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Research Application Summary

**RUFORUM Response to Africa Continental Strategies and the Global Sustainable Development Agenda**

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**Abstract**

The Regional Universities Forum for Capacity Building in Agriculture (RUFORUM, see [www.ruforum.org](http://www.ruforum.org)) is a network of 126 universities in 38 African nations spanning the Continent with a vision to ‘create vibrant, transformative universities to catalyze sustainable, inclusive agricultural development to feed and create prosperity for Africa.’ The Network was established to foster integration of member universities into Africa’s development processes, particularly within strategies and frameworks for agriculture, higher education, science, technology and innovation. RUFORUM has supported research initiated through graduate training, developing elite varieties of native crops, commodity production practices and novel methodologies for sustainable natural resources exploitation for enhanced livelihoods. Adoption of the RUFORUM-induced technologies, innovations and management practices has significantly contributed to improving livelihoods of smallholder farmers on the continent. RUFORUM engagement with continental and global policy and advocacy has contributed towards increasing public and private sector investment into higher agriculture education and research as well as building capacity for knowledge generation and the application of science, technology, business and innovation for rural agricultural transformation. Since establishment in 2004, RUFORUM has directly sponsored the training of 1919 students at MSc degree level, 525 graduates at doctoral degree level and 118 undergraduate students. Several others have benefitted through attending its flagship Regional Training Programmes and participation in its sponsored community action research projects, convening events and skilling workshops. The network has mobilized resources over US\$ 200 million to support research and training led by universities in Africa, vocationalisation of higher education through enhancing collaboration between universities and technical and vocational education training institutions, and strengthening university-community engagement initiatives. This paper summarizes the contribution of RUFORUM to the Africa continent-wide developmental strategies.

Key words: agricultural research, feeding and prosperity for Africa, higher agricultural education, science-technology-innovation, RUFORUM, vibrant transformative universities

**Résumé**

Le Forum Régional des universités pour le renforcement des capacités en agriculture (RUFORUM, voir [www.ruforum.org](http://www.ruforum.org)) est un réseau de 126 universités dans 38 pays africains

couvrant le continent avec pour vision de créer des universités dynamiques et transformatrices pour un développement agricole durable et inclusif en Afrique. Le réseau a été créé pour favoriser l'intégration des universités membres dans les processus de développement de l'Afrique, en particulier en réponse aux différentes stratégies pour l'agriculture, l'enseignement supérieur, la science, la technologie et l'innovation. RUFORUM a soutenu la recherche par le biais de formations supérieures, le développement de variétés d'élite de cultures indigènes, de pratiques de production des matières premières et de nouvelles méthodologies pour une exploitation durable des ressources naturelles afin d'améliorer les moyens de subsistance. L'adoption des technologies, innovations et pratiques de gestion financées par RUFORUM a considérablement contribué à améliorer les moyens de subsistance des petits exploitants agricoles sur le continent. L'engagement de RUFORUM dans l'arène politique continentale et mondiale a contribué à accroître les investissements dans les secteurs public et privé de l'enseignement et la recherche agricoles, ainsi que le renforcement des capacités de création de connaissances et d'application de la science, de la technologie, de l'innovation pour la transformation de l'agriculture rurale. Depuis sa création en 2004, RUFORUM a financé directement la formation de 1919 étudiants au niveau master, 525 docteurs et 118 étudiants de premier cycle. Plusieurs autres étudiants ont bénéficié à travers leur participation aux programmes régionaux de formation, aux projets de recherche et action communautaire, à l'organisation d'événements et d'ateliers de renforcement de compétences. Le réseau a mobilisé des ressources de plus de 200 millions de dollars pour soutenir la recherche et la formation en Afrique, la professionnalisation de l'enseignement supérieur en renforçant la collaboration entre les universités et les établissements de formation technique et professionnelle, et les communautés. Ce document résume la contribution de RUFORUM aux stratégies de développement à l'échelle du continent africain.

Mots clés: recherche agricole, alimentation et prospérité pour l'Afrique, enseignement agricole supérieur, science-technologie-innovation, RUFORUM, universités transformatrices dynamiques

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## Background

The Organisation of African Unity (OAU; French: Organisation de l'unité africaine (OUA)) was established on 25 May 1963 as an intergovernmental organization with 32 signatory governments. On 9 September 1999, the African Heads of State and Government called for the establishment of the African Union (AU; French: Union Africaine; Swahili: Umoja wa Afrika; Arabic: الاتحاد الأفريقي) to replace the OAU. The bloc was founded on 26 May 2001 and launched (thus disbanding the OAU) on 9 July 2002 to promote unity and solidarity of African States, to spur economic development, and to promote regional cooperation.

RUFORUM evolved from its predecessor, the Forum on Agriculture Resource Husbandry (FORUM), an initiative of the Rockefeller Foundation, which was implemented between 1992 and 2002. The network of universities has evolved from 10 member universities in five countries in 2004 to 126 universities in 38 countries in 2020. Implementation of the network programmes has been guided by strategic and business plans drawn up through wide stakeholders consultations and participatory processes: the RUFORUM Strategic Plan (2006-2015); the first (2006 – 2011) and second (2011 – 2016) Business Plans; the Strategic Business

Plan 2015 – 2020; and Vision 2030 - the African Universities' Agenda for Agricultural Higher Education, Science, Technology and Innovation (AHESTI).

### **Historical Perspective of Development Planning in Africa**

Development planning has a long and chequered history in Africa, and the continent's development trajectory has been influenced by various approaches to development planning since the early stages of independence. The late President Kwame Nkrumah, of Ghana, in his first speech at the foundation summit of the Organization of African Unity, in Addis Ababa on 24 May 1963, declared "We shall accumulate machinery and establish steel works, iron foundries and factories; we shall link the various states of our continent with communications; we shall astound the world with our hydroelectric power; we shall drain marshes and swamps, clear infested areas, feed the undernourished, and rid our people of parasites and disease. It is within the possibility of science and technology to make even the Sahara bloom into a vast field with verdant vegetation for agricultural and industrial developments". This was a statement of vision and ambition for ST&I in Africa – to eradicate poverty, disease and ignorance.

