

Research Application Summary

**Harnessing regional and national capacities to strengthen agricultural  
research and training in Africa: a Case Study of DAAD support to  
RUFORUM**

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**Abstract**

Limited capacities in managing research, training and outreach programmes are among the notable challenges preventing Higher Education Institutions (HEIs) and research institutions in Africa from effectively contributing towards the continent's development agenda. The Regional Universities Forum for Capacity Building in Agriculture (RUFORUM), using a networks approach is implementing demand driven regional postgraduate training programmes to enhance the quality of postgraduate training and research in Africa. The programmes are designed to build a critical mass of agricultural scientists to support generation of knowledge and innovations for development in Africa. To support the implementation of these programmes, RUFORUM entered into a partnership with German Academic Exchange Service (DAAD) through the in-region and in- country scholarship initiative. To date DAAD has provided 20 PhD scholarships for training at four RUFORUM Member Universities: Makerere University in Uganda, Jomo Kenyatta University of Agriculture and Technology in Kenya, Nelson Mandela University of Life Sciences in Tanzania and Lilongwe University of Agriculture and Natural Resources (LUANAR) in Malawi. The students have been drawn from six African countries (Kenya, Ethiopia, Sudan, Zambia, Tanzania and Uganda). The purpose of this paper is to share lessons, outcomes and experiences from the partnership. The partnership has led to important outcomes and impact in the regional agricultural research system including: increased access to quality demand driven regional PhD programmes in Africa, strengthened university and research staff capacities, locally relevant agricultural knowledge generated and used, enhanced learning and regional networking among ECSA Research and Development institutions, and internationalization of the training programs.

Key words: DAAD, PhD training, research and training capacity, RUFORUM, scholarships

**Résumé**

Les capacités limitées dans la gestion des programmes de recherche, de formation et de sensibilisation sont parmi les défis les plus importants qui empêchent les institutions d'enseignement supérieur et les instituts de recherche en Afrique de contribuer efficacement au programme de développement du continent. Le Forum Régional des Universités pour le Renforcement des Capacités en Agriculture (RUFORUM) avec ses universités membres, en utilisant une approche de réseaux, met en œuvre des programmes régionaux de formation

postuniversitaire axés sur la demande. L'objectif est de constituer une masse critique de la prochaine génération de scientifiques agricoles africains performants et capables de s'engager dans des recherches pertinentes et de soutenir les innovations agricoles à différents niveaux en Afrique. Afin de soutenir la mise en œuvre de ces programmes, RUFORUM a conclu un partenariat avec le Service allemand d'échange académique (DAAD) dans le cadre de l'initiative de bourses dans la région et à l'intérieur des pays, dans le cadre des efforts visant à renforcer les capacités régionales et nationales de recherche et développement en agriculture en Afrique orientale, centrale et australe (AOCA). Actuellement, le DAAD a accordé 20 bourses de doctorat pour quatre universités membres de RUFORUM: l'Université de Makerere (Ouganda), l'Université Jomo Kenyatta d'Agriculture et Technologie (JKUAT) au Kenya, l'Université Nelson Mandela des Sciences de la Vie (NMAIST) en Tanzanie et l'Université d'Agriculture et de Ressources Naturelles de Lilongwe (LUANAR au Malawi). Les étudiants sont originaires du Kenya, de l'Éthiopie, du Soudan, de la Zambie, de la Tanzanie et de l'Ouganda. Le but de ce document est de partager les leçons, les résultats et les expériences issues de la mise en œuvre du projet du point de vue du RUFORUM. Parmi les principaux résultats de l'initiative dans la région et à l'intérieur des pays, on compte l'accès accru à des programmes de doctorat axés sur la demande de qualité en Afrique, la création de capacités pour le personnel enseignant et les femmes, la production et l'utilisation de ressources agricoles et naturelles locales parmi les institutions de Recherche et Développement de l'AOCA, et l'internationalisation des programmes de formation.

