among the faculties of agriculture (e.g. declining soil fertility and the management of semi arid lands; HIV/AIDS); and

  - similar problems facing each of the universities that inhibit their ability to effectively address national and regional issues (e.g. inadequate linkages between faculties and other agricultural stakeholders; the need for revised curricula).

- It should ***develop long-term collaborative relationships*** between the faculties of agriculture and U.S. universities and ***increase the exposure of U.S. academics to Africa***. During the 1960's and 1970's, many U.S. academics accepted long-term contracts in institution building activities at universities throughout Africa. Their commitment to

Africa outlasted particular projects and many continue to maintain close ties with colleagues at African institutions. Unfortunately, nearly all of these U.S faculty members with "hands-on" experience in Africa have retired or will be retiring in the very near future. Thus, a vacuum is developing in the sense that there are now very few faculty in U.S. academia with even short- term, first hand exposure to Africa.

At first glance, this does not seem to be particularly relevant to the problems facing faculties of agriculture in the region. But it has implications for the effectiveness of any new capacity building effort and for long-term sustainable partnerships. African students studying in the U.S. have increasingly fewer opportunities to identify staff and major professors who understand their situations and who can provide supervision and mentoring that helps ensure they receive training that is as relevant as possible to the realities students will face in their home environments. Therefore, the team believes it is imperative that the younger generation of U.S. academics have first hand exposure to the situations in African countries.

Phased Approach

The team recommends a phased approach that can be implemented as funds become available (see Annex G for an example of a phased capacity building program). This has the advantage of allowing activities to be initiated quickly with the currently available funds and thus demonstrate a commitment to capacity development to African colleagues. There have been many assessments and fact- finding missions sponsored by various donors that have resulted in little. Faculties of agriculture have understandably become skeptical about the whole process.

Secondly, a phased approach allows more opportunities for fine-tuning the mechanisms for ensuring that the program is demand driven from the region and is not just a "top down" program implemented by U.S. institutions with only cursory discussions with the regional faculties of agriculture. A phased approach also will allow time to consider in more detail the elements of a larger capacity building effort. This should be designed in consultation with the faculties of agriculture, perhaps as part of an on-going process during the first phase. A prioritized plan may also provide an opportunity to enlist other donors in support of these efforts. Capacity building is going to require a long -term commitment, substantial funding, and a flexible approach.

Program Management

The team recommends that there should be a mechanism for ensuring that the initial design of a capacity building program is demand driven from the region. This could be done through the REDSO office with an informal committee to provide input into the development of an RFA and to vet the submitted proposals. The committee should include one representative nominated from the steering committees of the Collaborative M.Sc. Degree in Agricultural and Applied Economics and two representatives nominated by the steering committee of FORUM,[16] and one representative from animal science, and one from agricultural engineering. Each of the five

[16] Two are proposed from FORUM because of the multiplicity of disciplines represented in FORUM activities. The two from FORUM should represent different disciplines and should exclude agricultural economics which will be represented in the Collaborative M.Sc. Program in Agricultural and Applied Economics representation.

representatives should come from different faculties of agriculture in the region (i.e., in Kenya, Tanzania or Uganda).

Once the project is awarded, a formal mechanism for ensuring that the project continues to reflect the perspectives of the faculties of agriculture should be instituted through the project management structure. The project coordination unit (PCU) should be located in the region and should be associated with a regional institution. The team considered two possibilities: ASARECA based in Entebbe and the Inter-University Council (IUC) based in Kampala.

There are several advantages to using ASARECA. It's an organization that focuses solely on agriculture; it could help create linkages between the NARS and the faculties of agriculture; and REDSO is working closely with them and has confidence in the organization. The major disadvantage is that it has not demonstrated, to date, good connections with faculties of agriculture. The advantages of working with the IUC is that it has a mandate to link the universities in Kenya, Tanzania, and Uganda. The IUC already manages regional programs funded by the Ford Foundation and SIDA-SAREC, and will shortly be managing a program for the Rockefeller Foundation. The disadvantage is that the IUC does not focus primarily on agriculture.

On balance, the team supports locating the coordinating unit at ASARECA providing that the PCU is an autonomous unit within ASARECA.

In addition, the team recommends that a project steering committee should be established consisting of analogous representatives to the ones suggested above plus an agribusiness representative, a REDSO representative, and a representative from the U.S. university which is awarded the project. The steering committee should play an active role in prioritizing needs, approving work plans, and ensuring that the project is responsive to the faculties of agriculture in the region.

Concluding Comment

In developing the strategy, the assessment team has been acutely aware that the situation facing faculties of agriculture in Africa in the new millennium are very different from the situation in an earlier era (1960s through the 1980's) of capacity development projects. Currently, there are many more trained people in Africa with clear ideas about what is needed and how to proceed. At the same time, the changing patterns of global trade, diminishing public funds, the ravages of HIV/AIDS, declining soil fertility, as well as a number of other issues pose real challenges to meeting the overall goal of food security. The complexity of the situation, the many unknowns, requires a flexible and genuinely collaborative approach in developing the capacities of faculties of agriculture to respond to the changing environment.

ANNEX A

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ANNEX B

BACKGROUND INFORMATION ON AGRICULTURE RELATED FACULTIES IN KENYA, TANZANIA, AND UGANDA

I. KENYA

University of Nairobi / Faculty of Agriculture

Background Information

The Faculty of Agriculture at the University of Nairobi was started in 1970/71 with the enrolment of 41 students. Since then, the Faculty has grown into eight departments: Agricultural Economics, Animal Production, Crop Protection, Crop Science, Food Science and Technology, Soil Science, Range Management, and Environmental and Biosystems Engineering.

Academic Programs

Four-year B.Sc. degree programs are offered in agriculture (with options in animal production, crop production, soil science and crop protection), agribusiness agricultural extension and education, agricultural economics, food science and technology, nutrition & dietetics, range management, environmental management, and environmental and biosystems engineering. M.Sc. degrees are offered in each of the departments. All departments also offer thesis-based Ph.D. programs.

Student Enrolment

Data was available only for graduate student enrolment.

Output of Postgraduate Students by the Departments of the Faculty of Agriculture, University of Nairobi		
	M.Sc.	**Ph.D.**
Department of Crop Science	9-12 each year	1-2 each year
Department of Animal Production	3-4 each year	1 each year
Department of Food Science and Technology	18 alternate years	occasional

Department of Crop Protection	3-4 each year	1 each year
Department of Soil Science	2-3 each year	1 each year
Department of Environmental and Bio-systems Eng.	6 each year	Occasional
Department of Agricultural Economics	13 each year	1-2 each year
Department of Range Management	3-6 each year	occasional

Source: University of Nairobi, Faculty of Agriculture, Programs and Departments, October 2003

Academic Staff Levels

Distribution of Academic Staff of the Faculty of Agriculture, University of Nairobi, during the 2002/03 Academic Year

Department	Have Ph.D.	Have M.Sc	Have B.Sc.	Staff Rank						Total Staff
				P	AP	SL	L	AL	TA	
Crop Science	9	7	1	1	2	6	5	3	-	17
Animal Production	7	7	-	-	3	4	7	1	-	14
Food Tech. & Nutrition	9	3	-	1	3	4	3	5	-	12
Crop Protection	9	1	-	1	1	4	3	1	-	10
Soil Science	8	4	-	-	4	3	7	1	-	12
Env. & Biosystems Eng.	6	9	-	1	1	5	5	3		15
Agric. Economics.	11	4	1	-	4	3	8	1	-	16
Range Management	8	5	-	1	-	6	5	1	-	13
TOTAL	67	40	2	5	15	35	43	16	-	109

Legend: P Professor; AP Associate Professor; SL Senior Lecturer; L Lecturer; AL Assistant Lecturer

Source: University of Nairobi, Faculty of Agriculture, Programs and Departments, October 2003

Faculty Research

Faculty are conducting research in the following areas:

- Adoption of technology in agriculture.
- Small-scale food processing enterprises.
- Banana and sweet potato storage, processing and utilization; sorghum/millet processing and utilization; cassava processing and utilization.
- Runoff and soil erosion; modeling of hydrological processes, impact assessment of land degradation and productivity; and land evaluation using GIS.
- Livestock production systems; dairy goat breeding; tree forages and napier grass as livestock feed; agricultural by-products as animal feeds.
- Pest and disease problems in food crops, horticulture, cash crops and the environment and their management.

- Drip irrigation technologies; draft animal technologies; rainwater harvesting.

Collaborating Donor Agencies

1) Rockefeller Foundation

- Direct support to research projects of faculty staff
- FORUM: Support to postgraduate training scholarships and student research funding; support to research of faculty staff through competitive grant system
- Collaborative Masters in Ag. Economics under development

2) SIDA/SAREC:

- Support to the regional M.Sc. program in range management
- Support to M.Sc. programs and equipment in environmental and biosystems engineering
- Support to research, workshops and publications of the Conservation Tillage for Dryland Farming
- Biotechnology postgraduate training through the Bio-EARN Network

3) Netherlands Government

- Infrastructure development in environmental and biosystems engineering department

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ICT/ Distance Learning

The University is a member of the KENET system that links the universities in Kenya and improves their connectivity. However, this has not led to improved access in the Faculty of Agriculture to date. Computers are old and cannot run the new software; access to the Internet is extremely limited with only one (slow) dial-up connection in the Dean's office. There is no networking of computers in the faculty of agriculture.

HIV/AIDS Issues

The university has implemented a university-wide awareness and counseling program. There is some research activity on the impact of HIV/AIDS on farmer households.

Needs and Future Outlook

- ***Staff development***: There is a need for re-training staff in new and specialized areas. These include econometrics, biometrics, and GIS technology. Short courses delivered in the region are preferred, rather than long-term degree training.

- ***Training for technical staff***: Technical support personnel lack skills for handling modern research and training equipment. Skills improvement and re-tooling is required in instrumentation and equipment maintenance and on GIS technology.

- ***Curriculum development***: The faculty would like to develop certificate-training courses in floriculture, horticulture and landscape architecture. There is a need to revise current courses to reflect the new export requirements.

- ***Outreach***: The Faculty has several outreach programs (e.g. the Conservation Tillage project; the certificate program for professionals in Nutrition for Emergencies) but it would like to develop additional programs and activities that link the faculty directly with the end user.