The first phase of development planning in Africa spanned the 1960s and was characterized by centralized planning with three to five year planning phases. During this period, at least 32 African countries had national development plans. This first generation of development plans continued to the 1980s. These plans promoted state-engineered economies with resources allocated by governments. It was notably the time of State-owned enterprises operating in most of the productive sectors.

In 1973, the United Nations Economic Commission for Africa (ECA) set up an inter-governmental committee of experts for the development of Science and Technology which advised ECA on matters of development of Science and Technology (S&T) in the region. From 1974, the ECA in conjunction with UNESCO promoted a Regional Plan for Action for the Application of Science and Technology to Development leading to the first (Dakar, 1974) and second (Arusha, 1987) Conferences of Ministers Responsible for the Application of Science and Technology for Development in Africa (CASTAFRICA I and II). The ECA spearheaded the establishment of the African Regional Organization for Standardization (AFROS) in Nairobi, Kenya; the African Regional Centre for Technology (ARCT) in Dakar, Senegal; the African Regional Centre for Engineering, Design and Manufacture (ARCEDEM) and the African Network of Scientific and Technological Institutions (ANSTI), both in Ibadan, Nigeria; and, the African Institute of Higher Technical Training and Research in Nairobi, Kenya.

The Dakar Conference of Ministers (CASTAFRICA I, 1974) recommended that each country which had not yet set up a department responsible for elaborating national science and technology was to do so at its own level of technological development. This conference was followed by the United Nations Conference on Science and Technology for Development (UNCTAD) in Vienna (1979) which urged African Governments to formulate and implement national policies to promote the contribution of science and technology to the realization of objectives of their development, and accelerate the process of socio-economic transformation.

African countries made a bold attempt to turn around their development fortunes by adopting the Monrovia Strategy in July 1979, and the Lagos Plan of Action (LPA) for the Economic Development of Africa [1980–2000] and Final Act of Lagos in April 1980. The LPA represented Africa's first regional economic integration agenda. It was a visionary, far-reaching and unprecedented blueprint on how to foster collective self-reliance and sustainable development of the continent, driven by science, technology and innovation (ST&I) and addressing challenges such as food insecurity, poverty, energy deficiencies, health issues, pollution, water scarcity, and lack of industrialization. In this context, African countries pledged to increase their R&D spending to least 1 per cent of GDP. The LPA provided an explicit expression of the awareness of the key role of ST&I in Africa's development. Subsequent attempts at charting Africa's development have drawn inspiration from that visionary framework.

The broad national and continental development plans often took into consideration various global and continental development goals and frameworks. However, Africa's development plans of the 1960s had limited success. This was due to a variety of reasons: deficiencies in the plan documents, but also failure to implement them; ambitious formulation of targets; institutional and bureaucratic weaknesses; exogenous shocks; and political factors. The 1980s-1990s were characterised by Structural Adjustment Programmes (SAPs), which emerged with the support of the Bretton Woods Institutions. The SAPs aimed to reduce the role of the State in production and service delivery and placed emphasis on macroeconomic stability, downsizing of public sector institutions, privatization and reducing government spending and budget deficits (Moss, 2007; Lopes, 2013). The social cost of SAPs to Africa is a sad story. The downsizing of the public sector institutions and massive privatizations led to net job losses; the budget restrictions compromised social service delivery and human capital development; and most importantly SAPs failed to yield the envisaged growth outcomes.

Since the LPA, several declarations and articulations made over the years illustrate the importance assigned to ST&I as an enabler of development in Africa. In 1987, the first Congress of Scientists in Africa was held and the Pan-African Union of Science and Technology (PUST) created with its headquarters in Brazzaville, Congo Republic. The 30th of June each year was declared as the ST&I Renaissance Day in Africa. The Kilimanjaro Declaration of 1987 sought to develop science and technology Centres of Excellence, educating personnel in the field of S&T, promote indigenous technologies and mobilize funds for ST&I. The Khartoum Declaration of 1988 sought to restore the economic status of African countries which were experiencing a period of economic crisis, by developing human capacities.

In 2000, the Millennium Development Goals (MDGs) were endorsed by 189 States encompassing targets with aspirations of reaching these goals by 2015. Starting in the early 2000s, many African countries replaced the SAPs with Poverty Reduction Strategies and Programmes (PRSPs), which aimed at reversing the negative effects of a decade of structural adjustment on welfare and social conditions (IMF, 2005). Notwithstanding the principle of ownership and consultations that underpinned PRSPs, they lacked credibility because of the externally driven nature of the process. Furthermore, PRSPs tended to place disproportionate emphasis on the social sector at the expense of the productive sector thereby raising questions about the sustainability of the poverty reduction agenda.

