



Training the Next Generation of PhD Graduates in African Universities: Reflection on collaboration between RUFORUM and the Carnegie Corporation of New York, 2012-2022

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ABSTRACT

The Regional Universities Forum for Capacity Building in Agriculture (RUFORUM, www.ruforum.org) is a network of 163 universities in 40 African countries spanning all the five regions of the African continent. RUFORUM was established to promote the integration of member universities into Africa's development processes, particularly within the Comprehensive Africa Agriculture Development Program (CAADP); provide a platform for networking, resource mobilization and advocacy to transform universities for relevance towards inclusive sustainable development; and to rationalize resource use and enhance economies of scale and scope. The RUFORUM Network is mandated to strengthen the quality and relevance of postgraduate training and research in African universities especially in agriculture, science, technology, and innovation through activities designed to improve the capacity of African universities and research centres to generate knowledge relevant to Africa's development challenges. RUFORUM acknowledges that contribution to global knowledge in all spheres by scientists from Africa requires graduate training at Masters and Doctoral levels. Hence in 2012, RUFORUM entered into partnership with Carnegie Corporation of New York (CCNY) to launch its Post-Doctoral Training Programme and to support research of Doctoral and Masters Students. To date a total of 39 Post-Doctoral Fellowships and 294 Doctoral research grants were funded. Special emphasis was placed on supporting University Faculty staff pursuing Doctoral training especially female academics. The support from CCNY enabled RUFORUM to leverage funding from other sources such as the Intra-African Academic Mobility Programme, amongst others. Staff who have graduated are now helping to strengthen training and research programmes in their home institutions.

Key words: Doctoral Research Grants, Graduate Training Assistantship, Post-Doctoral Fellowships, RUFORUM

RÉSUMÉ

Le Forum régional des universités pour le renforcement des capacités en agriculture (RUFORUM, www.ruforum.org) est un réseau de 163 universités dans 40 pays africains couvrant les cinq régions du continent africain. Le RUFORUM était créé pour promouvoir l'intégration des universités membres dans les processus de développement de l'Afrique, en particulier dans le cadre du Programme détaillé de développement de l'agriculture africaine (CAADP); fournir une plate-forme de mise en réseau, de mobilisation des ressources et de plaider pour transformer les universités en termes de pertinence vers un développement durable inclusif; de rationaliser l'utilisation des ressources et d'accroître les économies d'échelle et d'envergure. Le réseau RUFORUM a pour mandat de renforcer la qualité et la pertinence de la formation postdoctorale et de la recherche dans les universités africaines, en particulier dans les domaines de l'agriculture, des sciences, de la technologie et de l'innovation, à travers des activités conçues pour améliorer la capacité des universités et les centres de recherche africains à générer des connaissances pertinentes que

représentent les défis qui entravent le développement de l'Afrique. RUFORUM reconnaît que la contribution aux connaissances globales dans tous les domaines par des scientifiques africains nécessite une formation de deuxième cycle, aux niveaux de la maîtrise et du doctorat. Ainsi, en 2012, RUFORUM a conclu un partenariat avec Carnegie Corporation de New York (CCNY) pour lancer son programme de formation post-doctorale et soutenir la recherche d'étudiants en doctorat et en master. À ce jour, un total de 39 bourses postdoctorales et 294 bourses de recherche doctorale ont été financées. Un accent particulier était placé sur le personnel universitaires poursuivant une formation doctorale, en particulier les femmes universitaires. Le soutien du CCNY a permis au RUFORUM de mobiliser des financements auprès d'autres sources telles que le programme de mobilité universitaire intra-africaine. Les membres du personnel qui ont obtenu leur diplôme contribuent maintenant à renforcer les programmes de formation et de recherche dans leurs établissements d'origine.

Mots clés : Bourses de la recherche doctorale, Assistanat de l'enseignement supérieur, Bourses post-doctorales, RUFORUM

INTRODUCTION

In January 2003, 10 Vice Chancellors from five African countries¹ signed a Memorandum of Understanding to establish the Regional Universities Forum for Capacity Building in Agriculture and by April 2004, RUFORUM was operational. In August 2005, support for RUFORUM was formalized in an endorsement signed by the New Partnerships for Agricultural Development (NEPAD) and the Ministers for education from each of the then five member countries. That same month a 10-year strategic plan (2006–2015) was developed to designate new thrusts and operational modalities to guide the Secretariat during the transition period from a donor programme (Forum for Agricultural Resource Husbandry of the Rockefeller Foundation) to an autonomous member-based organization (Waswa *et al.*, 2020). During this period in 2009, RUFORUM commenced facilitating academic mobility in Africa (Okalany *et al.*, 2016; ACE, 2020) to strengthen capacity of African universities to build their own human resource capacities and to train a new generation of African scholars who know Africa better and more widely (Adipala *et al.*, 2013; Chindime *et al.*, 2016; Anonymous, 2018; Adidja *et al.*, 2020).