Mots-clés: DAAD, PhD training, research and training capacity, RUFORUM, scholarships

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## **Background**

There is an increasing realization that with adequate support, African universities have the potential to effectively contribute through knowledge and skills to lead the changes needed for development. However, they are faced with staffing challenges especially at PhD level in all fields including in renewable natural resources and agricultural-related fields (Lynam *et al.*, 2016) and in the broad area of Science, Technology and Innovation (STI). Agriculture and renewable natural resources play a particularly important role in the lives of the rural poor and have potential to stimulate growth in sub-Saharan Africa. Africa's agriculture and environment related faculties could play a key role in generating the knowledge and facilitating process to enable the transformation necessary to achieve the targeted annual 6% growth in total agricultural output as envisaged under the Comprehensive African Agricultural Development Programme (CAADP). Unfortunately, the continent is short of competent human resources needed to shape and implement development programs in agriculture and related fields (Osiru *et al.*, 2016). Strengthening university regional centres of leadership will improve rationalisation particularly PhD qualified staff. However, this will require regional coordination and management. Critical also is funding to enable student mobility at postgraduate level with Africa. To address this shortage, the Regional Universities Forum for Capacity Building in Agriculture (RUFORUM) has spearheaded the design and implementation of regional MSc and PhD programmes. These programmes are designed to harness regional capacities and partnerships with major stakeholders in

agriculture to respond to specific capacity gaps within the realm of agriculture in Africa (Ekaya, 2010). The goal is to produce high level skills in relevant disciplines to implement CAADP programmes. The program also aims to build on existing specialization to deepen these into world class centres of excellence. Recognising the un equality of incoming students from around Africa, RUFORUM universities designed a new model of PhD training including one year of coursework for PhD programs, exchange of staff capacity, greater mentorship by NARs partners and research to be done at home countries.

The German Academic Exchange Service (DAAD) and RUFORUM have been in partnership with the aim of supporting doctoral training in Africa in order to improve the capacity of universities to train skilled problem solvers and generate releveant outputs. RUFORUM's program emphasizes in-region mobility of students, enabling them to take courses not available in their home institutions, while at the same time providing for some in-country scholarships to maintain a balance. From 2011 to 2016, 20 students have been supported in six countries. Students are supported through competitive scholarship awards tenable at RUFORUM training progrms. This paper shares experiences, lessons and outcomes emerging from the implementation of the partnership initiative.

#### **Approach to the implementation of in region and in country scholarship scheme.**

RUFORUM has built the partnership on over six years of investment in strengthening centres of leadership in Africa. As part of the approach, following DAAD confirmation of funding support RUFORUM prepares advertisement for the in-region and in-country PhD scholarships targeting specific RUFORUM regional PhD programmes (Table 1). The advertisements are circulated widely through mailing lists and RUFORUM website among network members and beyond. Interested applicants submit relevant documents through the RUFORUM online portal ([www.rimsruforum.org](http://www.rimsruforum.org).) Subsequently, members of the RUFORUM Technical Committee review the applications based on-set criteria as listed in the advertisement. These include aspects of gender equity, insttutional capacity building (specific target are the university faculty and researchers), innovations in research and approach, nationality and motivation for the PhD study. A plagiarism check is also undetaken. The selection process is documented and a detailed report with shortlist is submitted to the DAAD regional office in Nairobi, Kenya. Pre-selected applicants are then invited by DAAD to submit the necessary documents through the DAAD online portal for further screening. Successful candidates are awarded the scholarships and RUFORUM facilitates the students reporting for studies in the respective universities monitor the training progress.

In built rigorous and transparent recruitment processes are crucial in ensuring the selection of quality students for the doctoral programmes. RUFORUM uses an online application proces. Recruitment processes that are supported by automated systems for applications broadens the reach and improves the efficiency in managing the application processes as well as accuracy of data collected. However despite avaliability of various guidelines and support from the Sceretariat some applicants were unable to complete the online application through the RUFORUM and DAAD portals and this resulted in missing the submission

deadlines. While some of these failures to successfully submit may be attributable to the complexities of the portals used, they are also partly due to the applicants' negligence to read users' guidelines and to make use of support available. The current application process will need to be simplified to ensure user friendliness and enhance completion of applications. RUFORUM has also support for potential applicants. Plagiarism was identified as an important challenge highlighting poor awareness by applicants on ethics in science. Reports by various authors including Saana *et al.* (2016) indicate this is a growing concern in academic arena. Most of PhD candidates have weak theoretical and conceptual grounding which makes them vulnerable to plagiarism. There is a dire need to focus on building capacity by retooling doctoral supervisors, enhancing awareness on science ethics at lower levels and making use of antiplagiarism software. RUFORUM has made efforts to hold dialogue with partners especially with European based professors, such as in the Agricultural and Rural Innovation PhD programme (ARI), but there are also several institutional and logistical challenges to deal with.