To respond to the MDGS, a return to more comprehensive long-term development visions and planning frameworks with far more ambitious growth and social development objectives was desirable. National development strategies and plans started going beyond the narrow objective of poverty reduction to encompass objectives such as accelerated growth, employment creation, structural transformation and sustainable development. Unlike the 1960s, these plans employ a mix of state and market-based approaches and appreciate the critical role of both the public and the private sector in the development process. The New Partnership for Africa's Development (NEPAD) was adopted at the 37th session of the Assembly of Heads of State and Government in July 2001 in Lusaka, Zambia, as an economic development program of the AU to provide an overarching vision and policy framework for accelerating economic co-operation and integration among African countries. The AU Addis Ababa Declaration of 2007 sought to increase funding for national, regional and continental programmes for science and technology and support the establishment of national and regional centres of excellence in science and technology. The Johannesburg Plan of Implementation adopted at the 2002 World Summit on Sustainable Development called on the international community to: promote technology development, transfer and diffusion to Africa; further develop the technology and knowledge available to African centres of excellence; and support African countries in developing institutions and research activities capable of developing and adapting "world-class" technologies. The MDGs were succeeded in 2015 by Agenda 2030 for Sustainable Development (Agenda 2030) which instituted 17 Sustainable Development Goals (SDGs) to be accomplished by the year 2030 (Table 1). In July 2019, the AU Executive Council adopted the statute, rules of procedure and structure of the African Union Development Agency (AUDA-NEPAD) as the first development agency of the African Union, to coordinate and execute priority regional and continental development projects to promote regional integration. Human Capital Development (Skills, Youth, Employment and Women Empowerment); Regional Integration, Infrastructure (Energy, Water, ICT, Transport) and Trade; Industrialisation, Science, Technology and Innovation; and, Natural Resources Governance and Food Security constitute the priorities for the African continent and national governments as they aspire to build knowledge-based economies and accelerate inclusive growth.

### **RUFORUM in Africa's Continent-Wide Policy Frameworks**

RUFORUM derived and/or aligned its strategic objectives and agenda largely from/to the continent-wide policy frameworks as they evolved, specifically: Agenda 2063-the Africa We Want; the Comprehensive African Agricultural Development Programme (CAADP, adopted 2003, revised 2014); the Science, Technology and Innovation Strategy for Africa (STISA), 2014-2024; Continental Education Strategy for Africa (CESA), 2016-2025; the Africa Agricultural Education and Skills Improvement Framework (AESIF), 2015-2025; the revised Continental Technical and Vocational Education and Training (TVET) Strategy adopted in 2014; the Science Agenda for Agriculture in Africa (FARA, 2014); the Minimum Integration Programme (MIP adopted 2009); the Programme for Infrastructure (physical and digital) Development in Africa (PIDA signed 2010); Accelerated Industrial Development in Africa (AIDA) Strategy; AfDB Feed Africa Strategy, 2016 – 2025; AfDB Human Capital and HEST Strategies; Africa Environment and Climate Change response strategies, and a host of others. RUFORUM, in a cascade based on a theory of change, responds to these major continental frameworks (Figure 1).

Since establishment in 2004, RUFORUM has engaged policy at various levels from national, continental to global levels under the various development frameworks. This has mainly been undertaken through annual governance meetings and other convenings aimed at influencing Africa's Higher Agricultural Education agenda. Notable among the high-level convenings are: the roundtable meetings of the Ministers responsible for Education and Agriculture from member countries in 2010 and 2014; the Vice Chancellors dialogue with Commissioners and senior staff of the African Union Commission (AUC) in 2015; the RUFORUM/AUC (Rural Economy and Agriculture & Human Resources, Science and Technology)/Higher Education, Science and Technology Ministers and Senior Government officials meeting in 2015 to discuss the implementation of Priority Area One of STISA 2024; and the co-convening of the AU Committee of 10 Heads of State and Government to champion Education, Science, Technology and Innovation in 2018.

**Table 1. The Sustainable Development Goals**



No.	SDGs	No.	SDGs
1	End poverty in all its forms everywhere	9	Promote sustainable industrialization
2	End hunger, achieve food security and adequate nutrition for all, and promote sustainable agriculture	10	Reduce inequality within and among countries
3	Attain healthy life for all at all ages	11	Build inclusive, safe and sustainable cities and human settlements
4	Provide equitable and inclusive quality education and life-long learning opportunities for all	12	Promote sustainable consumption and production patterns
5	Attain gender equality, empower women and girls everywhere	13	Promote actions at all levels to address climate change
6	Secure water and sanitation for all for a sustainable world	14	Attain conservation and sustainable use of marine resources, oceans and seas
7	Ensure access to affordable, sustainable, and reliable modern energy services for all	15	Protect and restore terrestrial ecosystems and halt all biodiversity loss
8	Promote strong, inclusive and sustainable economic growth and decent work for all	16	Achieve peaceful and inclusive societies, rule of law, effective and capable institutions
		17	Strengthen and enhance the means of implementation and global partnership for sustainable development

## **Agriculture, Science, Technology and Innovations Strategies**

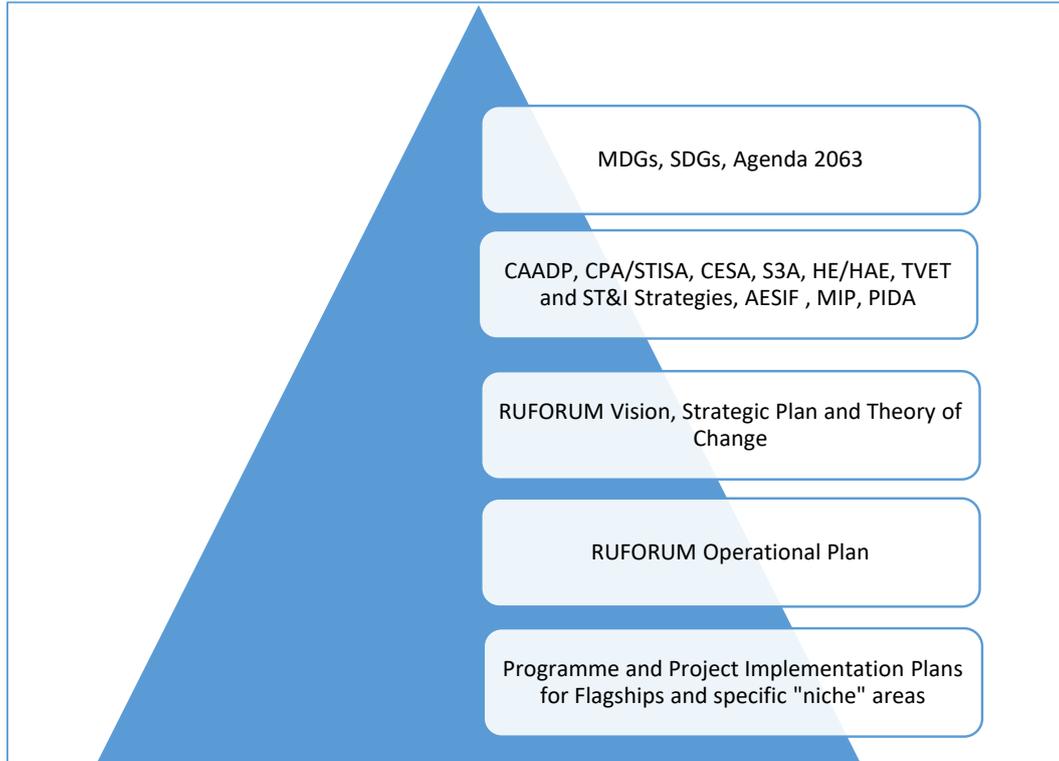
The CAADP was adopted in 2003 (Maputo Declaration) as Africa's overall framework for guiding agricultural development. The programme was renewed in 2014 by agreements made in the Malabo Declaration that highlighted new targets for achieving CAADP targets by the year 2025. The need to put in place the required human capacity and relevant resources for supporting implementation was emphasized as a critical limitation for CAADP implementation (Bahiigwa *et al.*, 2015), as well as enhancing Africa's overall research output and its use to support the CAADP process and indeed overall national economic growth. The CAADP identifies three outcomes at different levels: transformational change as a result of CAADP by creating conducive environments and systemic capacity; sustained inclusive agricultural growth through agriculture, jobs and poverty reduction; and, contributing to Africa's social economic development (wealth creation, resilience, improved and nutrition security).