In 2014, at the 4th African Higher Education Week and RUFORUM Biennial Conference, held in Maputo, Mozambique in July 2014

RUFORUM launched the Graduate Teaching Assistantship (GTA) programme (Fig. 1). It provided for the host university to waive fees, the sending university to continue providing salary and the staff member upgrading to PhD to assist with teaching at the host university (ACE, 2020; Adidja *et al.*, 2020). The Biennial conference which included the African Union Commission Chair and government ministers from across Africa resulted in demand for RUFORUM to broaden its focus to include science, technology and innovation (ST&I), and a call to expand membership to West and North Africa (Waswa *et al.*, 2018a; Waswa *et al.*, 2020).

During the period 2014 to 2017, RUFORUM consolidated its footprints in Eastern, Central and Southern Africa, including providing targeted support to build capacity for weaker National Agricultural Research Systems in Burundi, Rwanda and Sudan with support through the Forum for Agricultural Research in Africa that coordinated the SCARDA (Strengthening Capacity for Agricultural Research and Development) project which focused on building capacities for weaker National Agricultural Research System in Africa (Waswa *et al.*, 2020). In 2016, the World Bank availed an IDA credit of US\$140 million to eight Eastern and Southern African countries to set up 24 centres of excellence in universities to strengthen postgraduate training and research. Eleven (11) of

154 ¹Makerere University in Uganda; University of Malawi in Malawi; University of Zimbabwe and Africa University in Zimbabwe; Eduardo Mondlane University in Mozambique; University of Nairobi, Kenyatta University, Egerton University, Moi University; and, the Jomo Kenyatta University of Agriculture and Technology in Kenya

these were awarded to eight of the RUFORUM member universities in five countries (ACE, 2020; Adidja *et al.*, 2020; Waswa *et al.*, 2020). In the same year, RUFORUM secured US\$ 27.1 million from the Mastercard Foundation to support transformation of African agricultural universities and their graduates to better respond to developmental challenges through enhanced application of science, technology, business and innovation for rural agricultural transformation (Waswa *et al.*, 2020).

The RUFORUM Annual General Meeting of 2016 and the organization business strategy review of 2017 demanded that RUFORUM developed a comprehensive and inclusive programme for developing Africa's Agriculture through implementing innovative and transformative initiatives in the higher education sector. Subsequently, in 2018 through systematically conducted consultation processes, RUFORUM developed the Vision 2030 and a corresponding Operational Plan implemented through four Flagship Programmes and Secretariat Coordination: TAGDev-Transforming African Agricultural Universities' growth and development; RANCH-Regional Anchor Universities for Higher Agricultural Education; CREATE-Cultivating Research and Teaching Excellence, and K-Hub: Knowledge Hub for University Networking, Partnership and Advocacy. Key to the implementation of Carnegie Corporation of New York support to RUFORUM has been the CREATE flagship (Waswa *et al.*, 2018a; Adidja *et al.*, 2020; Waswa, 2020).

The RUFORUM-Carnegie partnership. For a period of ten years (2012-2022), the Carnegie Cooperation of New York has been supporting RUFORUM build African Universities' training capacity by strengthening doctoral programmes and thereby ensuring that they have adequate qualified faculty staff with doctorate degrees. This partnership is in line with the Carnegie Higher Education Programme's efforts to upgrade the capacity of university faculty, to support the required human capital and

locally generated research vital in sustaining and expanding social and economic gains, and increasing agricultural productivity and food and nutrition security (Adipala *et al.*, 2013; Chindime *et al.*, 2016; Adidja *et al.*, 2020). It is also well aligned with the RUFORUM's overall mission to enhance the quality and relevance of postgraduate education in Africa (Okalany *et al.*, 2016; Waswa *et al.*, 2020).

The RUFORUM-Carnegie partnership achievements. The Carnegie Corporation of New York (CCNY) has increasingly invested in higher education within Africa and has been instrumental in supporting higher education advancement. The support has created a significant difference in increasing the quality of faculty at universities to obtain their doctorates and to gain experience and strengthen their networks after graduation. This has helped to improve the quality of the universities, increase Africa's contribution to global knowledge and importantly to retain these highly skilled people in Africa. Since 2012, a total of 294 PhD scholarships have been awarded competitively to support training in 36 Universities spread across the continent (Fig. 2). Of the 294 PhD grantees, 81 have already graduated and have returned to their home countries to occupy various positions. Majority of the graduates rejoined universities where they have been appointed to senior positions such as Deans of Faculties, Heads of Departments, and Coordinators of Postgraduate programmes, amongst several other positions (Okori, 2014; Waswa *et al.*, 2018b; ACE, 2020; Adidja *et al.*, 2019). Despite the fact that this is a great development for alumni, it also highlights the need to enhance leadership management skills that would help strengthen the performance of the graduates in their new positions. This was incorporated in the training of subsequent Post-Doctoral fellows and graduate students. RUFORUM continued to support them through leadership coaching by its professional community. In addition to the PhD grantees, 123 master students were supported under the Carnegie Post-Doctoral

fellowship Programme which started in 2018. Out of these, 22 have completed their studies (Adipala

et al., 2013; Chindime *et al.*, 2016; Anonymous, 2018; ACE, 2020; Adidja *et al.*, 2020).