### **Outcomes of the partnership**

**Increased access to quality demand driven postgraduate programmes in Africa.** The in-region and in-country PhD training has provided opportunities for students to train in targeted academic fields available in the Eastern, Central and Southern Africa region to address the gaps in conducting quality research and teaching. Studies in Africa have shown that the key factors affecting higher education include low access to education (Mazzarol and Souter, 2002), the quality of education (Cubillo *et al.*, 2006) and the desire for qualifications with broader recognition (Mpinganjira and Rugimbana, 2009). RUFORUM's efforts to provide a framework for strengthening these specific academic postgraduate programs has been effective at putting in place strong PhD programs in the region (Table 1). These programmes are now accessible for training for Africa in Africa. The key characteristics of the curriculum development process of these programmes include a highly consultative and participatory process, articulation of demand at national level with diverse actors including employers, and regional and international consultation to enrich the curriculum, review of curriculum at national, regional and international level, institution of a regional academic advisory board for adherence to quality assurance procedures set by RUFORUM and institutionalization of the new programmes through the relevant university structures. The programmes offering training for DAAD sponsored PhD students are shown in Table 2.

To ensure learning and growth of the programmes RUFORUM undertakes periodic evaluations and reviews. In this regard, the universities have been able to institutionalize some of the outcomes from the initiative such as developing mechanisms that support internationalization of their institutions' academic programmes. These have also included putting in place students' recruitment strategies, providing supporting facilities, joint degree delivery and co-supervision of graduate students, and research collaboration beyond the host institution. This, in a way, is expanding the horizon and competitiveness of the universities and a number of them have been selected to host the African Higher Education Centers of Excellence funded by the World Bank, through IDA support to the member countries (Table 3).

Table 1. Regional PhD and MSc programmes developed to address key gap areas for implementation of the Comprehensive African Agricultural Development Programme

PhD programmes	Institution	Host Country
PhD Agriculture and Rural Innovations	Makerere University	Uganda
	Egerton University	Kenya
	Sokoine University of Agriculture	Tanzania
PhD Plant Breeding and Biotechnology	Makerere University	Uganda
PhD in Food Science and Nutrition	Jomo Kenyatta University of Agriculture and Technology	Kenya
PhD in Aquaculture and Fisheries Sciences	Lilongwe University of Agriculture and Natural Resources	Malawi
PhD in Agricultural and Rural Economics	Lilongwe University of Agriculture and Natural Resources	Malawi
PhD in Dryland Resource Management	University of Nairobi	Kenya
PhD in Soil and Water Management	Sokoine University of Agriculture	Tanzania
MSc in Research Methods	Jomo Kenyatta University of Agriculture and Technology	Kenya
MSc in Monitoring and Evaluation	Uganda Martyrs University	Uganda
MSc in Plant Breeding and Seed Systems	University of Zambia	Zambia
	Makerere University	Uganda
MSc in Agricultural Information and Communication Management	Egerton University	Kenya
	University of Nairobi	Kenya
	Haramaya University	Ethiopia
	Makerere University	Uganda
MSc in Agrometeorology and Natural Risk Management	Haramaya University	Ethiopia

**Enhanced learning and regional networking among African research and development institutions.** A key challenge with national postgraduate programmes has been small class sizes that are often unsustainable (Osiru *et al.*, 2016). Regional programs enable economies of scope and scale, while benefiting from available regional capacity and expertise in niche areas. The in-region and in-country has brought together students from different countries such as Sudan, Ethiopia, Zimbabwe, Zambia, Uganda and Tanzania hence fostering establishment of inter-African co-operation for the future. This was made possible by developing a regional curriculum and a MoU across RUFORUM member universities vice chancellor allowing student and staff mobility. It is evident that considerable learning takes place when students from across Africa work together in advanced academic programs (UNESCO, 2011). The added advantage to this initiative is that the regional programmes have attracted students and staff not only from

East Africa, but also the wider sub-Saharan Africa region thus providing extensive networking opportunities. Indeed RUFORUM mobilises funding from other sources for the regional PhD programs beyond DAAD. The regional PhD programmes also host concurrently students funded through RUFORUM and other initiatives such as the Intra-African Academic mobility, Intra-ACP Academic Mobility, etc. The scholars have appreciated the networking and learning opportunities facilities which enables them to meet a broad range of their needs including the integration of local and international needs through the in-region and in-country approach. The emerging lesson is that implementers need to put in place deliberate mechanisms to nurture these students networking opportunities while the students are still at the university and this could be a leverage point for research and teaching collaborations throughout the region beyond the scholarship time. It is also important that universities continue to strengthen internationalization of their academic programmes.