The STISA 2024 is a ten-year strategy that was approved by the African Heads of States in 2014 to enhance the use of ST&I to underpin social and economic development in Africa (African Union Commission, 2014a). The strategy represents the first of six 10-year strategies for building science and innovation capacity in Africa towards achieving the aspirations of the AU Agenda 2063 (African Union Commission, 2014b). The STISA is anchored in six priority areas: eradication of hunger and achieving food and nutrition security; prevention and control of diseases; communication (physical and intellectual mobility); protection of our space; live together- build the society; and, wealth creation.

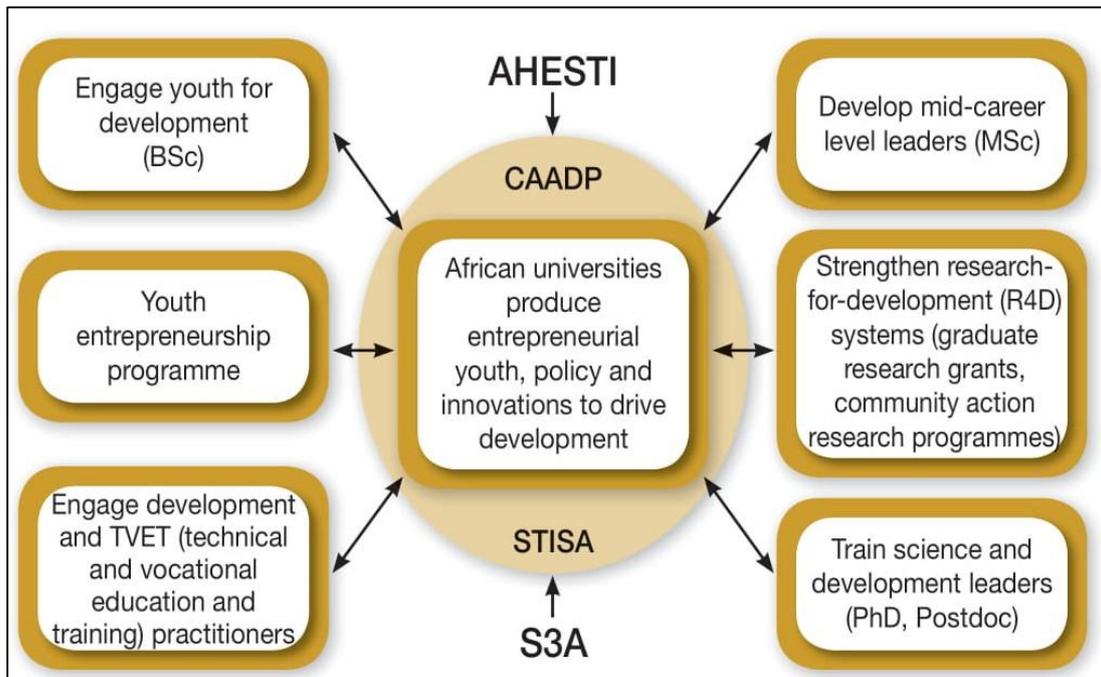
The Science Agenda for Agriculture in Africa (S3A) was adopted in 2014 as the main strategy for implementing the agriculture component (Priority Area One) of STISA 2024. It represents the decisive effort to build and strengthen capacity that is required to exploit the benefits of ST&I for revamping and accelerating the development of Africa's agricultural sector (FARA, 2014). It provides the framework for transforming Africa's agriculture through building and strengthening capacity for the production, uptake, utilization, financing and sustained collaborating in support of agricultural research and innovation. The S3A has three core thrusts including: integrating sciences more effectively at national and regional levels; linking science to beneficiaries with greater impact especially for CAADP at national and regional levels; and, strengthening the sciences and their application to agriculture at national and regional levels. For all the three thrust areas, focus is on bringing about a more productive and efficient food and agricultural sector that as minimum guarantees food and nutrition security. The main strategic goal is to increase public and private sector investment into agricultural R&D, at least doubling the volume of investment by 2030.