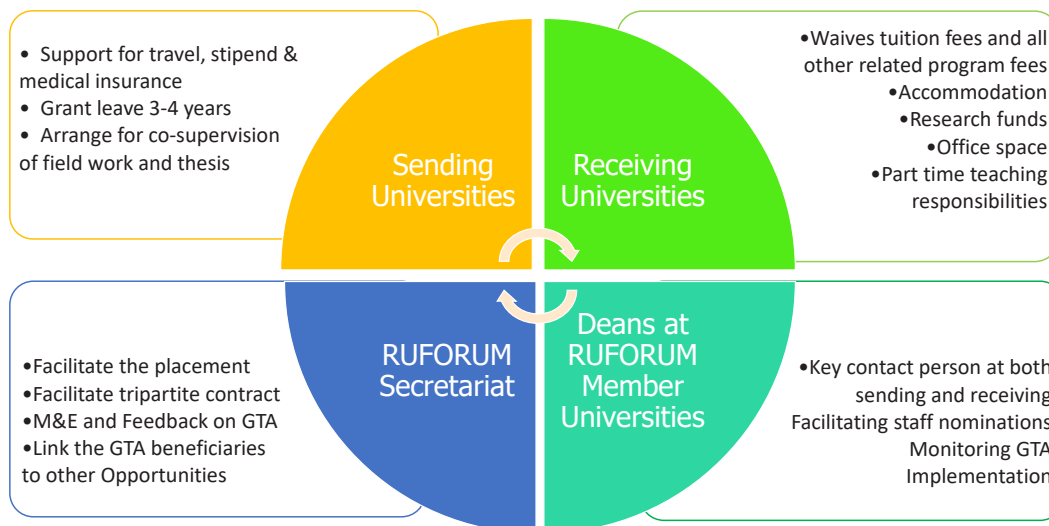


Figure 1. Key Actors and their Roles/ Responsibilities in GTA Implementation
Source: Adidja *et al.*, 2019

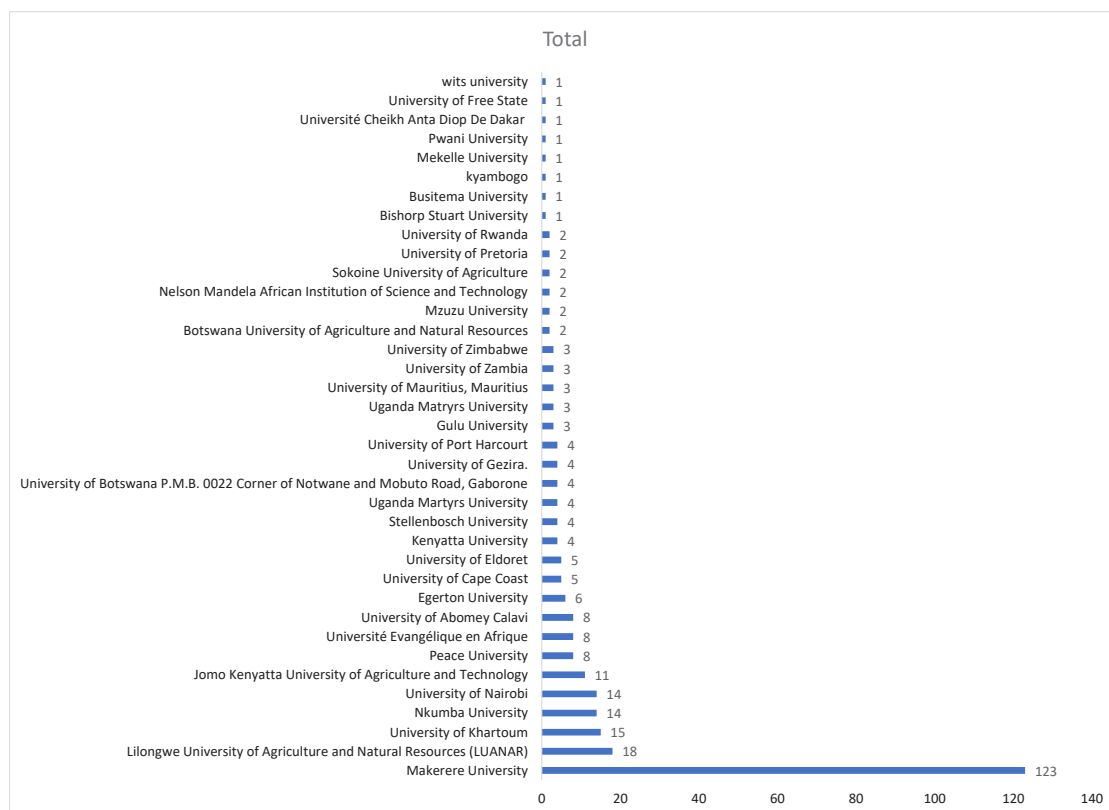


Figure 2. Universities training students under RUFORUM Exchange Programme amongst its Member Universities

Support to Regional PhD and Masters training Programmes. RUFORUM Regional PhD and Masters Programmes (Table 1) were designed to build the teaching and research capacity of member universities. They were established to address the skills gap at universities and research institutes and ultimately improve food and nutrition security and stimulate growth. Implementation of these programmes has been supported by multi-donor agencies including the Carnegie Corporation of New York by supporting recruitment of students into these programs. A total of 104 PhD and 11 MSc students have been recruited in these programmes (Okori, 2014; Mweetwa, 2021; ACE, 2020). RUFORUM also supported development of national programmes (Table 2).

information transfer and includes support to soft skills development and networking, thereby rendering graduates from RUFORUM supported programmes more suited to employment requirements. Many jobs today, and many more in the near future, require a combination of technological know-how, problem-solving and critical thinking, as well as soft skills and practical experience. The days of staying in one job, or with one company, for decades are waning. The new generation of graduates has different aspirations, viewing their employment ideals and options in self-employment, especially with the dwindling conventional public and private sector job opportunities (ACE, 2020; Njeru, 2014; Okori, 2014; Mweetwa *et al.*, 2021). Figure 3 shows some of the skill and exposure enhancement events conducted.