Egerton University / Faculty of Agriculture

Background Information

Egerton University was founded as a diploma-awarding agricultural college in 1939. It became a college of the University of Nairobi in 1986 and received full university status in 1987.

Academic Programs

The Faculty offers training at four levels:

- three-year diploma programs in: animal health, dairy technology, horticulture and farm management;
- four-year B.Sc .programs in seven disciplines: animal production, agriculture, dairy science and technology, food science and technology, horticulture, agricultural economics and in agribusiness management;
- two-year M.Sc. degrees in: animal production, agronomy, horticulture, soil science, agricultural economics, and food science;
- three-year thesis-based Ph.D. programs in animal science crop science, food science, agricultural economics.

In addition the Faculty offers short refresher courses for industry staff, especially in dairy technology and horticulture.

Student Enrolment

Student Enrolment in four program categories on the Faculty of Agriculture, Egerton University in the 2003/04 Academic Year

Program Category	Number of Students
Diploma	697
Bachelor of Science	1,523
Master of Science	48
Doctor of Philosophy	10

Source: 2003 Faculty Brochure, Faculty of Agriculture, Egerton University

Academic Staff Levels

Distribution of Academic Staff of the Faculty of Agriculture,

Egerton University, Kenya in mid 2002

Department	Ph.D.	M.Sc	B.Sc.	Staff Rank (second figure refers to vacancies)						Total Staff
				P	AP	SL	L	AL	TA	
Agronomy	11	9	1	1/2	0/2	5/7	8/0	6/0	1/0	21/11
Animal Science	9	13	0	0/2	4/1	5/2	7/0	6/0	0/0	22/5
Animal Health	1	10	0	0/1	0/2	2/4	8/0	1/3	0/0	11/10
Agricultural Economics										
Dairy Food Science	4	7	4	0/2	2/0	1/3	5/0	3/1	4/0	15/6
Horticulture	5	11	2	1/2	0/4	3/3	3/4	9/0	2/0	18/13
Soil Science	7	2	0	0/3	0/3	6/0	1/4	2/0	0/0	9/10
TOTAL	67	40	2	5	15	35	43	16	-	109

Legend: P Professor; AP Associate Professor; SL Senior Lecturer; L Lecturer; AL Assistant Lecturer

Source: Modified from: Norman and Obwona Report: *Status of Agricultural Economics in Selected Countries in Eastern/Southern Africa*. A Report Prepared for the Rockefeller Foundation in Respect of the Proposed Collaborative M.Sc. in Agricultural and Applied Economics

Research Programs

The various departments of the Faculty have research projects in the following areas:

- Cereal legumes rotation studies; adaptability of high-yielding climbing bean cultivars
- Management of striga weed in collaboration with KARI
- Livestock early warning systems
- Rapid micro-propagation technology
- Leguminous trees as fodder

- Chick pea studies
- Mineral nutrition in camels

Collaborating Donor Agencies:

1) The Rockefeller Foundation:

- FORUM Project: Postgraduate scholarships and competitive research funding for faculty.

2) The World Bank:

- Support for striga weed research in western Kenya in collaboration with the Kenya Agriculture Research Institute (KARI).

3) USAID/GL-CRSP:

- Support for development of livestock early warning systems in collaboration with Texas A&M and the International Livestock Research Institute (ILRI).

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ICT/ Distance Education

Access to computers and Internet connection is limited. The University of Massachusetts is implementing a project to build computer labs for the faculty of Social Sciences and to develop an Internet cafe/business center. This has not resulted in increased Internet access for the Faculty of Agriculture to date.

HIV/AIDS Issues

The University is developing an awareness course on HIV/AIDs for undergraduates as part of the African Universities Respond to HIV/AIDS initiative. Within the Faculty, there is some nutrition-related M.Sc. research and a course on relating HIV to development, agriculture, nutrition and prevalent disease conditions (such as malaria) is being planned.

Needs and Future Outlook

- ***Staff development***: The Faculty identified the following areas as critical for short courses for staff re-tooling: dry land farm management; biometry; and proposal writing. Long-term training is particularly needed in the departments of Food Science and Agricultural Economics

- ***Centers of Excellence***: The Faculty noted that there is significant duplication of research and postgraduate training by the universities, more particularly within Kenya, but also in the region. There was an identified need for the establishment of specialized teams/laboratories for specific areas of research and graduate training, which would be well equipped and staffed.

Moi Univesity / Faculty of Agriculture

NOTE: The Assessment Team visited Moi University on November 14, 2003. Unfortunately, all of the scheduled meetings were cancelled because of the nation wide strike by university academic staff. The team was able to meet with only one faculty member, Dr. C.O. Othieno, a member of the Department of Soil Science, who was called in to act for the Dean. Therefore, the information on Moi University is quite limited.

Background Information

Moi University was founded in 1984 as a science and technology based institution. The Faculty of Agriculture was established in 1992. The Faculty of Agriculture consists of five departments: Soil Science, Crop Production, Agricultural Marketing and Co-operatives, Rural Engineering and Horticulture.

Academic Programs

The Faculty of Agriculture at Moi University was primarily a graduate training and research facility. Undergraduate training in the Faculty was added only recently. Presently, three, four-year Bachelor of Science programs are offered: horticulture, general agriculture, and agricultural marketing. Two-year Master of Philosophy programs are offered in: agricultural resource economics, soil science, and rural engineering. Ph.D. programs that are thesis-based are offered in rural engineering. In addition, there is a three-year diploma program in agricultural mechanization.

Student Enrolment

The Team received no comprehensive information on student enrolment in the Faculty.

Academic Staff Situation

The table below shows the numbers and rank distribution of academic staff of the Faculty of Agriculture. A striking feature is the high number of vacancies in the departments, particularly in the Departments of Agricultural Marketing and Cooperatives and Rural Engineering, which reflects the difficulty of retaining people with these specializations at the university. The relatively isolated location of the university is also a factor since it is difficult for staff to supplement salaries with consultancies.

Distribution of Academic Staff of the Faculty of Agriculture,

Moi University, Kenya in mid 2002

Department	Ph.D	M.Sc	B.Sc.	Staff Rank (second figure refers vacancies)						Total Staff
				P	AP	SL	L	AL	TA	
Soil Science	2	2	0	0/1	2/0	0/2	1/1	1/1	0/0	4
Crop Prod. & Seed Tech.	4	2	2	1/0	1/0	1/0	1/0	2/0	2/0	8
Agric. Marketing & Coop[a]	0	2	0	0	0	0	2	0	0	2
Rural Engineering	1	1	0	0/1	1/0	0/1	1/0	0/0	0/0	2
Horticulture	3	3	1	0/0	0/1	2/1	2/1	2/0	0/1	7
TOTAL	10	10	3	1/2	4/1	3/4	4/4	5/1	2/1	23

Legend: P Professor; AP Associate Professor; SL Senior Lecturer; L Lecturer; AL Assistant Lecturer

[a]Information on the established positions in this department was not available

Source: Modified from: Norman and Obwona Report: *Status of Agricultural Economics in Selected Countries in Eastern/Southern Africa*. A Report Prepared for the Rockefeller Foundation in Respect of the Proposed Collaborative M.Sc. in Agricultural and Applied Economics

Research Programs

The Team was unable to obtain details on Faculty research. The Soil Science Department is involved in arid/semi-arid lands research, which seems to duplicate what the University of Nairobi and Egerton University are doing. However, there was no discernable collaboration between the three universities.

Collaborating Donor Agencies

This information was not available to the Team. The Faculty participates in the FORUM program and therefore collaborates with the Rockefeller Foundation indirectly.

ICT Facility / Distance Learning

The Faculty has limited Internet connectivity and does not have a distance-learning program.

HIV/AIDS Issues

No information was available.

Limitations and Future Outlook

- ***Staff Development***: As noted above, there are a considerable number of staff vacancies. The Faculty is in dire need of qualified staff in all its departments. However, the working conditions, low salaries, and the location of the university make it difficult to retain staff.

- *Centers of Excellence*: **There is recognition that the proliferation of under funded, understaffed programs is a problem. There needs to be specialization of university departments and research teams into centers of excellence in order to build quality for high-level research and graduate training.**

Jomo Kenyatta University Faculty of Agriculture and Technology

Background Information

The Faculty of Agriculture was established in 1980 under the then Jomo Kenyatta College of Agriculture and Technology. It was fully sponsored by Japan through the Japanese International Co-operation Agency (JICA). In 2001, a major restructuring of programs was undertaken to phase out diploma programs and to introduce more undergraduate degree programs. There are now three departments: biomechanical and environmental engineering (BEE), food science and technology (FST), and horticulture.

Academic Programs

The Faculty of Agriculture offers four-year programs leading to B.Sc. in horticulture, ornamental science and landscaping, food science, nutrition, and food science/post-harvest technology. There also are two five-year programs in: biomechanical and processing engineering and soil, and water/environmental engineering. M.Sc degrees are offered in the following fields: food chemistry, food microbiology, food engineering, postharvest physiology and technology, biomechanical engineering, processing engineering, soil and water engineering, pomology (fruit science), olericulture (vegetable science), floriculture, postharvest physiology, crop protection, and soil fertility. The Ph.D. degree by thesis only is also offered in various specializations.

The Faculty also offers short courses for national and international participants: applied food analysis for food scientists, applied plant propagation technology in horticultural crops, agricultural machinery and management, and irrigation and water resources management for extension workers and officers. Local courses include food processing for small-scale businesses and alternative energy sources for the small and medium enterprises sector.

Student Enrolment

Student Enrolment in the Faculty of Agriculture, JKUAT in the 2003/2004Academic Year			
Diploma and Undergraduate Programs	**Male**	**Female**	**Total**
Diploma Agricultural Engineering	25	2	27
Diploma Food Science and Postharvest Technology	21	7	28
Diploma Horticulture	26	9	35
B.Sc. Biomechanical and Processing Eng.	49	10	59
B.Sc. Soil, Water and Environmental Eng.	35	7	42

B.Sc. Food Science and Postharvest Tech.	47	33	80
B.Sc. Horticulture	89	43	132
B.Sc. Ornamental Science & Landscaping	21	20	41
B.Sc. Agricultural Eng.	56	4	60
Alternative Degree Programs			13
Totals	**369**	**135**	**517**
Postgraduate Programs			
Master of Science	15	9	24
Doctor of Philosophy	9	1	10
Totals	**24**	**10**	**34**

Source: Office of the Registrar (Academic)

Academic Staff Levels

The Faculty of Agriculture at JKUAT is one of the best-staffed institutions of agricultural education and research in Kenya. The current number of staff stands at fifty-six (56), with 38 Ph.D. holders and 18 M.Sc. holders.