The African Union Commission (AUC) in 2014 mandated RUFORUM to lead the development of the implementation plan for STISA-2024 Priority One (RUFORUM, 2015). RUFORUM through its integrated innovation model for higher agricultural education (Figure 2) mobilized member universities to: proactively recruit youth into agriculture through undergraduate, graduate and entrepreneurship training programmes; develop entrepreneurship programmes to engage youth emerging from colleges in innovation and

investments in agriculture; and, to leverage university competencies to improve science quality and of technical and vocational education and training.



**Figure 1. RUFORUM link to Africa continental frameworks**



**Figure 2. RUFORUMs' integrated model for higher agricultural education**

To date, eight RUFORUM member universities host 13 joint regional training programmes (Table 2) that link to other individual university programmes to train young scientists to support teaching, research and development process. The programmes were developed in response to emerging gap areas to support implementation of CAADP.

**Table 2. The RUFORUM Regional Postgraduate Training Programmes**

PROGRAMME	CENTRE OF LEADERSHIP	YEAR OF LAUNCH	GRADUATES TRAINED by 2018			Comments
			M	F	Total	
<b>PHD PROGRAMMES</b>						
Dryland Resource Management (DRM)	Nairobi	2008	47	25	72	
Plant Breeding and Biotechnology (PBB)	Makerere	2008	70	39	109	Makerere University Regional Centre of Excellence for Crop Improvement (MaRCCI)
Aquaculture and Fisheries Science (AFS)	LUANAR	2009	21	3	24	African Centre of Excellence (ACE) for Aquaculture and Fisheries Science (AquaFish)
Agricultural and Resource Economics (ARE)	LUANAR	2009	33	14	47	
Soil and Water Management (SWM)	Sokoine	2010	21	5	26	
Agricultural and Rural Innovations (ARI)	Makerere	2012	64	27	91	
	Egerton	2012	10	17	27	ACE for Sustainable Agriculture and Agribusiness (CESAAM)
	Sokoine	2013	4	1	5	ACE for Innovative Rodent Pest Management & Biosensor Technology Development
Food Science and Nutrition (FSN)	Jomo Kenyatta	2013	13	6	19	
Agroecology and Food Systems	Uganda Martyrs University	2015				Centre for Excellence in Agroecology and Food Systems
<b>Total</b>			<b>283</b>	<b>137</b>	<b>420</b>	
<b>MASTERS PROGRAMMES</b>						
Plant Breeding and Seed Systems (PBS)	Makerere	2008	118	74	192	Absorbed into the Makerere University Regional Centre for Crop Improvement (MaRCCI)
Research Methods (RM)	Jomo Kenyatta	2009	71	45	116	
Agricultural Information and Communication Management (AICM)	Egerton	2008	43	2	45	
	Nairobi	2009	29	20	49	
	Haramaya	2010	71	22	93	Centre of Excellence for Climate Smart Agriculture and Biodiversity Conservation (Climate SABC)
Agrometeorology and Natural Risk Management	Haramaya University, Ethiopia	2015				
Monitoring and Evaluation	Uganda Martyrs University, Uganda	2016				
<b>Total</b>			<b>332</b>	<b>163</b>	<b>495</b>	

Through these programmes and other granting portfolios managed through RUFORUM, 1919 MSc and 525 PhD graduates have been trained. In order to inculcate relevance of research and development processes and strengthen university engagement with communities, RUFORUM supported community action research projects (CARPs) that focused on commodity value chains and deploying multi-disciplinary research teams with additional emphasis on systems approach and regional learning. A Young African Entrepreneurs and Innovators competition was instituted to help young agribusiness innovators demonstrate their ability in entrepreneurship and enterprise development. To date, 59 young entrepreneurs have been supported in enterprise development as part of efforts to support youth integration into the economic growth for youth employment.

RUFORUM training involves experts working with learners to transfer knowledge, skills and attitudes to improve their effectiveness. General responses from alumni reveal that their performance, innovation, tacit knowledge, adaptive expertise, confidence and self-management skills of graduates increased due to the training received. Because of the focus on more than just information transfer and the support to soft skills and networking, the multi-dimensional qualities of graduates from regional training programmes means they not only get employed in highly competitive job sectors that also offer better remuneration, but also generally move rapidly through the promotion ladders in their career paths. RUFORUM Graduates are highly relevant for solving Africa's problems and labour market needs. Apart from much lower costs compared to international study, training in the local environment and through their research during their training, students find solutions that are applicable in the local context and thus contribute to improving livelihoods of rural communities. Furthermore, these graduates are retained on the continent on course completion to transfer this knowledge and their innovations to society.

Results from a 2014 tracer study indicate that 75% of RUFORUM graduates found employment within 6 months of completing their studies, 73% were on permanent or long-term contracts, and 56% occupied positions of influence at regional, national or local government levels. Unlike graduates trained outside the continent, 98% of the graduates stayed on the continent - 94% working in their home countries while 4% worked elsewhere in Africa. The graduates went into academia employed within the university system (39%), research and development (27%), produced relevant knowledge products, and, have become change makers in their various specific fields of expertise and in national development. The civil society and industry each employed 10% of the graduates.

African governments have been expanding their higher education sector through rapid establishment of public and private universities within the past decade. The rapid expansion has often not been matched by sufficient skilled human capital. Training of academic faculty in higher education is a demanding undertaking that needs a concerted effort to ensure a high level of quality of education. RUFORUM programmes have played an important role in improving the quality of education in the rapidly changing higher agricultural education environment in Africa. Among the member universities, a few first generation universities took leadership in establishing the regional training programmes starting in 2008. These have been instrumental in training staff for the newer universities and contributing towards the development of these universities as well as those in fragile countries and preparing the next generation of Africa's agricultural research leaders and academic faculty. Over 10% of staff

with PhD level qualifications in the faculties of Agriculture in member universities were trained with RUFORUM support (RUFORUM, 2018a).