These programmes focus on more than just

Table 1. RUFORUM Regional Training Programmes as of 2022

Programme	Centre of Leadership	Year of Launch
PhD Programmes		
Dryland Resource Management (DRM)	University of Nairobi	2008
Plant Breeding and Biotechnology (PBB)	Makerere University	2008
Aquaculture and Fisheries Science (AFS)	Lilongwe University of Agriculture and Natural Resources, Malawi	2009
Agricultural and Resource Economics (ARE)	Lilongwe University of Agriculture and Natural Resources, Malawi	2009
Soil and Water Management (SWM)	Sokoine University of Agriculture, Tanzania	2010
Agricultural and Rural Innovations (ARI)	Makerere University	2012
	Egerton University	2012
	Sokoine University of Agriculture, Tanzania	2013
Food Science and Nutrition (FSN)	Jomo Kenyatta University of Agriculture and Technology	2013
Agro-ecology and Food Systems	Uganda Martyrs University	2017

Agrometeorology and Natural Risk Management	Haramaya University, Ethiopia	2011
Climate Smart Agriculture	Haramaya University, Ethiopia	2016
Climate Change and Society	Mekelle University	2014
Agrometeorology	University of Gezira	2011
Agroecology and Climate Sciences	Universite Evangelique en Afrique	2022
Agricultural and Applied Biosciences	Gulu University	2016
Climate Change and Sustainability	Makerere University	2016
MASTERS PROGRAMMES		
Plant Breeding and Seed Systems	Makerere University	2008
Plant Breeding	University of Zambia	2010
Research Methods	Jomo Kenyatta University of Agriculture and Technology	2009
Agricultural Information and Communication Management (AICM)	Egerton University	2008
	University of Nairobi	2009
	Haramaya University	2010
Agrometeorology and Natural Risk Management	Haramaya University, Ethiopia	2011
Monitoring and Evaluation	Uganda Martyrs University, Uganda	2012
Agro-ecology, Biodiversity and Climate Science	University of Antananarivo	2013
Climate Smart Agriculture	Haramaya University, Ethiopia	2016
Agroinformatics	Ndejje University	2022

Table 2. RUFORUM Supported National Training Programmes

Programme	Centre of Leadership	Year of Launch
PhD Programmes		
Natural Resource and Environmental Management	Peace University	2021
Natural Resource Management	University of Juba	2022
Masters Programmes		
Natural Resources Management	University of Juba	2019
Entrepreneurship	University of Juba	2019
Agronomy	University of Juba	2019
Animal Science	University of Juba	2019

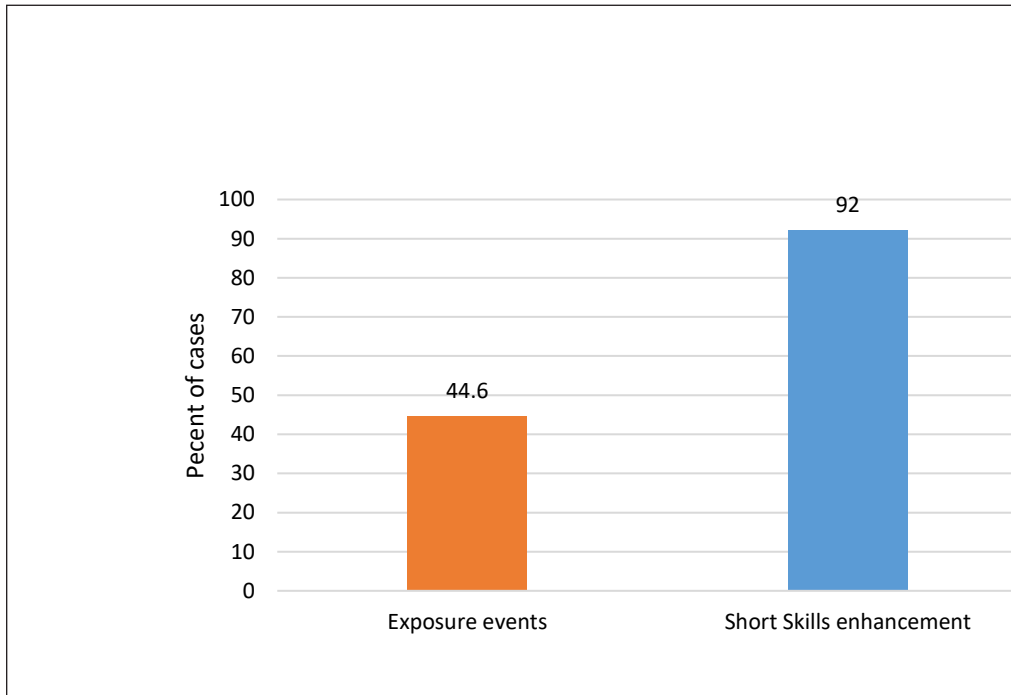


Figure 3. Distribution of alumni and graduate students reporting participation in exposure events and short skills enhancement training

University relevance improved through revamped curricula, skills enhancement, and research grounded in local reality .