Distribution of Academic Staff of the Faculty of Agriculture, Jomo Kenyatta University of Agriculture and Technology (JKUAT), Juja, Kenya in November 2003 (Female member shown in brackets)

Department	Ph.D.	M.Sc	B.Sc.	Staff Rank						Total Staff
				P	AP	SL	L	AL	TA	
Horticulture	10(2)	6(0)	0	0	3	4	6	3	0	16
Food Science & Tech	13(2)	5(0)	0	1	3	8	0	4	2	18
Biomech & Env. Engineering	15(2)	7(0)	0	0	2	11	7	1	1	22
TOTAL	37(6)	18(0)	2	1	8	23	13	8	3	56

Legend: P Professor; AP Associate Professor; SL Senior Lecturer; L Lecturer; AL Assistant Lecturer

Source: Office of Registrar (Administration. Planning & Development), JKUAT, Juja, Kenya

Research Programs

The Faculty undertakes both applied and basic research.

- Germplasm development for genetic improvement; toxicity and water stress in vegetables and fruits; mineral nutrition in fruits
- Optimization of agronomic practices in indigenous/exotic vegetables
- Research on problems affecting small-scale farmers
- Food processing technology; development of food standards
- Biomechanical systems; bio-processing and structures; farm power and machinery; Vehicle-soil interactions

Collaborating Donor Agencies

1) Rockefeller Foundation:

- Equipment and infrastructure support to the Institute of Biotechnology; training in biotechnology.

2) Japan Agency for International Co-operation (JICA)

- JIKA has been the principal supporter of JKUAT since its founding. Core support has ended, but support for specific research and training activities is still extended to the Faculty through the programs of the Japanese-sponsored African Institute for Capacity Development (AICAD).

3) German Academic Exchange Agency (DAAD)

- Provision of scholarships through the In-country Program
- Support to Annual Workshop on Sustainable Agricultural Production in the Tropics

4) International Center for Research in Agro-forestry (ICRAF) –

- Support for joint agro-forestry research and demonstration projects.

ICT / Distance Learning

The university is in the process of installing Internet connectivity, but it was noted that such a facility would still be inadequate for distance learning. The library has a CD-based literature support from the TEEAL Program, whose implementation is supported by the FORUM program.

HIV/AIDS Issues

The university is participating in the African Universities Respond To Aids Initiative and is developing training materials for undergraduates. The Faculty has no research program on the impact of HIV/AIDS on agriculture but it was agreed that this is an area that deserves attention

Needs and Future Outlook

- ***Staff development***: The university has more than 80 members of staff on training abroad many of whom seem unlikely to return. To prevent this in the future, the faculty would like to see more "sandwich" training and incentives such as resettlement research allowances. There is also a need for faculty retooling; short courses in biometrics are particularly needed. There is a need to support attachment of staff in advanced laboratories in US universities as part of staff re-training.

- ***Linkage programs***: The Faculty has attempted to develop student exchange programs with US institutions (Iowa State and George Mason University) with limited success. Nevertheless, the Faculty would like to encourage the development of student exchange programs.

- ***Centers of Excellence/Biotechnology Training***: The need for a common curriculum of training in biotechnology in the East Africa region was identified. It was suggested that there should be

specialization by different universities in specific areas of strength. JKUAT stated their strength as being in tissue culture techniques.

II. TANZANIA

University of Dar es Salaam / Faculty of Science

Background

The Faculty was established in 1965 and is one of the oldest at the university. Initially, the Faculty comprised of the departments of Botany, Chemistry, Mathematics, and Physics, but it grew steadily to its current full strength of six departments with the establishment of the Department of Geology and Computer Science.

The Academic Programs

The Faculty offers both undergraduate and postgraduate degree programs. The six undergraduate programs offered include: general science, geology, science education, computer science, and electronic science and communications. M.Sc. degree programs include: applied science of materials, chemistry, applied microbiology, biology, computer science, geology, physics, mathematics, fisheries and aquatic sciences, and wildlife and terrestrial ecology. Ph.D. programs are by thesis. The Faculty also offers an evening postgraduate diploma in scientific computing.

Student Enrolment

Faculty of Science Student Enrolment: 1996/97-2000/01 in Years 1-4

Program	1996/97	1997/98	1998/99	1999/2000	2000/01
B.Sc. Gen	99(35)	127(41)	112(48)	126(57)	112(59)
B.Sc. Edu.	216(51)	282(115)	270(104)	275(110)	362(111)
B.Sc. Geol	62(5)	79(4)	67(4)	72(7)	61(8)
B.Sc. Comp	67(4)	80(6)	99(5)	80(8)	79(9)
B.Sc. with Comp			26(3)	49(3)	66(15)
B.Sc. Elec	49(1)	58(1)	48(3)	53(3)	59(2)
TOTAL	**493(96)**	**626(167)**	**622(167)**	**655(188)**	**739(204)**

Note: The number of Female Students included in each category in a given year is shown in brackets.

Source: Facts and Figures 2000/2001 Booklet

Staffing Situation

The Staffing Situation for Academic Staff in the Faculty of Science, UDSM, Tanzania, November 2003 (Female Staff Shown in Brackets)

Department	Ph.D. Holders	M.Sc Holders	Total	Average Age
Botany	17(4)	1(1)	18(5)	46
Chemistry	19(1)	0	19(1)	46
Central Science Workshop	0	1(0)	1(0)	41
Computer Science	3(1)	6	9(1)	49
Geology	13	2(1)	15(1)	46
Mathematics	10	4(2)	14(2)	47
Physics	12	1(1)	13(1)	49
Zoology and Marine Biology	23	3(3)	26(3)	47
TOTAL	85(6)	30(8)	115(14)	47

Source: The Faculty of Science Five-Year Strategic Plan 200/03 – 2006/07

Collaboration with Donor Agencies

1) NORAD:

- Support for biotechnology training fellowships, training materials, and capital development

2) **DUTCH/MHO/NUFFIC** and **University of Nijmegen**
   - Support for capital development
   - Support sandwich postgraduate training

3) **SIDA/SAREC**:
   - Supports capacity building through training-linked research

4) **DAAD**:
   - Supports postgraduate training through in-country scholarship program and through their support to regional training networks

5) **DANIDA**:
   - Supports capacity building through research-linked training

6) **McArthur Foundation**:
   - Provides biodiversity research support

7) **Carnegie Foundation**:
   - Provides unrestricted Core Funding

ICT / Distance Learning

With the help of NORAD, the faculty is developing a distance-learning curriculum and is looking into bandwidth issues. Further assistance is needed in curriculum development for various courses, interactive pedagogical techniques, and infrastructure development for course delivery.

HIV/AIDS Issues

The faculty will be developing a course to be offered as a core course to undergraduates.

Needs and Future Outlook

The University is implementing the Institutional Transformation Program (ITP), in order to improve (a) staff remuneration, (b) university governance and (c) consultancy regulations with increased take-home for staff and consideration of consultancy work in promotions. The goal is to improve the teaching and research environment in order to attract and retain good staff.

The Faculty of Science identified several priority areas:

- Support for short courses for faculty skills development in biotechnology.
- Development of new courses to produce graduates with the skills demanded by industry.
- Re-tooling of teachers through in-service training.
- Training in proposal writing as part of the re-tooling of staff already in employment.
- Short courses for the re-training of technical staff in laboratory and analytical techniques.

Sokoine University of Agriculture / Faculty of Agriculture

Background Information

The Sokoine University of Agriculture was established in 1969 as a constituent college of the University of East Africa of which it was the Faculty of Agriculture. The Faculty was later transferred to the University of Dar es Salaam in 1970 and grew to become a full university in 1984. The Faculty consists of seven departments: agricultural economics and agribusiness, agricultural engineering and land planning, agricultural education and extension, animal science and production, crop science and production, food science and technology, and soil science. All departments are based at the main campus in Morogoro.

The Academic Programs

A semester system is being introduced for all programs and will be standardized in three years. Currently, there are both three and four- year undergraduate programs. Three-year programs are in agricultural economics, agribusiness, agricultural education and extension, and home economics. The four -year programs include general agriculture, agricultural engineering, agronomy, animal science, food science and technology, and horticulture. There are M.Sc. degrees (one year of course work and a dissertation) in all these areas.

Student Enrolment

Admission of undergraduate students to the Faculty Agriculture, SUA from 1995/96 to 2002/03 academic years. Current female enrolment is 33%

Gender	Year of Admission								
	95/96	**96/97**	**97/98**	**98/99**	**99/00**	**00/01**	**01/02**	**02/03**	**Total**
Male	506	626	621	676	804	921	1,064	1,247	6,465
Female	213	222	228	214	251	344	374	352	2,198
Total	**719**	**848**	**849**	**890**	**1,055**	**1,265**	**1,438**	**1,599**	**8,663**

Source: Computed from data in: Facts and Figures 2002 – 2003, SUA

Staffing Situation

The Faculty has difficulty attracting graduates to teach since they find it more attractive to work for NGO's, banks, and other commercial firms than to teach agriculture.

Staffing Situation in the Faculty of Agriculture, Sokoine University of Agriculture (SUA), November 2003

Department	Ph.D. Holders	M.Sc. Holders	Total Staff	Average Age
Crop Science	9(3)	7	16(3)	
Animal Science	21(5)	1	22(5)	
Food Science	17(5)	4(3)	21(8)	
Soil Science	11	2(1)	13(1)	
Agric. Eng. & Land Planning	16	1	17	
Agric. Economics	13(2)	5(1)	18(4)	
Agric. Edu. & Extension	6(1)	5(2)	11(3)	
TOTAL	93(16)	25(7)	118(21)	46

Note: Number of Female Staff in each category are shown in brackets

Source: Dean's Office Faculty of Agriculture, SUA

Collaboration with Donor Agencies

1) USAID:

- The principle support for research and training programs in the Faculty is through USAID. SUA is involved in several of the 18 or so CRSP programs including the CRSP-IPM on legumes and cereals and the bean CRSP.