As part of nurturing young universities, RUFORUM provided resources, research and support services grants to enhance post-graduate training of their staff, support research infrastructural development, develop curricular and conduct short-term staff skills enhancement. Research and curriculum development enabled establishment of new taught doctoral programmes, for instance PhD in Agriculture and Resource Economics and PhD Aquaculture and Fisheries Science at Lilongwe University of Agriculture and Natural Resources (LUANAR). Because of the regional training programmes, increases in student enrolment at both the PhD and masters level have been registered.

Graduates joining the university system have improved the ratio of academic staff with Master or PhD degrees to students and increased exposure of students to highly qualified teachers. Developing competences of staff and production of well-trained graduates who join faculty significantly contributes to a critical mass of motivated, highly trained self-reflective academic staff to train the next generation of scientists. Capacitated staff with broader and deeper technical skills in an administrative arrangement that guarantees greater academic freedom become proactive, win research grants, publish and progress rapidly through the academic hierarchy.

RUFORUM has established networks of leadership, to provide strategic response in key development research and training needs in the region and in support of the CAADP process. The PhD and MSc postgraduate programmes target imparting to students, university researchers and their partners skills that focus on ensuring greater social benefits to the community. RUFORUM encourages the students and their teachers to have more opportunity to network with one another and other professionals in similar fields. In addition, students are required to obtain further experience with presentation skills to ensure scientific robustness and communication skills for development. Supporting and facilitating engagement of African universities in CAADP implementation through partnerships to design, test, pilot and scale best practices in Africa has been severally acknowledged as having significantly contributed to the achievement of CAADP results. Growth of the network has also placed RUFORUM in a strategic place to enhance the engagement of policy makers in the higher education sector and enhance understanding of human capacity building issues in Africa for enhancing agricultural and the broader economic development.

### **Education and Skills Development Strategies**

The Continental Education Strategy for Africa (CESA) was approved by the African Union Commission in 2016 to provide a framework for bridging education to the human capital demands of Agenda 2063, as Africa's domestication of the global SDG 4 and Education 2030, and framework for transforming education and training systems in Africa (African Union, 2016). Initiatives being pursued under the CESA include the Pan African University (PAU), ICT in Education initiatives, the PAU Virtual and E-Institute (PAU-VEI), and STEM (Science, Technology, Engineering and Mathematics) education.

The revised Continental Strategy for Technical and Vocational Education and Training

(TVET) to foster youth employment was also adopted in 2014 (African Union Commission, 2014c). The strategy argues that the development of higher level skills is necessary for the adaptation of technology and innovation, transformation of national production systems, and industrialization of the economy. TVET national policies and strategies must not only be based on related inter-national best practices, but should also be firmly rooted in indigenous knowledge and learning systems that reflect cultural practices and local values, technological preferences, the challenges of globalization, and national development priorities.

The Agricultural Education and Skills Improvement Framework (AESIF), 2015-2025, aims to “enhance agriculture education, skills development and knowledge support” for the whole Agricultural knowledge systems both at regional and country levels targeting reforms at the: i) Tertiary Agricultural Education (TAE); ii) Agricultural Technical and Vocation Education and Training (ATVET); and iii) informal sector learning, acquired on lifelong training. The framework further provides pathways for institutional reforms, curricula reviews, and leveraging multi-consortia private-public partnerships on agriculture education and skills development to drive innovative solutions and value addition in agriculture. Its ultimate objectives are to address the challenges of disconnect among: i) the types of training provided and the skills needed in the workforce, ii) the fragmentation of knowledge actors and isolation of AET from research and extension, and iii) the lack of appeal of youth and women towards AET learning systems.

RUFORUM is a network of universities with a passion for agriculture. Its core business has always been higher agricultural education. Through a collaborative partnership with IFPRI/ASTI, RUFORUM generates information on agricultural higher education capacities in Africa detailing institutional capacity (human resources including gender, student enrolments, funding, research focus, etc.) of member universities. The reports provide evidence of efforts towards university transformation to ensure quality and relevance; fast-tracking processes leading to gender parity and equity; revitalizing and expanding tertiary education, research and innovation to address continental challenges and promote global competitiveness; and, improving the management of education system as well as building and enhancing capacity for data collection, management, analysis, communication, and use.

RUFORUM has harnessed the capacity of ICT to improve access, quality and management of higher agricultural education and training systems in African universities. It has strived to build capacities of member universities to implement technology-mediated learning, teaching and research through open educational resources (OER) and massive open online courses (MOOCs). The massive open online courses are currently piloted in a partnership with Mohammed VI Polytechnic University (UM6P). This is aimed at building the capacity of African universities to develop MOOCs and encourage adoption of online learning and new educational technologies in member universities’ academic programs.

RUFORUM has expanded TVET opportunities at both secondary and tertiary levels to strengthen linkages between employment demands and education and training systems – focusing on agriculture and agribusiness. This has been undertaken through facilitating universities and TVET institutions to work together to attract, recruit, train and skill Africa’s new age of development practitioners and cadres and to help speed up research-into-use. RUFORUM has facilitated relationship of universities with TVET institutes thus strengthening a broad

stakeholder intervention for the smallholder farmers and brokering stronger relationships along the education value chain.

Through piloting the Technical Skills Development Program (TESDEP) and the out of school youth programme with the TVET institutions, RUFORUM has responded to the skills gap and needs of smallholder farmers and in particular, the youth that seek to improve their livelihoods through entrepreneurial agriculture. This has been piloted in Benin, Botswana, Ghana, Kenya, Namibia, South Africa, Uganda and Zimbabwe. The emerging evidence is that youth participation in agriculture targets enterprises with short gestation periods (e.g. horticulture). These are highly profitable, especially with a fast expanding market from a rapidly growing urban population. The increased commitment and community engagement to transform rural agricultural communities gives universities and TVET institutions more practical exposure, opportunities to speed up research into use, and further opportunities for curriculum development and support in training staff and students.