A key aspect of the Carnegie Corporation of New York -RUFORUM partnership was to put in place skills enhancement programs to improve the relevance and quality of the postgraduate programmes in Africa. Accordingly, RUFORUM supported students’ skills enhancement both through short skills training and mentorship received from their supervisors. Specifically, students were trained in proposal writing, journal publication, scientific data management, and personal mastery. RUFORUM supported 800+ students to participate in the scientific events during its Annual General Meetings and Triennial conferences. It organised 27+ short skills enhancement events for students, Post-Doctoral researchers and staff in member universities covering 15+ thematic areas including: leadership and management, scientific research proposal development, scientific writing skills, scientific data management using R programming language and data analysis using AMOS and STATA, financial literacy training, competitive grants

project proposal development, among others. The following outputs materialised:

1. RUFORUM-funded students in the scientific events during its AGMs and Triennial conferences submitted 321 papers and 551+ posters, and made 125 oral/poster presentations.
2. A total of 11,504 individuals including students, post-doctoral researchers and staff from member universities were trained in 15 thematic areas, which has created a pool of resource persons in the region to train other scientists. According to a recent follow-up study of RUFORUM Alumni in general, 92% of the alumni/graduate students who responded to the on-line survey reported that they had participated in at least one short skills enhancement events while 45% had engaged in RUFORUM organized exposure events

The short skills enhancement events were appreciated for addressing both technical and soft skills, which are not adequately handled by the

general training curricula. These include aspects that are vital for success of the graduates such as emotional intelligence, empathy and critical/innovative thinking. Skill-sets that were noted to be needed for future training include scientific writing, e-content development, and on-line pedagogy for interactive sessions, learner centred pedagogy (how to teach) as this would improve quality of training delivery in light of large class sizes.

Support from the CCNY helped RUFORUM test different model of human capital development and this has boosted the performance of African universities through increased numbers of staff with higher education qualifications and better pedagogical and research skills. The support towards soft skills and networking, and the imparting of multi-dimensional skill qualities render graduates more suited to employment requirements, a key challenge confronting Africa's universities today.

RUFORUM further collaborated with the African Women in Agricultural Research and Development (AWARD) to offer targeted leadership and skill enhancement training for especially female researchers and mid-career university administrators (Waswa *et al.*, 2018b). Over the time, RUFORUM also supported establishment of leadership development programmes as refresher courses to strengthen university leadership and management.

Quality of teaching and learning improved through academic mobility and mentoring. Collaboration with the Carnegie Corporation of New York resulted in enhanced regional cooperation and networking among RUFORUM member universities. Students and faculty had opportunities, through mobility, to learn about various countries and formed close relationships that were consolidated through formal RUFORUM structures and social networking initiatives. For instance, staff

exchanges within the RUFORUM Network created opportunities for universities in Africa to collaborate particularly in terms of strengthening research and visiting lectures. This provided opportunity for faculty cross learning. Through these collaborations, joint proposals were developed for funding by the EU Intra-ACP and Intra-African academic mobility programs. As a result, more than US \$10.5 million was raised to facilitate over 36 staff exchanges and training of 179 MSc. and 75 PhD students across Africa (Table 3). Such partnerships respond to the need to harness capacities existent in various universities to serve the wider higher education and research sector. It also promotes professional networking across the relevant scientific disciplines and within the private and public sectors to transform African economy into a knowledge-based economy (Chindime *et al.*, 2016; Okalany, 2016; Anonymous, 2018; ACE, 2020; Adidja *et al.*, 2019).

Further, six EDULINK projects were conceived through staff exchanges and collaborations, including; PASUFONS²; ii) ADECEA³; iii) AGRIBUSINESS⁴; iv) ARI⁵II; v) PhD Aquaculture⁶; and, vi) Online Networking Platform⁷.

The PASUFONS project facilitated strengthening of academic collaboration amongst three universities namely Makerere University in Uganda, Jomo Kenyatta University of Agriculture and Technology (JKUAT) in Kenya, and Stellenbosch University in South Africa. The three universities used satellite technology to facilitate virtual teaching. The hardware for receiving signals was provided by Stellenbosch University and installed at JKUAT and Makerere University. Using the telematic system, students at Makerere University, JKUAT, and Stellenbosch University attended lectures recorded at the Telematic Centre at Stellenbosch University. In addition to virtual teaching, PASUFONS facilitated sharing of expertise among partners through staff exchange.