2) Ohio State University:

- (USAD/ALO grant): This is a relatively new collaboration which is supporting the development of an agribusiness program.

3) Tuskegee University:

- Tuskeegee collaborates with the Faculty in on-farm research and extension. In addition, there is support for exchange visits, SUA staff training at Tuskegee, and purchase of equipment and facilitation of SUA's teaching programs.

4) NORAD:

- Provides capacity building support through the Future Opportunities and Challenges in Agricultural Learning program (FOCAL).

ICT / Distance Learning

The Faculty is exploring a distance-learning program with Wye College of the UK. Limited connectivity and computer resources are an issue.

HIV/AIDS Issues

The university has no HIV/AIDS policy. However, the Faculty is discussing launching studies on the impact of HIV/AIDS on agricultural productivity and the livelihoods of rural households and how the labor and nutritional inadequacies resulting from the affliction could be alleviated.

Needs and Future Outlook

- **Curricula review**: The Faculty plans to review its curricula to make it more responsive to the needs of the private sector. Modules on entrepreneurship skills and business financing will be developed

- **Faculty research:** Research has been production oriented, but there is a perceived need to take into consideration the socio-economic aspects of technology and its possible commercial impact to the market

- **Staff development**: The Faculty has a critical shortage of research and teaching staff in horticulture, food technology, and agricultural economics. It was noted that these professionals are in high demand in the private sector and the university had difficulties retaining staff.

III. UGANDA

Makerere University / Faculty of Agriculture

Background Information

The Faculty was established 1961. Currently, it includes the departments of Agricultural Economics and Agribusiness, Agricultural Engineering, Agricultural Extension and Education, Animal Science, Crop Science, Food Science and Technology, and Soil Science. It also includes the Makerere University Agricultural Research Institute (MUARK) and the Continuing Agricultural Education Center (CAEC).

Academic Programs

There are seven programs offering four-year undergraduate degree programs. These are: B.Sc. Agriculture with five options (animal science, crop science, soil science, agricultural education/extension and agricultural economics); agribusiness management; agricultural engineering; agricultural extension education; food science and technology; land use management; and horticulture, which has only been introduced recently.

The Faculty offers M.Sc. programs in agricultural extension education, agricultural engineering, agribusiness management, agricultural economics, animal science, crop science, food science and technology, soil science and applied human nutrition. In addition, each department offers thesis - based Ph.D. and D.Sc. degrees.

Student Enrolment

Undergraduate and Postgraduate Student Population Trends in the Faculty of Agriculture, Makerere University					
A. Undergraduate Students					
Year of Admission	1st Year	2nd Year	3rd Year	4th Year	Total
1995	157	146	164	151	618
2003	232	229	141	133	735
B. Graduate Students					
	1st Year	2nd Year			Total

1995/96	61	4			65
2002/03	136	95			231

Postgraduate students are sponsored through donor-funded scholarships and the private sector. Programs, such as FORUM, have increased the number of postgraduate students in the Faculty. A special, three-year project for Mainstreaming Gender in the Curriculum and Women Scholarship is now underway. The $227,693 U.S.D. project is funded by the Carnegie Corporation and is presently upgrading to B.Sc. 25 women who hold diplomas.

Academic Staff Levels

Distribution of Academic Staff of the Faculty of Agriculture, Makerere University in the 2001/02 Academic Year (25% of the staff are women)

Department	Have Ph.D.	Have M.Sc	Have B.Sc.	Staff Rank						Total Staff
				P	AP	SL	L	AL	TA	
Crop Science	13	7	1	4	2	3	8	2	2	21
Animal Science	7	6	1	2	1	1	7	3	-	14
Food Sci. & Tech.	6	6	3	-	-	3	9	1	2	15
Soil Science	7	7	1	1	3	4	5	-	2	15
Agric. Eng.	1	9	2	-	-	1	4	4	3	12
Agric.Econ.& Agribusiness.	5	4	5	-	-	1	3	5	5	14
Agric. Ext. / Educ.	2	8	-	-	-	1	8	1	-	10
TOTAL	41	47	13	7	6	14	44	16	14	101

Legend: P Professor; AP Associate Professor; SL Senior Lecturer; L Lecturer; AL Assistant Lecturer; TA Teaching Assistant. Source: Updated from Annual Report and Research Highlights 2001/2002

Research Programs

The Faculty has a very active research program involving each department:

- *Department of Agricultural Economics and Agribusiness* - poverty alleviation through crop production and land management.
- *Department of Agricultural Engineering* - animal draft power implements; field mechanization systems; and surface irrigation technologies.
- *Department of Agricultural Extension/Education* - effect of reforms on the financing and delivery of extension services.
- *Department of Animal Science* - small ruminant production.
- *Department of Crop Science* - management of pests and pathogens of grain legumes, cereal crops and root and tuber crops; genetic improvement studies on pigeon pea and potato for pest resistance and/or improved nutritional value; biotechnology applications using molecular markers and tissue culture.
- *Department of Soil Science* - environmental conservation; soil fertility; weed management; soil nutrients and fertilizer studies; dryland husbandry.
- *Department of Food Science and Technology* - food processing; food microbiology.

Collaborating Donor Agencies

1) USAID:

- USAID/CRSP (Collaborative Research Support Program) supports a large number of pest management research projects in the Department of Crop Science as well as graduate training under the same projects
- Ohio State University: Postgraduate training through sandwich arrangements; staff development training; institutional capacity building; visiting teaching faculty
- Fulbright program: visiting teaching faculty; collaborative research
- IDEA Project: support for undergraduate internships; some post graduate training; development of floriculture certificate course
- The Agriculture Productivity Enhancement Project (APEP) will support post graduate training in biotechnology and horticulture and the development of a horticulture certificate program

2) Rockefeller Foundation

- Direct support to research projects of faculty staff
- FORUM: Support to postgraduate training scholarships and student research funding; support to research of faculty staff through competitive grant system
- Collaborative Masters in Ag. Economics under development

3) SIDA/SAREC:

- Research support in biotechnology and genetic studies in crop science
- Infrastructure development – seed laboratory
- Biotechnology postgraduate training through the BIO-EARN Network

4) ENRECA/DANIDA:

- Research support in livestock systems, either directly or through the Danish Veterinary University

5) NORAD:

- Major contributor towards capital development projects – e.g., new classrooms and laboratory facilities for the departments of Food Science and Technology, and Animal Science
- Rehabilitation of MUARIK/CAEC facilities

ICT/ Distance Learning

Connectivity for the entire university will be substantially improved through an ICT development project funded by a consortium of donors. The Faculty has a facility for distance learning and offers limited distance learning to districts. However, assistance is required in pedagogy for distance education delivery. Excellent facilities for distance education including video conferencing capacity are available at the nearby Uganda Management Institute that can be used on a fee-basis.

HIV/AIDS Issues

The Faculty collaborated with NARO on research on the impact of AIDS on small holder dairy production. DANIDA is providing funds for follow up with the families on the project.

Needs and Future Outlook

- **Staff development**: Priority training needs are in agricultural economics and agribusiness, horticulture, retooling staff in new areas of technology utilization, and new pedagogical methods.

- **Course development**- Biometrics: The Department of Crop Science plans to develop and offer short courses on Applied Statistics in Agricultural Research and Pesticide Application and needs assistance in course development.

- **Outreach activity**: There is need for enhancement of Farmer Field Schools and training of extension officers on extension methods, agricultural engineering and animal production. There is also need for support for production of farmer-oriented publications.

ANNEX C

COLLABORTIVE M.SC. PROGRAMME IN AGRICULTURAL AND APLLIED ECONOMICS

Background

For at least the next two decades, most of the inhabitants of Central, Eastern and Southern Africa will continue to reside in rural areas and derive their living directly or indirectly from agriculture. Income generation and employment will continue to depend on the transformation of the agricultural sector. To address this challenge, there will be the need for a great many agricultural economists with a range of skills including the ability to:

- Analyse the implications of changes in trade and macroeconomic policy.
- Study the performance of local markets for agricultural products, services and inputs.
- Together, with technical scientists and other agricultural stakeholders, determine the technical as well as the economic feasibility of new products and processes.
- Improve productively in agribusiness activities.
- Design, implement and monitor agricultural related polices that are economically and ecologically feasible and sustainable.

A study in 2001 commissioned by AERC, ECAPAPA, IFPRI and the Rockefeller Foundation in 2000 (Obwona and Norman, 2001) confirmed that addressing the above challenges would require more trained and higher quality agricultural economists in both the public and private sectors. To deliver these would require substantial upgrading of the departments of agricultural economics in the region. The Collaborative M.Sc. Programme in Agricultural and Applied Economics is designed to provide this upgrade.

Program Description

At present, the initiative comprises a collaborative undertaking by 16 public universities in 12 countries, including Kenya, Tanzania and Uganda .

Specific points about the program are:

1. The structure and content of the program and courses will be responsive to client demand.
2. An expanded pool of applicants will be tapped, some in mid-career, who have their first degree in fields other than agricultural economics. Particular emphasis will be placed on attracting more women.
3. Departments qualified to offer the program will award their own institution's degree. The collaborating group as a whole will set criteria and processes for determining whether a specific department is qualified. There will be a mechanism for departments that don't qualify to have their students admitted.

4. The programme of study will consist of course work and a thesis offered over five semesters totalling 20 months and discouraging a period of more than two years. In terms of the programme content:
   - For those whose undergraduate degrees are in areas other than agricultural economics, remedial courses will be offered (i.e., prior to starting the five semester sequence).
   - The first two semesters will consist of compulsory core courses in qualified department campuses.
   - Fields of specialised study (i.e., initially agricultural trade and policy, agricultural and rural development, environmental and natural resources management, and agribusiness management), a mandatory course in behavioural and institutional economics, and up to two electives (i.e., the specific ones offered will be demand driven) will be offered at a shared facility for all students (i.e., the University of Pretoria campus).
   - An effort will be made to ensure that orderly and timely progress is made for completion of the thesis during the specified time period.
5. In support of the four important issues listed above are the following:
   - There will be efforts over time to upgrade existing faculty within the departments of agricultural economics and in the interim any current deficiencies in terms of current skills will be rectified by calling on the services of qualified professionals in economics departments and nearby research and policy institutions.
   - Funding will be sought for improving electronic connectivity in agricultural economics departments.
   - Synergy between research and training will be exploited, to sharpen faculty skills and knowledge and to introduce case studies and other material into the curricula.
   - Research will be facilitated through providing seed grants and other support so that individual faculty can take full advantage of ongoing initiatives.