The RUFORUM networking arrangement has been valuable in fostering research collaboration, mobility exchange and curriculum improvement. Inter- and intra-institutional collaborations have been of imperative importance, especially for the development of the younger universities - consolidating their academic environment and accessing better-trained faculty to improve the quality of their teaching and learning. Staff and student exchanges facilitate the learning of new teaching and research tools, increasing the breadth of their knowledge, learning different approaches to solving Africa's problems. Mentoring programmes aided students and early-career staff to connect with peers, colleagues and other academic and professional contacts that provided insights and opportunities in career paths.

The Regional Training Programmes (RTPs) and most sub-grant mechanisms had a strong element of programme internationalisation and staff/student mobility - students and teachers in higher education moving to another institution inside or outside of their own country to study or teach for a limited time. Significant support for the mobility programmes came through grants to universities won with the support of RUFORUM through the EU Intra-ACP, Intra-Africa Academic Mobility Schemes and the RUFORUM Graduate Teaching Assistantship Programme, an initiative by African Vice Chancellors to strengthen staff capacities by providing especially PhD training in different African universities on a cost-sharing basis. The Intra-Africa Academic Mobility Scheme set up under the EU Pan-African Programme supported higher education cooperation between countries in Africa. Financial support was provided to partnerships of African higher education institutions (HEIs) for the organisation and the implementation of student and staff mobility in high-quality master and doctoral programmes within African countries and academic/administrative staff mobility, as well as the provision of education/training and other services to foreign students and teaching/training and research assignments and other services to staff. The overall objective of the scheme is to enhance human capital development in Africa. More specifically, it aimed to: increase the employability of students; improve the quality of higher education in Africa and its relevance to Africa's development vision; and, strengthen the modernisation and internationalisation of African higher education institutions, and promote the development of an African higher education and research space. A total of 308 MSc, 267 PhD and 65 staff were supported under several projects (Table 3).

**Table 3. Student and staff exchanges facilitated by RUFORUM**

Project Name	MSc	PhD	Staff	Total Mobility
Sharing Capacity to Build Capacity for Quality Graduate Training in Agriculture in African Universities (SHARE)	52	17	8	77
Inter-University Cooperation to Train Crop Scientists for Enhancing Agriculture in Africa (CSAA)	43	20	10	73
Mobility to Enhance Training of Engineering Graduates in Africa (METEGA)	44	20	8	72
Partnering for Health Professional Training in African Universities (P4PHT)	43	18	8	69
Collaborative Training in Fisheries and Aquaculture in East, Central and Southern Africa (COTRA)	24	12	10	46
Regional Academic Exchange for Enhanced Skills in Fragile Ecosystems Management in Africa (REFORM)	23	11	6	40
Partnership to Train Scientists in Crop Improvement for Food Security in Africa (SCIFSA)	24	12	4	40
Mobility of African Scholars for Transformative Engineering Training (MASTET)	22	12	6	40
Mobility for Innovative Renewable Energy Technologies (MIRET)	33	12	5	50
RUFORUM Graduate Teaching Assistantship programme	-	133	-	133
Total	308	267	65	640

### High-level Policy Engagement

**Action Plan for the AU Committee of Ten Heads of State and Government Championing Education, Science, Technology and Innovation (AU-C10).** The C10 was endorsed by the AU Assembly of January 2018 and held its inaugural meeting in Addis Ababa on 27 January 2018 and its first Extra-Ordinary Summit hosted by the Government of the Republic of Malawi, 2-3 November 2018. The major outcome was the C10 Declaration (RUFORUM, 2018b) and Action Plan (RUFORUM, 2018c) with three major commitments including: investing in education, science and technology; promoting education in Africa; and, engaging the private sector. RUFORUM in collaboration with other partners was mandated to oversee the implementation of the C10 Action Plan (RUFORUM, 2018d). In particular, RUFORUM, either in leading or as a partner was tasked to ensure progress and report (RUFORUM, 2019) on: Operationalisation of the African Education Fund in collaboration with the African Development Bank; Strengthening teacher development and retention; Enhancing TVET

and skill development for employment; and, Strengthening higher education, science, technology and innovation as indicated in the summary table below.

**Summary table of RUFORUM achievement towards roles assigned by the Committee of Ten Heads of State (C10)**

C10 Commitment 1: Investing in Education, Science and Technology

Priority area 1: Operationalize Education Science and Technology Funds in Africa

Strategic Action 1.1: Commit a special fund to facilitate the training of female university members of staff and women in general to PhD level to support Agenda 2063 vision of quality education and gender equality	RUFORUM has no special fund for training female university members of Staff. However, the proportion of female students fully supported by RUFORUM for PhD training more than quadrupled from 12% in 2004 to 45% by December 2018. RUFORUM supported the launch of the Forum for Women Vice Chancellors in Africa, in August 2016, as a platform for networking, lesson learning and mentorship among female Vice Chancellors.
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C10 Commitment 2: Promoting Education in Africa

Priority area 4: Strengthen teacher development and retention

Strategic Action 4.1: Increase qualified teachers in Member States at all levels with special attention to STEM, ICT skills and digital technology	RUFORUM has supported upgrade in qualification of university lecturers through the Graduate Teaching Assistantship programme, where up to 133 GTA placements from 37 Universities in 25 African countries have been facilitated to increase the pool of PhD trained faculty in African Universities.
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Priority area 5: Enhancing TVET and skill development for employment