²Partnerships to strengthen university food and nutrition sciences training and research in Eastern and Southern Africa

³Establishing and piloting postgraduate programmes for supporting agricultural development in post conflict countries of Central and Eastern Africa

⁴Strengthening University capacity to enhance competitiveness of agribusiness in Eastern and West Africa

⁵Strengthening Human Resource Capacity to Foster Agricultural and Rural Innovation in Eastern Africa

⁶Concerted Fit-for-purpose PhD training in aquaculture and fisheries to improve food security and livelihoods in Sub-Saharan Africa

⁷Deploying Interactive On-line Networking Platform for Improving Quality and Relevance of African University Graduates to Labour Markets

Table 3. Projects conceived out of inter-university collaboration amongst RUFORUM Member Universities

Project Name	Staff exchange	PhD students in mobility	MSc students in mobility
METEGA	8	19	44
CSAA	10	19	44
P4PHT	8	18	47
SHARE	10	19	44
COTRA	10	12	24
REFORM	6	11	23
SCIFSA	4	12	24
MASTET	6	12	22
MIRET	5	12	33
GTA Programme	-	216	36

Source: Mweetwa *et al.*, 2021

Through the ADECEA project coordinated by Makerere University, demand driven MSc programmes were developed and piloted by Université d'Antananarivo in Madagascar, Université du Burundi in Burundi, and Université Catholique de Bukavu in DRC; three countries emerging from conflicts. The three RUFORUM member universities were backstopped by Agreenium and SupAgro-Montpellier in France and University of Ghent in Belgium.

The AGRIBUSINESS project coordinated by Egerton University sought “to improve the relevance of agricultural science teaching and outreach to the needs of agribusiness and enhance the collaboration between universities and the private sector”. Through this project, four RUFORUM member universities – namely Mekelle University (Ethiopia), Gulu University (Uganda), and University of Port Harcourt (Nigeria) – collaborated with the University of Copenhagen in Denmark to increase competences of Faculty in terms of Agri-entrepreneurship to equip them to teach courses appropriately and build the entrepreneurship skills of graduates. Through this project, an entrepreneurship fund scheme was also established to help students

develop agri-enterprises as practical hands on training to engage in entrepreneurship activities.

Through ARI II project, three RUFORUM member universities- Makerere University, Egerton University, and Sokoine University of Agriculture (Tanzania) jointly ran a Regional PhD Programme in Agricultural Rural Innovations in partnership with Wageningen University and Research Centre in the Netherlands, Agreenium in France, and University of Copenhagen in Denmark. The programme was offered both on site and online to offset the cost of students and staff mobility.

The On-line Networking Platform project was coordinated by Egerton University, which partners with JKUAT, Makerere University, RUFORUM, and AGRINATURA in Europe to increase interaction between academic world and labour market through an innovative interactive online networking platform, thus improving the relevance of universities to communities. The project involved several associate partners representing various segments of the agriculture sector.

Due to the COVID-19 pandemic there was no movement across the borders and all the activities were done online which included proposal development and refinement and technical backstopping of the African Higher Education Centres of Excellence. Students were supported to develop proposals for submission to their respective universities. The virtual mobility faculty provided technical backstopping to Regional Centers of Excellence by undertaking mentoring, teaching and training of students (both graduates and undergraduates) and also supported the review of the RUFORUM initiated Regional MSc and PhD programmes. The staff also participated in the development of new PhD programmes on Agro-ecology and Climate Science, and Natural Resources and Environment Management.

Improved research Capacity. Over the past ten years, RUFORUM has with funding from Carnegie Corporation of New York supported early career scientists to find their footing within the academic and research environment and to have opportunity to advance their work and initiate new research. Below are profiles of some of the supported research which has been able to directly impact the agricultural research and development in Africa.

1. Improved cassava and soybean varieties (Namsoy 4M, Maksoy 1N, Maksoy 2N, Maksoy 3N, Maksoy 4N, Maksoy 5N) now grown widely in Africa and have been taken up seed companies in Kenya, Sudan, Ghana and Zimbabwe.
2. Banana macro propagation for the production of disease free banana seedlings in central and eastern Kenya; and, consequently strengthening farmer associations in several countries including Kenya.
3. Molecular markers for Peste des petits ruminant's virus (PPRV) diagnostic targeting the nucleoprotein, fusion and hemagglutinin genes. These markers are being used to map the PPRV distribution in South Kivu (Eastern of DR Congo) and for characterizing the PPRV lineages circulating in eastern DRC (PPRV Lineage III).

4. Fifteen (15) Kersting's groundnut elite lines with resistance to storage bruchids have been developed and are undergoing advanced trials and will soon be released in Benin (West Africa).
5. Pearl millet genotypes with resistance to witch weed (*Striga asiatica*). These genotypes are being used as sources of resistance in breeding pearl millet genotypes for marginalized farming areas of Zimbabwe and are also being used in the ongoing project under the Future Grains for Africa.
6. An environmentally benign botanical fungicide for the control of late blight in Solanaceous crops (Neemox) has been developed. The development of the botanical fungicide is now embedded in the University of Zimbabwe innovation hub and being commercialized.
7. SIPROSA, an Artificial Intelligent (AI) based chicken disease chatbot, which is able to diagnose, and recommend the best treatment based on the current best practices. This has been installed on 25,788 farmers' devices/ phones and is actively being used by farmers in Kenya.
8. Developed foundation seeds of six cowpea varieties resistant to aphid and Striga yielding 2600-2800 kg/ha. The foundation seed is being sold to seed companies for the production of commercial seed in Benin.