The first intake of students will occur in September 2004; by the year 2005, there will be a total enrolment of 210 students in five departments. By the end of the first phase, 700 students will have obtained M.Sc. in agriculture and applied economics.

Program Management

For the near future, the Programme Secretariat will be located in the IDRC Regional Office in Nairobi and IFPRI will act as the Facilitating Agency, thus continuing the approach that was used in the planning exercise. Various support administrative services will be contracted on behalf of the Programme Secretariat by the Facilitating Agency.

The Programme Secretariat will be answerable to the following: A Governing Council (i.e., equivalent to a board), which will meet annually, and will consist of donor representatives. It will be responsible for designating the Facilitating Agency (i.e., in the future); and appointing the Programme Director; and, in conjunction with AEEB, appointing the members of the Technical Advisory Committee (see below). The Council will also approve work plans and budgets; mobilise external resources; and implement periodic reviews and evaluations of the programme.

The Agricultural Economics Education Board (AEEB) (i.e., equivalent to a steering committee) will consist of the heads of agricultural economics departments of institutions that have signed a Memorandum of Understanding with the Facilitating Agency to participate in the collaborative programme. It will not be involved in financial matters, but will have other functions such as: determining and approving the programme structure and syllabi/curricula; setting standards and procedures for assessing student and department performance; approving departments to offer the M.Sc. course work; and advising the Council on programs of work.

There will also be a Technical Advisory Committee that will provide feedback unlikely to be obtained at the department level. Its major task will be to advise the AEEB and Council on issues relating to the Program's quality and relevance. Membership will include representation from regional organisations concerned with agricultural development, poverty alleviation, and food security.

ANNEX D

THE FORUM ON AGRICULTURAL RESOURCE HUSBANDRY

Introduction

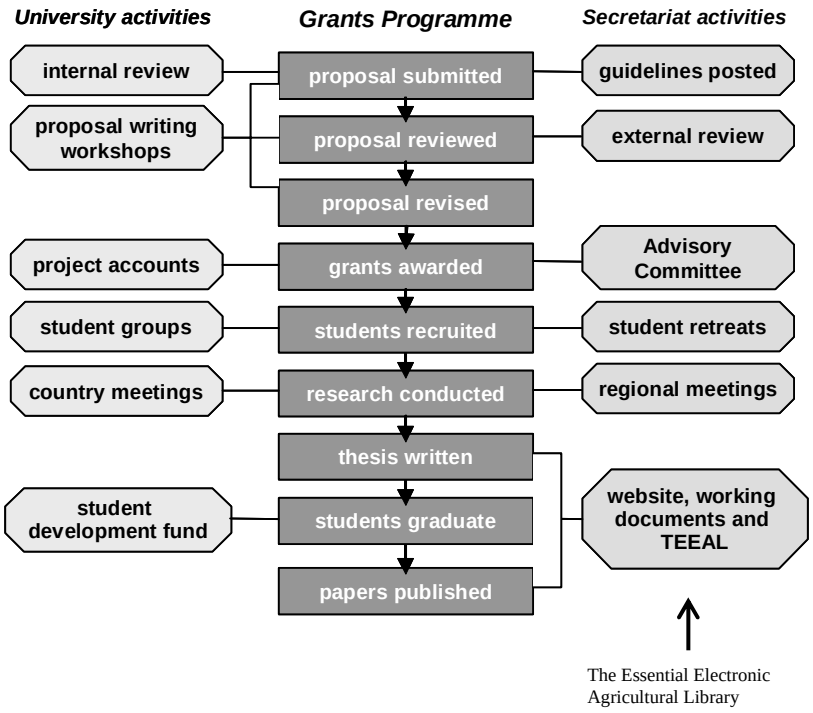
The Forum on Agricultural Resource Husbandry (FORUM) was initiated in 1992 by the Rockefeller Foundation to increase human capacity for inter-disciplinary problem-solving in five countries (Kenya, Malawi, Mozambique, Uganda and Zimbabwe) through the training of M.Sc. students.

With a Secretariat located in the Rockefeller Foundations' Nairobi office, the FORUM is a component of the Foundation's Food Security Program. The focus of the program is management of aspects of crop growth (soil, water, light, etc.), crop protection, processing, food quality and nutrition and socio-economics. The program seeks to complement existing achievements and support to crop improvement by international organizations in Africa and on-going research thrusts of National Agricultural Research Institutions (NARIs). FORUM achieves its main objective of assisting faculties of agriculture in the member countries by providing funds to strengthen M.Sc. student education. It is hoped that through this effort, a large cadre of well-trained agricultural resource specialists familiar with the constraints and perspectives of small-hold farmers will contribute to sustainable food security in sub-Saharan Africa

Management & Grants Process

In line with FORUM's guidelines and regulations, proposals are submitted by faculty members (Principal Investigators) in participating universities to a peer review team within the respective universities. Following this internal review, revised proposals undergo an external review process which is undertaken by the FORUM Secretariat. The external review comprises of peer review by 5-6 experts in development agriculture selected specifically to ensure a holistic approach. External reviewers then recommend funding of revised proposals or otherwise to the FORUM Secretariat in Nairobi which takes the final decision on the proposal. Once successful, the Principal Investigators (PIs) recruits M.Sc. students who undertake the research activities and publish findings on successful completion. The entire proposal submission to grant award process is detailed in Figure 1. Awards fall into two categories, Preparation Grants ($5,000), that assess the feasibility of projects and Full Grants ($35,000-$75,000), through which students are recruited and research conducted. Guidelines emphasise M.Sc. student training (must have 1-2 M.Sc. student training component) and multi-disciplinary partnerships (including team members from other NARS institutions) as key criteria. The program leans toward adaptive/ applied research although support has also been given to more upstream research such as population genetic studies using molecular tools and marker assisted selection. The students train in their home institutions, although it is becoming common for projects to train students from different countries, and to send students to other institutions in the region where expertise exits.

Figure 1: FORUM: proposal submission to grant award process



Other FORUM activities

The FORUM undertakes additional activities in order to provide a more holistic support to participating universities. These activities include a biennial FORUM Regional Meeting, periodic graduate student retreats, and, more recently in 2002, the setting up of an internet website, *www.rockforum.org*, for the benefit of its members and to disseminate FORUM activities and accomplishments. The internet site also provides a discussion forum for FORUM PIs and students.

In addition to publishing a newsletter (FORUM NEWS), the FORUM initially encouraged grantees to publish research findings in reputable journals by offering to pay page charges of scientific journals. In recognition of the need for up-to-date literature, the FORUM also subscribes and makes available to participating universities the Essential Electronic Agricultural Library (TEEAL). TEEAL is a collection of 130 scientific journals compiled on computer compact disks. Finally, to ensure research outputs are documented, FORUM publishes a Working Document series, which contains research summaries of R&D activities in participating institutions.

The FORUM also supports its members' participation in regional scientific conferences and has a particularly close working relationship with The African Crop Science Society (ACSS). It has also arranged for remedial courses on Biometrics and proposal writing.

FORUM Achievements

As of 2003, there were 180 journal publications from FORUM research and close to 250 M.Sc. students have graduated, with 30 still undergoing training. It is considered by many in the region as one of the most successful programs because of its strong ownership by the participating institutions (students and PIs) and the quality of the M.Sc. graduates. The students produced by the program are highly marketable, being highly sought by the civil society, private sector and many are employed by international agricultural research centres (IARS) and National Agricultural Research Institutes (NARIs). Some are now faculty staff and over 30 are undertaking Ph.D. research in and outside Africa. The program has also facilitated stronger linkages between universities in the region, and university linkages with NARIs and farmer groups. There is also linkage with universities in South Africa, U.K. and USA. By its design, the program has also supported joint research undertakings by universities, NARIs and CGIARS (especially the International Potato Centre, (CIP) and the International Institute of Tropical Agriculture(IITA)).

Management of the FORUM

Since its inception in 1992, the FORUM has been managed by a senior staff member (Assistant Director) of the Rockefeller Foundation. He/She has been directly answerable to the President and Board of trustees of the Rockefeller Foundation. To oversee the running of the Program, a FORUM Advisory Board was formed, composed of five senior scientists in the region outside the universities but representing the different participating countries (one from Kenya, Malawi, Mozambique, Uganda and Zimbabwe). These five plus the FORUM Coordinator form the policy making body of the FORUM including reviewing all the proposals. In addition, every two years the FORUM holds regional meetings where half a day is fully dedicated to discussing issues related to the Program. The meetings are attended by the FORUM coordinator, other Rockefeller Foundation officials, the FORUM Advisory Committee, the PIs, graduate students and representatives of other stakeholders. This has served as a major forum for developing policies related to the FORUM.

FORUM management from 2004 and beyond

Following changes in the Rockefeller Foundation during the last year, and a major review of the FORUM, it was agreed that the FORUM Secretariat be devolved from the Rockefeller Foundation to an African institute. This was to increase visibility and ownership by member countries and ensure sustainability by bringing on board other development partners/ donors/ local institutions to support the FORUM. Beginning January 2004, the FORUM will now run as an autonomous unit housed at Makerere University. It will have a Secretariat with three full time personnel- a coordinator, a program officer and a financial management specialist.

The Secretariat will be backstopped, in the interim, by the Rockefeller Foundation which has allocated US$3.7million for FORUM's operations during the period 2004/5. The program Secretariat will be answerable to the following:

- A Governing Board which will meet annually, and consist of Five Vice-Chancellors (one representing each of the participating countries), representatives of donors, private sector and a reputable scientist. The Board is responsible for appointment of the three key secretariat posts, approving plans of work and budget, mobilising financial resources and undertaking reviews and evaluation of the program.
- A technical committee consisting of five deans of Faculties of agriculture (one per country) and three other persons outside the universities. They will be responsible for approval of proposals.