#### **Improved theoretical understanding**

Regional programme students benefit from a one year of taught coursework that has improved their theoretican understanding. Recognising the variety of educational backgrounds represented by potential students who were from all over Africa, the course work is critical for ensuring that all students begin research with a strong theoretical background. In a review meeting during the RUFORUM Biennial conference 2016, the students indicated to have gained additional soft skills such as inter-cultural communication, openness and problem solving skills. This has been made possible by the harnessing of broader capacities in the region through RUFORUM frameworks.

**Enhanced capacity of faculty staff and women.** The design of the in-country/in-region scholarship targets capacity building of staff members from the research and academic institutions with special emphasis on female participation especially those from less privileged regions or groups. Of the 20 scholarships targeting researchers and staff from universities in Ethiopia, Kenya, Sudan, Uganda, Zambia and Zimbabwe have been offered, 45% are women beneficiaries who are pursuing doctoral training under the regional programmes. Despite this considerable increase in the numbers of women participation in the PhD programs (against an average of 19% for women pursuing postgraduate training in Sub-Saharan Africa) UNSECO, 2012, there is need to consider gender aspects for attracting female participation in the programmes and post-graduate training generally in Africa. This requires deliberate added incentives to enable women study and conduct quality research at the same time supporting their families adequately. Focus goes beyond female perticipation at selection to supporting female graduate students to ensure completion.

**Knowledge and technology transfer.** The in-region and in-country programmes have allowed flexibility for the students to conduct research either in their home countries or host university institutions. Whatsoever option the student choices, attempt is made to link the research to country specific needs. Consequently, the arrangement gives the students opportunities to conduct research that address the needs of their home countries and integrate the research recommendation effectively for the betterment of the communities they serve. The arrangements also emphasizes that in addition to the academic supervisors at host

institutions, the students are also mentored by experts from home country to keep up with the current trends of home research and ensure that the research still remains relevant to the home institution. This increases the chances of students to settle down in their home institution at completion, since they work on a topic of national importance.

Table 2: Regional PhD programmes providing in-country and in-region PhD training through the DAAD scholarships

PhD programmes	Institution	Host Country*	Number of PhD students trained
Agriculture and Rural Innovations	Makerere University	Uganda	5
PhD Plant Breeding and Biotechnology	Makerere University	Uganda	6
PhD in Food Science and Nutrition	Jomo Kenyatta University of Agriculture and Technology	Kenya	4
PhD Aquaculture and Fisheries Sciences	Lilongwe University of Agriculture and Natural Resources	Malawi	2
PhD in Life Sciences	Nelson Mandela African Institution of Sciences and Technology	Tanzania	3
Total			20

\*The focus of DAAD / RUFORUM scholarship is East Africa hence more placements in Uganda and Kenya

The emerging lesson is that there is need for stronger facilitated linkages between home supervisors and host university academic supervisors in order to ensure relevance in the production of knowledge generated innovations that will suit diverse conditions. This also ensures that returning researchers fit seamlessly into national innovation system. The host universities need to institutionalize and formalize the recognition of the home supervisor role and this will enable them engage fully in this arrangement.

Table 3: Approved Africa Higher Education Centers of Excellence (Phase II) in Eastern and Southern Africa of the World Bank