Strategic Action 5.1: Promote dissemination and implementation of the Continental TVET Strategy	RUFORUM has facilitated integration between Universities and TVET institutions where up to 496 TVET students; 927 out-of-school Youth; and 97 farmers have been engaged by RUFORUM Member universities at University of Abomey Calavi (Benin); University of Cape Coast (Ghana); Egerton University and University of Nairobi (Kenya); University of Namibia (Namibia); Bindura University of Science Education (Zimbabwe); University of Free State (South Africa); and, Gulu University and Makerere University (Uganda) in experiential learning and training collaboratively with university students.
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Strategic Action 5.2: Provide practical attachment programmes and strengthen incubation of business and entrepreneurship training	RUFORUM member Universities including Gulu University in Uganda in collaboration with Northern Uganda Development Centre built capacity of TVET students in entrepreneurship following a peer-to-peer training approach. The training focused on the detailed components of the Business Model Canvas and enabled students develop feasible and fundable business ideas.
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Strategic Action 5.3: Capacity building of TVET trainers and stakeholders and Rebrand TVET for enhanced access, equity, quality and relevance	RUFORUM with support from Mastercard Foundation has enhanced the capacity of TVET instructors in innovative pedagogical approaches and communication skills. These capacity building events resulted into the realization of the need to develop a communication Strategy for the TVET; capacitate
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	<p>TVET staff on report writing; support marketing and advocacy of the TVET; and, the need to promote documentation of the technologies from TVET institutions.</p>
<p>Strategic Action 5.4: Incorporate life skills development and career guidance in TVET</p>	<p>Gulu University in Uganda with support from RUFORUM reviewed the competence based non formal curriculum for artificial insemination and Indigenous microorganism Technology at Northern Uganda Youth Development Centre TVET to develop a hands on practical training curriculum for capacitating smallholders with limited education attainment. The curriculum focuses on farmers, TVET students, TVET instructors, agricultural extension agents and community knowledge workers. In collaboration with Curriculum Development Assessment and Certification Council (CDACC) of Kenya and Egerton University in Kenya, RUFORUM has supported the development of occupational Standards for Piggery curriculum for Level 3 and Level 4 for Baraka Agricultural College academic programmes to respond to the skills needs among the out of school Youth and community members.</p>
<p>Strategic Action 5.5: Enhance linkages between universities and TVET institutions with focus on strengthening practical skills and education to enhance innovation, entrepreneurship and skills development for employability</p>	<p>To identify opportunities for harnessing University-TVET engagement for community outreach; and, develop strategies for strengthening entrepreneurial training and curricular support for TVETs, RUFORUM organized the First National Agri-entrepreneurship Symposium 25-26 May 2019 in Gulu, Uganda. The Symposium involving over 600 participants included representatives from the United Nations Educational, Scientific and Cultural Organization (UNESCO) and recommended nurturing University-TVET engagement to empower TVETs perform better the function of youth training for employability, whilst enhancing university outreach relevance and expanding this engagement to other non-formal youth training initiatives outside TVETs. Joint capacity building events have been extended to both University and TVET staff in community engagement, and entrepreneurship training to strengthen community engagement and entrepreneurship in the TVET institutions and Universities.</p>
<p>Strategic Action 7.1: Strengthen foresight capacity at African Universities and other partners and support capacity building in this important area to support planning and future implementation of key programs</p>	<p>RUFORUM coordinated the development of a proposal to the BRIDGIN Foundation to support the Uganda Higher Education Sector through a pilot programme. The proposal worth US\$ 700 million has seven sub projects including construction and equipping of a High-Tech Centre for Data Science and Foresight studies at Makerere University.</p>

Priority area 7: Strengthen higher education, science, technology and innovation

Strategic Action 7.2: Develop programs to establish Research Chairs in African Universities, increase academic mobility schemes and improve infrastructure and increase staff capacity development

Implementation is at infancy.

RUFORUM has further supported research teams from RUFORUM member Universities prepare and submit proposals to various funding agencies including the 2019 and 2020 Intra-Africa Academic Mobility Scheme (IAAMS) calls for proposals.

### **RUFORUM response to the Sustainable Development Goals**

The RUFORUM programmes contribute to all the seventeen aspirations of the SDGs (Table 4). The RUFORUM Agenda is transformative in nature and thus, through support to member universities to facilitate implementation of the vision and mission of RUFORUM, the ultimate goal is transformation of universities to remain relevant to the African context and specifically to the African smallholder farmer.

**Table 4. Alignment of RUFORUM Strategic objectives to the SDGs**

No.	Strategic objective	Links to SDGs
1	Masters and doctoral programs responsive to stakeholder needs and national/regional development goals.	1, 2, 4, 5
2	Shared research and education/training facilities and capacities rationalised for enhanced economies of scale and scope.	4, 5
3	Innovative education/training research and outreach activities supported by adaptive management structures in universities contributing to policy and development practice.	4, 5
4	Operational capacity and approaches for innovative, quality and impact-oriented agricultural R4D mainstreamed in universities.	4, 17
5	Increased participation and voices of women in education/ training, research and production and marketing of knowledge;	5
6	Increased use of technology to support effective, decentralized learning and sharing of knowledge.	9.5, 17.6
7	A dynamic regional platform for policy advocacy, lobbying, coordination, and resource mobilization for improved education/ training, research and outreach by universities.	17

## Conclusion

The RUFORUM story, from the time of its transformation and founding in 2004 to its current scope and scale of operations is one of a learning organization. RUFORUM-supported training covers the whole value chain capacities, including new competencies needed by the “fit for purpose” 21st century graduates through development of regional level curricula and training programmes (8 PhD and 5 MSc) hosted at regional centers of academic excellence to support skills development in strategic areas required for implementation of CAADP, S3A and STISA. Through higher-level policy engagement, the RUFORUM network is well positioned to dynamically contribute to Africa’s development vision. The flagship programmes currently embedded under the RUFORUM Vision 2030 Strategy adopt interdisciplinary and innovative approaches that integrate research, education and engagement activities in order to maximize university impact. RUFORUM has credible systems for data collection and analysis, as well as sharing of information on progress towards major goals and implementation of activities. The network plays an important role in supporting the engagement of African universities in CAADP implementation - through partnerships, to design, test, pilot and scale best practices in Africa. Growth of the network has placed it in a strategic position to enhance the engagement of policy makers in the higher education sector and this has enhanced understanding of human capacity building issues in Africa for enhancing agricultural and the broader economic development.

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