ANNEX E

CONTACTS

KENYA

1. Universities:

Egerton University
Jomo Kenyatta University of
Agriculture & Technology
P. O. Box 6200-00200
Nairobi, Kenya

Mr. Steven Kagio
Lecturer, Animal Science Department

Dr. Dorcus Isutsa
Chairperson, Horticulture Department

Prof. J. Liu
Visiting Scientist, Horticulture Department

Prof. L.M. Mumera
Professor, Department of Agronomy
cell: 254-0733-771632
Email: lmmumera@africaonline.co.ke

Dr. Lennah Nahone
Chair, Soil Science Department

Prof. E.N. Njoka
Dean, Faculty of Agriculture
tel: (037) 62437 / 62276
cell: 0733-934221

Dr. Njoka
Head, Agronomy Department

Amos N. Nzinga
Department of Dairy &
Food Science & Technology
Tel: 051 62039 (office) /

Prof. Obura
Agronomy Department

Prof. Eliud O. Omolo
Agronomy Department
Email: ocd@africaonline.co.ke

Jomo Kenyatta University
P.O. Box 536,
Njoro, Kenya

Mrs. M. Kisaka
Academic Registrar's office
Tel: 0733 873454

Mr. A.M. Kiswii
Ag. Registrar, Academic office
Tel: 0722 860917

Dr. Wariara Kariuki
Chairperson, Horticulture Department
Tel: 254(0)6752200
Email: wariarak@yahoo.com

Dr. Kimani Njoroge
Dean & Chairperson, Food Science Department
Tel: 067 52255 / 0722860929
Email: drnjoroge@yahoo.com

Dr. Romanus Odhiambo
Dean, Faculty of Science
Tel: 0733 341025 / 067 52711 ext 2331
Email: romanusotieno@yahoo.com

Prof. H.M. Thairu
Deputy Vice-Chancellor (Academic)
Tel: 254 067 52711
Email: dvcaca@nbnet.co.ke

Moi University
P. O. Box 1125
Eldoret, Kenya

Prof. C.O. Othieno
Department of Soil Science
Tel: 254 0321 63020 / 254 0321 32143
cell: 0733 533002
Email: cotieno@africaonline.com

prep@multitechweb.com

Nairobi University, College of Agriculture and Veterinary Medicine
P.O Box 30197, 00100 GPO
Nairobi, Kenya

Dr. G. N. Cheminiguia
Crop Science Department
Email: umchemin@hotmail.com

Dr. C.K.K. Gachene
Head, Soil Science Department
Tel: 631643
Email: ckkgachene@africaonline.co.ke

Dr. S.G. Kiama
Assoc. Dean, Faculty of Veterinary Medicine
Tel: 0722380971

Dr. R.O. Mosi
Animal Production Department
Tel: 631487
Email: oyoomosi@uonbi.ac.ke

Prof. N.M. Muroki
Department of Food Technology and Nutrition
Applied Nutrition Programme
tel: 254-2-631004 0 630408
cell: 0724-640729
email: nmuroki@anp-uon.ac.ke

Prof. N.M. Muroli
Food Tech. & Nutrition
Tel: 63408/ 630172
Email: head@anp-uon.ac.ke

Nashon K-R. Musimba
Director, Institute for Dryland Research,
Development and Utilisation
Tel: 254 02 631636/7
0721-206636
Email: nkrmusimba@bidii.com

Dr. E.W. Mutitu
Chairperson, Faculty of Agriculture
Crop Protection Department
Tel: 631277
Email: Pheatth@nbnet.co.ke

A.W. Mwang'ombe
Dean, Faculty of Agriculture

Tel: 632121/0722-788995
Email: mwangombe@kenyaweb.com

Dr. R. Kinuthia Ngugi
Lecturer, Range Management
Tel: 631932
Email: range@bedii.com

Assoc. Prof. F.M. Njerutt
Chairperson, Dept. PHPT
Tel: 631325

Dr. Rose Nyikal
Head, Agriculture Economics Department
Tel: 632150
Email: agecon@insightkenya.com

Mr. J.P.O. Obiero
Environmental Sciences
Tel: 631353/ Ext. 27072
Email: obierop@avu.org

2. USAID MISSIONS:

REDSO
PO Box 30261
00100 Nairobi, Kenya
tel: 254-20-862400/2

Jeffrey Ashley
Director,
Regional HIV/AIDS Programs
Email: jashley@usaid.gov

Gerald A. Cashion
Deputy Regional Director
Email: gcashion@usaid.gov

Carolyn Daffeson
Email: cjefferson@usaid.gov

Peter T. Ewell
Food Security
Email: pewell@usaid.gov

Michael Hall
Regional Biotechnology Advisor
cell: 254-733-333551

Email: mhall@usaid.gov

Walter Knausenberger
Senior Regional Environmental Officer
cell: 254- 733-896956
Email: wknausenberger@usaid.gov

Diana Putman
Food Security
Email: dputman@usaid.gov

USAID/Kenya

Julius Kilungo
Program Specialist
Email: jkilungo@usaid.gov

Maria Mullei
Email: mmullei@usaid.gov

Silas D. Obukosia
Email: Sobukosia@usaid.gov

Stephen Ragama
Project Development Officer
Email: sragama@usaid.gov

Kevin Smith
Arid and Semi-Arid Lands Advisor
Email: kevsmith@usaid.gov

Beatrice Wamalwa
Email: bwamalwa@usaid.gov

3. ROUNDTABLE

Roundtable, 12th November 2003, Norfolk Hotel, Nairobi, Kenya

Lilian Kimani
Assistant Director,
Kenya Agriculture Research Institute (KARI)

Dr. Julius Kilunga
USAID/ Kenya

Prof. A.W. Mwangombe
Dean, Faculty of Agriculture,
University of Nairobi

Dr. Peter Ewell

USAID/REDSO

Prof. Willis Oluoch-Kosura
IDRC / Collaborative Masters Programme in
Agricultural Economics

4. OTHERS

Dr. John Lynam
The Rockefeller Foundation
Nairobi, Kenya

Harris Mule,
Chancellor, Kenyatta University,

David Ngugi,
Director, Relay Consultants and Associates
P. O. Box 39797
Nairobi, Kenya
Email: D.N.Ngugi@cgnet.com

Ralph von Kaufmann
Forum for Agricultural
Research in Africa
P. O. Box 30709, Nairobi, Kenya
Tel: 254 (0) 20 630743 /254 (0) 733 634508
Email: r.von-kaufmann@cgiar.org

Paul Woomer
Sacred Africa
Nairobi, Kenya

TANZANIA

1. UNIVERSITIES

University of Dar es Salaam
P. O. Box 35060
Dar es Salaam, Tanzania

Dr. Z.L. Kanyeka
Department of Botany
tel: 255 222410764 /255 0744 486370

Dr. Marelain Njau
Senior Lecturer, Zoology Department

Sokoine University of Agriculture

P.O. Box 3003
Morogoro, Tanzania

Dr. G.C. Kifaro
Head, Department of Animal Science & Production

Dr. Method Kilasara
Head, Department of Soil Science
tel: 255-023-2603999
Email: mmkilasara@yahoo.com
Kilasara@suanet.ac.tz

Dr. A.P. Maerere
Head, Department of Crop Science

Prof. Z.S.K.Mvena
Rural Sociologist, Department of Education and Extension
tel: 255-023-2604795
cell: 255-0744-886963
Email: zmvena@suanet.ac.tz

Dr. E.N. Mwampaba
Agricultural Engineering
Sokoine Univesity of Agriculture

Prof. Z.S.K. Mwena
Head, Department of Agricultural Education and Extension

Prof. B.P.M. Tiisekwa
Head, Department of Food Science &
Technology
tel: 255-0744-476410
Email: btiisekwa@yahoo.co.uk

Dr. N.A. Urio
Dean, Faculty of Agriculture
tel: 255-023-2604649
cell:255-0744-275216
Email: ndelilio@yahoo.co.uk
naurio@suanet.ac.tz

2. USAID MISSION:

USAID/Tanzania
PO Box 9130
Dar es Salaam, Tanzania
tel: 255-22-266 8490

Flora Majebelle
Training Specialist
Email: fmajebelle@usaid.gov

Thomas McAndrews
Economic Growth
cell: 255 - 744- 444540

Daniel Moore
Economic Growth
Email: dmoore@usaid.gov

Onesmo Shuma
Project Management Specialist
Email: oshuma@usaid. gov

UGANDA

1. UNIVERSITIES:

Makerere University/ Faculty of Agriculture
P. O. Box 7062
Kampala, Uganda

Dr. Bernard Bashaasha
Head, Agricultural Economics & Agribusiness

Dr. Richard Edema
Lecturer, Crop Science Department
Tel: 256 41 533580 / 256 77 314511
Email: redema@agric.mak.ac.ug

Mr. J.B. Kawongolo
Head, Engineering Department
Email: jbkawongolo@agric.mak.ac.ug

Dr. W. Kyamuhangire
Lecturer, Food Science & Technology
Email: wkyama@agric.mak.ac.ug

Dr. Denis Mpairwe
Deputy Dean, Animal Science Department

Dr. M. Nabasirye
Senior Lecturer, Crop Science Department
Tel: 256 41 533580
256 41 531152
Email: mnabasirye@agric.mak.ac.ug

Dr. R. Namirembe-Ssonkko
Lecturer, Crop Science Department
Tel: 256 41 533580
Email: rmirembe@agric.mak.ac.ug

Prof. D.S.O. Osiru
Professor, Crop Science Department
Tel: 256 41 533580
Email: acss@starcom.co.ug

Dr. A.R. Semana
Senior Lecturer,
Agricultural Education/Extension
Email: acss@starcom.co.ug

Mr. B. Tayebwa
Senior Lecturer,
Agricultural Economics & Agribusiness
Email: acss@starcom.co.ug

Dr. J.S. Tenywa
Senior Lecturer,
Soil Science Department
Tel: 256 41 540464
Email: acss@starcom.co.ug

2. USAID MISSION:

USAID/Uganda

Paul Crawford
Team Leader, Sustainable Economic Growth
Email: pcrawford@usaid.gov

James F. Dunn
Agricultural Adviser
USAID/Uganda
42 Nakasero Road
P. O. Box 7856
Kampala, Uganda
Tel: 256 31 387387
256 41 387387
Email: jdunn@usaid.gov

