COMMONWEALTH SCHOLARSHIPS

# COMMONWEALTH KNOWLEDGE

ISSUE #7 MARCH 2019

## THE FUTURE OF FARMING

*Collaborating over new technologies to ensure sustainability*

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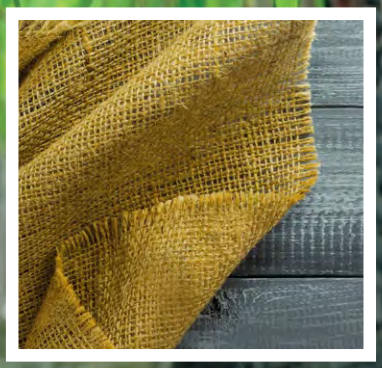

# THE FIRST WORD

**Perhaps the only frustration of being a Commonwealth Scholarship Commissioner is that we have so few opportunities to meet in person our Scholars, alumni and associated researchers who comprise this extraordinary contribution to world learning. It is therefore a particular pleasure every few months to read *Common Knowledge*, and to understand more about the people supported by our programmes, and the breadth and depth of their work.**

In managing the programme, setting our priorities, and selecting the Scholars, the Commission is always mindful of both the priorities of Her Majesty's Government, which provides the bulk of the funding, of the research interest of UK universities, who are also significant funders, and, of course, of the national priorities of the countries from which Commonwealth Scholars come. It is a particular strength of our programme that responsibility for the selection process is shared between the Commission and nominating agencies in 53 Commonwealth countries.

We are mindful too of the Sustainable Development Goals agreed in 2015, and in particular of Target 4b which calls upon the international community to "substantially expand globally the number of scholarships available to developing countries, in particular least developed countries, small island developing States and African countries". This is a matter of some urgency. The target date for SDG 4b is 2020. This closely matches our own ambitions; we aim to ensure that more than 90% of our scholarships are offered to citizens of least developed and lower middle-income countries and fragile states. I am very pleased, therefore, that the UK Government has increased funding for the Commonwealth Scholarship Commission for 2019-20 and 2020-21.

However *Common Knowledge* is not about the programme, but about the people whose stories, research and impact make it all worthwhile. This year we have decided to play our own small part in reflecting the sustainable development work of our Scholars by making the shift from plastic wrapping to paper envelopes, with the aim of making the *Common Knowledge* mail out more eco-friendly.

In this edition, our Scholars' commitment to ensuring sustainable development is clearly demonstrated through articles such as *'Blazing a Trail'* (the development of responsible tourism along the River Gambia), *'Past Innovations, Future Applications'* (which features Gerardo Aldana's work on developing the use of an ancient soil enhancer – biochar), and *'Blast from the Past'*, which describes Md Toffazzal Islam's work on reconfiguring genomes in order to battle wheat blast, a disease which is already threatening an important part of Bangladesh's food production.

Of course this is only a snapshot of the variety and depth of subjects which our Scholars and alumni are working within – but I hope you enjoy reading it as much as I do.

**Sandy Balfour**
Commissioner
**alumni@cscuk.org.uk**

**Common Knowledge**
Editorial team:
Hannah Openshaw
Kirsty Scott
Halema Khatun
James Goldsmith
Thomas Blunt
Brendan Harrison
Design:
Pilot Design Consultancy Ltd
Print:
TFW Printers Ltd

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**Commonwealth Scholarship Commission in the UK**
Woburn House, 20-24 Tavistock Square, London WC1H 9HF, United Kingdom
**info@cscuk.org.uk** **dfid.gov.uk/cscuk**

# YOUNG SCIENTISTS: EMPOWERING A NATION

***Devina Lobine** shares her experiences as a NEPAD SANBio Youth Ambassador, promoting the importance of science programmes and empowering young scientists in southern Africa*

**According to the Southern African Development Community (SADC) Gender Protocol 2018 Barometer, enrolment in STEM programmes (science, technology, engineering and mathematics) among young southern Africans is lower than 20%. There are various reasons hindering scientific research among younger generations, however to respond to the range of challenges in these countries (which include disease and malnutrition) it is of paramount importance to encourage more young people to study STEM subjects.**

**Devina Lobine** *is a 2013 Commonwealth Split-site Scholar from Mauritius – she studied for a PhD in Biotechnology at Durham University and the University of Mauritius*

Through my Commonwealth Split-site Scholarship, I realised that my home country of Mauritius (along with many others in southern Africa) does not have the necessary resources to support talented young scientists in implementing their research. Instead, scientists from these countries must actively seek to build partnerships with the wider international research community to gain access to suitable facilities and funding.