Country	Name of ACE	Institution
Ethiopia	African Centre of Excellence for Climate Smart Agriculture and Biodiversity Conservation (Climate SABC)	Haramaya University
	Centre for Innovative Drug Development and Therapeutic Trials for Africa (CDT-Africa)	Addis Ababa University
	ACE for Water Management (ACEWM)	Addis Ababa University
	African Railway Education and Research Institute (ARERI)	Addis Ababa University
Kenya	Centre of Excellence in Sustainable Agriculture	Egerton University

	and Agribusiness Management (CESAAM)	
	Sustainable use of Insects as Food and Feeds (INSEFOODS)	Jaramogi Odinga Oginga University of Science and Technology
	Centre of Excellence in Phytochemicals Textiles and Renewable Energy (PTRE)	Moi University
Malawi	Aquaculture and Fisheries Science (Aquafish) Centre of Excellence	Lilongwe University of Agriculture and Natural Resources (LUANAR)
	Centre for Public Health and Herbal Medicine (CEPHEM)	University of Malawi - Malawi College of Medicine
Mozambique	Center of Studies in Oil and Gas Engineering and Technology (CS-OGET)	Universidade Eduardo Mondale
Rwanda	African Centre of Excellence in Energy for Sustainable Development (ACEESD)	University of Rwanda – College of Science and Technology
	African Centre of Excellence in Internet Things (ACEIoT) Science and Technology	University of Rwanda – College of
	African Center of Excellence for Teaching Learning Mathematics and Science (ACEITLMS)	University of Rwanda College of and Education
	African Centre of Excellence for Data Sciences (ACE-DS)	University of Rwanda – College of Business and Economics
Tanzania	African Centre of Excellence for Innovative	Sokoine University of Agriculture
	Rodent Pest Management and Biosensor Technology Development (IRPM and BTM)	
	Southern African Centre for Infectious Disease Surveillance (SACIDS)	Sokoine University of Agriculture
	Water Infrastructure and Sustainable Energy Centre for the Futures (WISE)	Nelson Mandela African Institution of Science and Technology
	Collaborating Centre for Research, Evidence, Agricultural Advancement and Teaching Excellence and Sustainability (CREATES)	Nelson Mandela African Institution of Science and echnology
Uganda	Makerere University Centre for Crop Improvement (MaCCI)	Makerere University
	Centre of Materials, Product Development and Nanotechnology (MAPRONANO)	Makerere University
	African Centre for Agro-ecology and Livelihood Systems (ACALISE)	Uganda Martyrs University
	Pharm-Biotechnology and Traditional Medicine Centre (PHARMTRAC)	Mbarara University of Science and Technology
Zambia	Centre of Excellence for Emerging and Zoonotic Diseases (ACEEZD)	University of Zambia
	The Copperbelt University Africa Centre of Excellence for Sustainable Mining (ACESM)	Copperbelt University



## **Conclusion**

The in-region and in-country scholarships provided by DAAD to RUFORUM have had positive impact on postgraduate education in Africa. They have resulted in building individual and institutional capacity of African universities where programs are being run, but also trained over 20 PhDs who are all expected to return to their home institutions. They have also improved inter-regional cooperation and indeed regional integration as participating researchers have had opportunity to build regional / cross country networks of specialisation and cross fertilised knowledge and experiences. The programmes have attracted students from universities (lecturers) and national agricultural research institutes. However, current growth in the NARs, including as a result of a fast expanding university sector will require an escalation in Msc and PhD training in Africa and the DAAD / RUFORUM model provides important features for building the human capacity required. There still exists major human resource gaps in the continent requiring escalation in investments and PhD training.

Considering the vision for RUFORUM to scale up doctoral training through academic mobility, regional academic programmes initiatives such as in-region and in-country training should be scaled up and promoted to deliver quality postgraduate training programmes for the continent. RUFORUM will seek partnership with other initiatives supporting mobility of staff and students such as the ACE I and ACE II projects of the World Bank, Partnership for skills in Applied Sciences, Engineering and Technology (PASET), the Future Africa Studies Centre being established at the University of Pretoria, and others. There is only 6-8% enrolment in higher education in Africa, as compared to a global average of 30%, and as high as 85% for developed countries. The need for escalating postgraduate training is critical to drive quality across the entire education pipeline. This is one of the recommended actions agreed upon by African Ministers during the Fifth African Higher Education Week Conference held 17-21 October 2016 in Cape Town, South Africa. [http://ruforumbiennial.org/sites/all/themes/corporate-site/corporate/images/RUFORUM\\_Biennial\\_Ministerial\\_Communique\\_2016.pdf](http://ruforumbiennial.org/sites/all/themes/corporate-site/corporate/images/RUFORUM_Biennial_Ministerial_Communique_2016.pdf).

Finally, while considerable progress has been made by RUFORUM/ DAAD to increase the number of female students at undergraduate level, more effort needs to be made to attract and retain female students to postgraduate training in Africa.

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