Gaudensia Kenyangi
USAID/Uganda
Email: gkenyangi@usaid.gov

3. ROUNDTABLE:

Roundtable 18 November 2003,

Grand Imperial Hotel, Kampala

Dr. Buyinza,
Faculty of Forestry & Nature
Conservation,
Makerere University

Ms. Stella Nagujja,
Secretary,
National Council of Science &Technology
P. O. Box 6884
Tel: 256 41 342409
Email: : uncst@starcom.co.ug
bioearn@infocom.co.ug

Mr. P. Okori
Department of Crop Science,
Faculty of Agriculture, Makerere University
Email: acss@starcom.co.ug

Dr. Margaret Nabasirye
Acting Dean,
Faculty of Agriculture, Makerere University
Tel: 256 41 542277
Email: mnabasirye@agric.mak.ac.ug

Dr. G.W. Otim-Nape
Acting. Director-General,
National Agricultural Research Organisation
Email: onape@infocom.co.ug

Prof. J.K. Mukiibi
Managing Director,
AGRICONSULT.ea,
P. O. Box 26049, Kampala, Uganda,
Tel: 256 41 200566 / 256 77 700722
Email: mukiibi@imul.com

Paul Crawford
USAID/Uganda

James F. Dunn
USAID/Uganda

Gaudensia Kenyangi
USAID/Uganda

Clive Drew,
IDEA Project,
Email: clive-adc@starcom.co.ug

John Magnay
Chief Executive,
Uganda Grain Traders Limited
P. O. Box 7341
Kampala, Uganda
Tel: 256 (041) 220927 / 256 (077) 771237
Email: jmagnay@infocom.co.ug

4. OTHERS:

The Inter-University Council for East Africa,
Plot 4 Nile Avenue, 3rd Floor, EADB Building,
P. O. Box 7110, Kampala, Uganda
Tel: 256 41 256251/2 / 256 41 235249
Email: iuc@infocom.co.ug

Akot-Ojungu Ana,
Finance Officer

Z. Aoguta,
Vicres Coordinator

Lilian David Amri ,
Administrative Officer

Prof. Moses L. Golola,
Deputy Secretary,
Email: luutu2000@yahoo.co.uk
mgolola@iucea.org

Mildred Warugaba,
Public Relations Officer

Prof. Ogutu,
Lake Victoria Basin Project

IFPRI
Kampala, Uganda
email: : **ifpri@utlonline.co.ug**
S.W. Omamo,
Email: w.omamo@cgiar.org

Rhiona Walusimbi
Email: w.omamo@cgiar.org

Pamela Nahamya

ASARECA
P. O. Box 765,
Entebbe, Uganda
Tel: 256 41 322225/6

Email: asareca@imul.com

Michael Duerr
Programme Manager (Technical),
Email: manager@rsuasareca.co.ug

Dr. Howard Elliott
Senior Technical Advisor,
Tel: 078 312649
Email: elliotthjc@aol.com

Seyfu Ketema
Executive Secretary
Tel: 256- 41-320556 /256-41 -321389

Dr. I. Minde
Coordinator, ECAPAPA
Tel: 256 41 320566
email: ecapapa@imul.com

Dorothy Mukhebi
Coordinator
RAIN
Email: rain@infocom.co.ug

Dr. A. Taha
Monitoring and Evaluation

Other Individuals

Prof. David Kraybill
Visiting Professor
Ohio State University
c/o Department of
Agricultural Economics & Agribusiness
Makerere University
Tel: 256 41 542277

John Oloa
Manager,
Uganda Management Institute
P. O. Box 20131, Kampala, Uganda
Tel: 256 41 345990/259312 / 256 77 658008
Email: uga_joloa@gdln.org

Mark Wood
IDEA Project
Email: mark-adc@starcom.co.ug

Warwick Thomson

Chief Advisor,
Agricultural Sector Programme
DANIDA
Plot 58 Kiira Road
PO Box 29851, Kampala
Tel: 256-41-541192 / 533605
email: Thomson.psu@aspsuganda.org

ANNEX F

QUICK START ACTIVITIES

The following are suggested activities to be funded through the African Agriculturalist Training Task Order to be implemented by World Learning. They are organized in terms of priority with the assumption that there may not be sufficient funds in the Task Order for all of the suggested activities. The team spent a lot of time eliciting ideas on short courses/workshops from individuals in the region; "quick start" funding should be allocated to types of short courses/workshops that meet the following criteria:

- maximize the multiplier impact;
- are of concern to as many faculty in the region (Kenya, Tanzania, Uganda) as possible; and
- increase consultation/interaction between faculties of agriculture in the region.

Using these criteria, the team recommends the following two short courses and two workshop for "quick start" activities:

Courses

Writing proposals for research funding*:* Developing skills in grantsmanship is an obvious issue in the region given the lack of funds available to faculty of agriculture in the region. Such a course could build on a short course format already developed by the FORUM program. Improving access to research funding from different sources could be very important in developing and retooling human capital in the faculties of agriculture in the region. If there are sufficient funds, this course should be run twice.

Biometrics:[17] This is a continuing need throughout the region and affects agricultural scientists of many different disciplines. Skills in finding, selecting and analyzing data, including surveys and databases from a variety of sources, are weak in general. However, strong skills in statistical analysis are the essential foundation for developing good research skills. Virtually every faculty consulted felt there was a need for regional biometrics courses. FORUM has developed short courses in this area and individuals associated with FORUM could help developing such a course. It should be noted that a precondition for this course is the need to ensure that the participants have access to appropriate computers and software on completion of the course.[18] This could involve the need for additional resources to make this possible.

[17] Biometrics is statistical analysis of biological data.

[18] For example, Genstat is a program that many universities in the region are using.

Workshops

Building Linkages Between Regional Programs and U.S. Faculty: Representatives from both the FORUM program and the new Collaborative M.Sc. program were interested in developing linkages with U.S. faculty. Both the lack of time and the lack of availability of key people prevented further discussion of this beyond general agreement that it was an idea worth exploring. A workshop that brought together representatives from the program along with representatives from USAID/REDSO and U.S. academics could address the issue of linkages in more depth .

***Nurturing linkages between faculties of agriculture and other agricultural stakeholders and demonstrating impact*:** Faculties of agriculture in the region are increasingly focusing on developing linkages with other stakeholders in the agricultural sector not only with the aim of improving the relevancy and quality of training of their students, but also in being able to demonstrate that they are engaged in a meaningful way with the "agricultural community" and are not isolated in "academic ivory towers." The team believes a workshop consisting of representatives from faculties of agriculture and other agricultural stakeholders in the region would be desirable in order to: (1) share information on how such linkages have been established at the different universities; (2) share information on how the faculties of agriculture assemble and disseminate information on the impact of their outreach activities; and (3) collectively decide on what needs to be done to ensure good and effective interactive linkages and to demonstrate impact.

ANNEX G

ILLUSTRATIVE CAPACITY BUILDING ACTIVITIES

The team has developed a phased training program that can be implemented as funds become available. Recommended activities for each phase are highlighted below and are listed in order of priority.

FIRST PHASE

1. Support for Regional Programs

Two specific programs are the on-going FORUM Program and the soon to be launched Collaborative M.Sc. Program in Agricultural and Applied Economics (see Annexes C and D for descriptions of the programs). The condition for giving funding to the Collaborative M.Sc. Program is that the funds should primarily benefit faculties of agriculture in Kenya, Tanzania, and Uganda. In the case of the FORUM Program, the team suggests that the bulk of the funds be allocated for competitive research grants to Sokoine University in Tanzania.[19] There are a number of advantages to using the funds in this way:

- The need for using the very limited funds for direct administrative and monitoring requirements would be minimal since this would be the responsibility of the boards and steering committees of the two regional programs.

- The potential multiplier impact of the limited funds are likely to be high since they would be combined with the funds from a number of other donors.

- It would be a good example of collaboration between donors in terms of a shared vision and a common strategy.

- Both programs are responding to the expressed needs/demands of agricultural stakeholders in the region.

- Both programs foster linkages. FORUM program, nurtures specific operational linkages between the faculties of agriculture and agricultural stakeholders outside the university (e.g., NARS, extension/development agencies and the private sector). The Collaborative M.Sc. Program in Agricultural and Applied Economics encourages linkages between agricultural economics departments in and outside the region and between departments of agricultural economics, economics, and business administration within universities.

[19] FORUM representatives have indicated that they would be amenable to using the funds for extending FORUM activities to Sokoine University. To make such a program viable, would require sufficient funding for at least three research grants (grants are generally about $50,000) to faculty members. Each grant includes support for two or three M.Sc students.

- Both programs provide an opportunity for upgrading of M.Sc. degrees in the region, and hence retooling of faculties of agriculture and some faculty. The FORUM program in particular provides an opportunity for faculty to access research funds for M.Sc. graduate students, on a competitive grant basis, thereby helping them to develop professionally and increasing their multiplier impact.

- Both programs emphasize the need for adapting the curricula to the changing needs of potential employers of graduates in the agricultural sector, and to improving the quality of the courses.

- Both programs provide a strong foundation for further training at the Ph.D. level. Many of the students supported through FORUM have gone on for Ph.D. training in Europe and the U.S. and have been exemplary students as a result of the training and support received through FORUM.

2. Research Planning Grants

These are intended to facilitate engagement of U.S. academics in the region, and build linkages while developing the research capacity of faculties of agriculture in the three countries. Research planning grants should be made to five U.S. academics to visit the region for a short period (i.e.3 to 6 weeks) for the purpose of identifying and planning research partnerships with qualified faculty in the region. This should be coupled with giving a few invited lectures whenever feasible.

A condition for receiving the grant would be the development of joint research proposals to submit for funding to relevant grant/research funding agencies. It also would be highly desirable to include potential research partnerships with faculty in more than one faculty of agriculture in the region in order to encourage collaboration within the region and increase the multiplier impact of the grant. If success is achieved in obtaining research funds, then a collaborative working relationship can be established between the U.S. academic and the identified faculty in the region. What would be possible under the grant would depend on the specific content of the grant. For example, if the grant provides funding for graduate students, those students could be registered in their home universities, and receive support for doing their thesis on a component of the specific research topic. In such cases, the U.S. academic could possibly provide a supervisory role in terms of the thesis. In terms of any resulting publications, the optimal result would be for everyone involved to receive credit.