Reflections on achievements and challenges

1. The mobility approach is increasingly becoming popular and has potential to provide quality education, research, and regional integration across Africa through internationalization and opening up of Programmes. To effectively harness this need, African universities should put in place measures for quality assurance and credit accumulation equivalence and transfer modalities.
2. Graduates published over 150 papers in high impact journals, thus contributing to increasing visibility of Africa's research outputs.

3. Regular interaction among the beneficiaries, RUFORUM, and the Carnegie Corporation of New York project implementation was very critical for success. Regular communication fostered trust, confidence, and ownership by the grantees and RUFORUM.
 4. Training with regional scientific and thematic networks is an important way to ensure that students have adequate support locally and regionally. This approach can also build professional communities of practice that have wider knowledge and experience with the continent development needs. It also promotes regional integration.
 5. The collaboration increased the diversity of Fellows and students on postdoctoral and doctoral Programmes, which is an opportunity in itself. Thus, the Fellows and students established friendship and linkages that will be useful throughout their professional and personal life. These Programmes have provided effective platforms for networking, collaboration and mentorship.
 6. The supported graduates have added to the pool of well-trained scientists that are serving research institutions and universities across Africa, contributing to building capacity for capacity development in Africa. A snapshot of the deployment of some of the graduates is shown in the Figure 4.
 7. The CCNY grant support to RUFORUM contributed to increasing the number of University staff with PhDs, enhancing quality training, research relevance, and visibility of African institutions through publications, conference attendance, and academic mobility.
 8. The CCNY support strengthened the RUFORUM network capacity to win grants from various development partners.
2. At both the Masters and PhD levels, female participation was at 40.8 %, below the targeted 50% female recruitment. The challenge is not unique to this programme but a general one that RUFORUM has experienced with almost all its training programmes.
 3. The COVID-19 restrictions instituted by most countries such as lockdowns and social distancing measures resulted in delays and interruptions of fieldwork of Fellows and doctoral students.
 4. Most doctoral programs run for 3-5 years in Africa, which is longer than that of the grant period. There is thus need to explore opportunities supplementary for finding of especially Doctoral students; and,
 5. Scheduling of the short skills courses was sometimes not well aligned with activities in the member university calendars, hence some would-be participants ended up missing the on-line course due to conflict of time with commitments in their degree programs.

Challenges

1. Unequal ability of applicants to compete for scholarships opportunities. Since most of the applicants were from universities, this is probably reflective of the weakness of some universities in terms of training in proposal

Opportunities for future engagement with the Carnegie Corporation of New York. Carnegie Corporation of New York has invested much over the years to increase the number and quality of the qualifications of university faculty. These efforts have helped to strengthen regional post-graduate programmes and encourage the sharing of resources across Africa. They have also taken the lead in ensuring that women are prioritized and this has helped RUFORUM shift from 08% female student intake in 2004 to 45.8% female participation in 2022. Nevertheless support is needed for post-graduate scholarships and post-doctoral fellowships. These should focus on increasing the participation of women and building capacity for less endowed institutions and fragile States. There is also need to support the regional programmes and the mobility of people, and thus enhancing ideas and shared skills, across Africa. Special attention is also still needed to increase the pool of PhD trained faculty in African universities so as to build capacity for capacity development.