The initial challenge is to identify the potential areas for developing such research collaboration. Needs are many and so prioritization becomes a difficult exercise. Given the current situation in the region, the team proposes the following:

- The FORUM steering committee should be asked to identify two areas in which they would like to develop collaborative relationships with U.S. academics.
- The Collaborative M.Sc. Program in Agricultural and Applied Economics steering committee should identify one area that they would like to develop collaborative relationships with U.S. academics.

- A more difficult one to organize would be asking the animal science departments and the agricultural engineering departments in the region to each identify an area in which they would like to develop collaborative relationships with U.S. academics.

Given the intention of re-engaging U.S. academics in Africa, the team believes that priority should be given to promising young U.S. academics who have an interest in Africa but who have not had a previous professional experience in Africa. The opportunity for such engagement should not necessarily be confined to individuals in U.S. universities already operating in the region, but to other universities as well.

3. Short courses/workshops

It is proposed that some resources should be devoted to implementing short courses/workshops that will contribute to the "retooling" of faculty. Also, consideration should be given to other short courses/workshops that are of general interest to faculties of agriculture. These are likely to relate to concerns at the mesa and global levels such as trade issues, issues relating to genetically modified organisms, or regional environmental issues such as the loss of soil fertility. There are several ways to approach this:

- Condensed Courses: This is a model that was used by Ohio State University in the development of the agribusiness program at Makerere University. Courses were taught for one month (six days a week) by faculty from Ohio State and other universities.

- Off the Shelf Courses: Another option is to identify off-the-shelf courses that will provide training in specific technical areas for faculty retooling. Some of these may be available regionally.

- Summer School Programs: A third option is summer courses in specialized technical fields. Some subject matter might require two or three modules as part of a certificate program. Summer School programs could be taught at either a "hub" university in the U.S. or at one of the faculties in the region with U.S. faculty coming in as needed. Summer school programs in the U.S. have the advantage of providing students with specialized facilities, laboratories, and materials not generally available at their home institutions. However, it would be substantially more expensive and a course in the region would allow more faculty members to attend.

- Regional Workshops: These would bring together faculty to share information and resources, and to discuss cooperation and research agendas on issues that are affecting the region. One example is the problem of declining soil fertility and the increased farming activity in semi arid areas. This topic was brought up in a number of meetings and is an issue of great concern in all three countries: semi-arid and arid areas are substantial particularly in Kenya (75% of the land area), Tanzania (35%) and to a lesser extent in Uganda (20%). Failure to simultaneously address productivity and ecologically sustainability issues in such areas could have catastrophic consequences on those living in such areas and could place increasing pressures on the better endowed regions. There would be merit for faculty of agriculture representatives and other agricultural stakeholders (e.g., NARS plus relevant

CGIAR and CRSP representatives) to meet in a workshop format to (1) review current knowledge; (2) share information on current initiatives; (3) identify gaps in knowledge; and (4) explore possible collaborative relationships between faculties of agriculture and partners outside the region.

4. HIV/AIDS Component

Discussions with faculties of agriculture have elicited a very positive response about the need to develop research agendas to enable more effective response to the changing small holder farming systems as a result of the impact of HIV/AIDS. There is potential for linking the capacity building of agricultural faculties with other USAID initiatives on HIV/AIDS in the region.

5. Miscellaneous Activities

Library Support: Visits to the faculties of agriculture in the region indicated major problems in terms of access to up to date scientific literature and textbooks. The needs go way beyond the funds available. However, the team believes the following should be considered, since they could have a very positive impact, for little expense:

- Faculties of agriculture have access to some journals via TEEAL and AGORA.[20] In some places visited by the team, concerns were expressed about the potential ability of universities of paying the annual subscription fee for TEEAL if the Rockefeller Foundation stopped paying for it. If the annual subscription fee for TEEAL is dropped, then this should be a priority since access to current journals is an essential component of any capacity development effort.

- U.S. academics are always disposing of textbooks and old journals. Many would be prepared to pay the cost to ship them to a central location in the U.S. providing they could be shipped to the Africa region with other funds. Supporting such an initiative with some of the funds could have a very high pay-off. Discussions with the faculties of agriculture indicated that they would be very grateful to receive these journals.

Distance Learning: The American Agricultural Economics Association (AAEA) has been for some time considering developing some distance learning modules on different subject areas pertaining to agricultural economics. If the steering committee of the Collaborative M.Sc. Program in Agricultural and Applied Economics feels some modules could be used in their program, then the team would be supportive of a small amount of money being given to support this. Given current inadequacies of electronic connectivity in some of the region's faculties of agriculture, the team believes using CDs would be a more appropriate mode of distance learning in the immediate future.

Another distance learning initiative that could be considered is the Master's of Agricultural Business at Kansas State University. This attracts individuals from different parts of the world although to date, not from Africa. The potential exists for adapting some of the modules in CD

[20] Available free in countries where the income/capita is less than $1,000.

format for use in the region. This could be done at relatively little cost, but such an initiative should be adapted in partnership with knowledgeable individuals in the region.[21]

SECOND PHASE – THREE TO FIVE YEAR PROGRAM

The proposed activities for the second phase assume that additional funding will become available with a three to five year funding commitment. Undertaking Ph.D. level training for selected faculty members requires a minimum five-year funding/program commitment. With a three- year commitment, M.Sc. level training is possible; less than that precludes long-term training. The activities do not have a cost figure attached. They are intended to be illustrative of the types of activities that should be part of a "ramped-up" program. The costs will depend on a number of factors that are difficult to calculate at this point.

A second phase should continue to provide funding for all of the First Phase activities**.** Additional activities should include:

1) M.Sc. level Training

The team feels that it is important to continue to support the FORUM program and the Collaborative M.Sc because they provide excellent training at the M.Sc level in most of the agricultural specializations. However, neither provide support for mainstream animal science or agricultural engineering. These two areas could benefit from support for M.Sc. level training. This should be through a "sandwich" model (see the discussion of Ph.D. training below). Training in the region (South Africa) should be explored.

2) Ph.D. level Training/ Sandwich Model

Virtually unanimous support was given by regional faculty to the sandwich model for Ph.D. training. Students would register at their home universities for their Ph.D. and would enroll for courses at a U.S. university for twelve to eighteen months depending on their program's requirements.[22] After completing the course work, the student would return to the region to conduct the dissertation research. The primary supervisor would be a faculty member from the home university, but a faculty member from the U.S. university would be on the dissertation committee. In a very few cases, if the required laboratory equipment is not available in the region, some of the analysis of the research could be undertaken in the U.S. by the Ph.D. aspirant.[23] Such an approach to Ph.D. training keeps the faculty better trained and connected with their home environment, and optimizes the use of human capital already present in the faculty of agriculture in the region.

[21] For example, the Department of Agricultural Economics and Agribusiness at Makerere University.

[22] Course work for a Ph.D. is not currently required for most Ph.D.s in the region, but support for such a requirement is growing. Those met by the team believed it was highly desirable even if not formally required, especially as faculty would be getting their degrees from their home universities.

[23] However, with reference to this approach, the assessment team urges caution. If there is no hope that the analytical approach will ever be able to done within the region or in a nearby country (e.g., South Africa) then this probably should not be encouraged.

The budget would include funds for the sandwich courses, for research support, and for two visits by the U.S. academic representative. The involvement of U.S. academics has additional potential benefits:

- Supervisory visits would provide opportunities for them to give invited lectures and short courses in specialized subject matter.
- Collaborative research partnership with faculty could be developed (e.g., along analogous lines to those described for the research planning grants).
- They could assist in the publication and dissemination of the student research results.

3) U.S. Ph.D. Training/ Non Sandwich

There may be a role in special cases (e.g., developing expertise in an area not currently available in the region) for a few persons to be trained in U.S. academia for their whole Ph.D. degree. However, the potential disadvantages of doing this should be constantly borne in mind. For example, one way of encouraging such individuals to return to the region would be to link completion of such training with a resettlement research grant in their home university (see below).

4) Resettlement Grants

An additional incentive to retaining staff once they have obtained their Ph.D.s would be to provide resettlement/research funds for undertaking research in collaboration with U.S. academics and other faculty in their own university and other faculties of agriculture in the region.[24] Such relationships, developed at the early stages of their professional careers, could potentially pay off handsomely in later years. The team suggests such grants would only be given if the Ph.D. was completed within a specific time period, such as four years.

THIRD PHASE – A PROGRAM OF FIVE OR MORE YEARS

The recommendations for the third phase are predicated on a substantial funding commitment for a program of five or more years. If such funds were forthcoming, the assessment team believes there are two additional initiatives that would potentially have a high payoff. Both of these would require coordination with other donors and may not be amenable to a "project" approach. These are the following:

1) Improve electronic connectivity and computer access in the region's faculties of agriculture

[24] Such an approach is being used in the SIDA-SAREC sponsored BIO-EARN biotechnology project, and was used by the Rockefeller Foundation rice biotechnology program in Asia.

The advantages and potential payoff from improvement of electronic connectivity are obvious and need no elaboration. Related to this is improvement in computer access and related software. Although there may be some skepticism as to whether this would be an appropriate use of funds, the team is convinced that without this basic issue being addressed, the region's faculties of agriculture will continue to lag behind in access to new knowledge, new analytical techniques, and problems in communicating with the "outside world" – including U.S. academia. Given the high initial capital outlays, as well as the continuing costs for upgrading equipment, this should be done in coordination with other donors.[25]

2) Support the development of Centers of Excellence

Centers of Excellence would increase the likelihood of keeping up with and using "state of the art" methodologies and techniques and could be focal points for collaborative working relationships with experts in U.S. academia. This is particularly needed in the Kenyan universities with faculties of agriculture to avoid duplication in the use of very limited resources, and to enable a critical mass of staff and the necessary equipment to be assembled and to be used for the benefit of the country (in the case of Kenya) and for the region as a whole. However there are two important preconditions that would need to be met for funds to be devoted to this.

In the case of Kenya, the Government of Kenya would have to agree to such an initiative/strategy and in the case of the region, there would need to be an agreement between the three governments. In such agreements, decisions would need to be made about which centers of excellence should be established and where they should be located. Since establishment of such centers will involve substantial resources, they should be done with a consortium of donors.

[25] The Collaborative M.Sc. Program in Agricultural and Applied Economics is planning on ensuring good electronic connectivity in the agricultural economics departments included in the program.