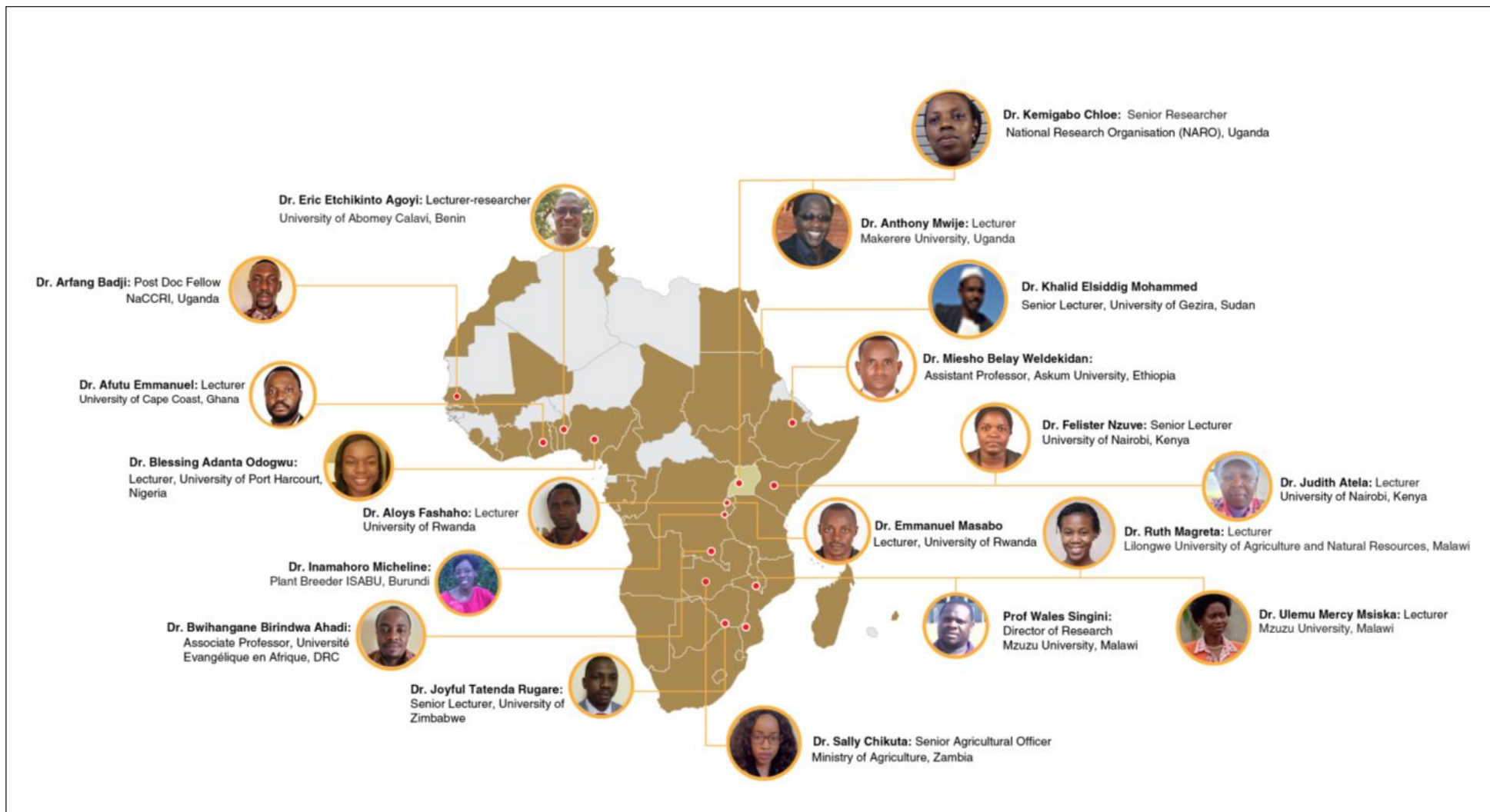


Figure 4. RUFORUM impact in African countries

There is need to support universities to engage in locally relevant research, networking and collaboration so as to enhance effectiveness of African universities within countries. RUFORUM has programmes that strengthen collaboration between universities for both teaching and research and programmes that effectively integrate universities into their societies. It is also important to strengthen self-help initiatives such as RUFORUM Graduate Teaching Assistantship Programme to increase the pool of PhD trained Faculty and promote African Academic mobility. There are also new ideas that could help to identify where the greatest opportunities and challenges lie such as in the suggestion of a Research Excellence Barometer for Africa.

Critically important is the need to strengthen post-graduate programmes to deliver relevant graduates, and also to promote leadership and mentoring, and to help universities adopt more digital and 4IR to increase their reach (97% of university students have access to mobile phones so adapted access is possible, although access to smart phones and laptops is still much lower). In addition to providing support to strengthen university programmes, philanthropists can also help to link universities and, in particular their post-graduate programmes, to resources to improve their facilities. There are other needs such as:

1. Building capacity to respond to emerging challenges and opportunities. Globally, but more so in Africa, climate change is grossly impacting negatively on the wider society and economies, especially for the rural communities. Targeted investment is needed to develop Africa's response capacity and innovations that reduce and mitigate the impact of climate change vulnerabilities, declining soil fertility and productivity and for addressing emerging challenges such as human-animal health related epidemics and pandemics.
2. Strengthening capacity to harness digital technologies as eluded to above.
3. There is also still the wider need to escalate

doctoral training in the continent to service the increasing demand for staffing at African Universities, research institutions, and other bodies. While each university needs to increase its capacity for PhD training, regional initiatives based on thematic focus such as being done under the RUFORUM Regional Training Programmes would enhance access to quality programmes across the continent and promote regional integration.

CONCLUSION

The CCNY grant support to RUFORUM contributed to increasing the number of University staff with PhDs, enhanced quality of graduate training, research relevance, and visibility of African institutions through publications, conference attendance, and academic mobility. Additionally, the support has enabled the strengthening of the RUFORUM network to win grants from various development agencies. Given the success of this partnership, CCNY and other development partners should consider working with African universities to generate science solutions such as for strengthening Agri-food Systems and responding to emerging challenges such as climate change, natural resource degradation and animal-human health paramedics, amongst others. There is also still need to escalate doctoral training in the continent to service the increasing demand for staffing at African Universities, research institutions, and other bodies. While each university needs to increase its capacity for PhD training, regional initiatives based on thematic focus such as being done under RUFORUM would enhance access to quality programmes and regional integration.

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USAID, DFID and others. The author also acknowledges RUFORUM Member Universities and the many Regional, Sub-regional and Global Networks such as AGRINATURA, APLU, FARA and CTA for their collaboration with RUFORUM to strengthen agricultural development and Higher Education in Africa. Further, the author greatly acknowledges and appreciates the support from RUFORUM Network universities in implementation of the various initiatives.

STATEMENT OF NO-CONFLICT OF INTEREST

The author declares that there is no conflict of interest in this paper.

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