As a young bio scientist, I felt that more needed to be done to raise awareness of the collaborative opportunities available to individuals and organisations working in STEM areas. I enthusiastically joined the Southern Africa Network for Biosciences (NEPAD SANBio) as a Youth Ambassador. NEPAD SANBio is a shared biosciences research, development, and innovation platform which encourages and supports collaborative working to address some of southern Africa's key issues in health, nutrition, and health-related intervention areas, such as agriculture and environment.

In my past years as a SANBio Youth Ambassador, I've had the chance to participate in and contribute to numerous initiatives and projects relevant to the STEM agenda.

## INVESTING IN THE FUTURE OF AFRICA

According to UN reports, approximately 224 million people are undernourished in Africa as climate change and conflicts heighten food insecurity across the continent. Furthermore, there is a strain on African health systems caused by a high burden of life-threatening communicable diseases, compounded by increasing rates of non-communicable diseases, such as hypertension and coronary heart disease. Science and technology hold the key to unlocking food security issues by mitigating the effects of climate change and producing healthier and nutritious food.

In the African Union Commission, Agenda 2063 document 'The Africa We Want', the leaders of the African Union envision a prosperous Africa based on inclusive growth and sustainable development. This dream can be achieved through concerted efforts to reform educational systems and approaches, which is why key policies and investment are necessary to unlock Africa's potential; successful implementation of STEM greatly depends on the adoption of various education and economic policies in each country. Increasingly there have been calls for a new, more collaborative approach to African science which encourages entrepreneurship within research organisations, as well as public-private partnerships for innovation commercialisation.

Both nationally and internationally, young scientists play a key role in developing knowledge economies. With this understanding, the NEPAD SANBio Youth Ambassador initiative was launched to raise awareness of the potential of biosciences to contribute to the knowledge economy in southern Africa and increase youth participation in science subjects.

Through various activities as a Youth Ambassador, I promote the importance of youth participation in high-level processes that shape

> Both nationally and internationally, young scientists play a key role in developing knowledge economies.

the science agenda and policies, and bridge the gap between science and industry to contribute to economic development in southern Africa. Several training initiatives have taken place under the SANBio Youth Ambassador initiative, including a Winter School on the Commercialisation of Indigenous Knowledge System Products and a Summer School on the Business of Clinical Research.

One of the most recent initiatives towards increasing STEM education in Africa was through a partnership with the University of Oxford. We hosted two regional LabHackathons in Zimbabwe and South Africa, with the aim of bringing the ideology of the Open Hardware movement (a subcategory of the open-design movement which focuses on the development of products through publicly shared design information) to the African educational community. The LabHackathon offered a platform for students and educators to take matters into their own hands and design and build the equipment needed to support their learning, such as vortex mixers, polymerase chain reaction (PCR) machines, centrifuges, and magnetic stirrers. Using Open Hardware resources, participants were encouraged to design and build this equipment from the hardware available in their local context.

## EMPOWERING WOMEN IN SCIENCE

It is not only a lack of STEM education uptake in general that is a problem. In Africa, as is the status globally, women are still underrepresented in STEM. But, as the African proverb says, 'you empower a woman, you empower a nation'. Taking this powerful proverb forward, with support from the Finnish-Southern African Partnership Programme BioFISA II, NEPAD SANBio developed the FemBioBiz Accelerator Programme. This programme will support entrepreneurial women working in bioscience related industries.

In two years, the programme has trained over 250 female bio-entrepreneurs in business and leadership skills to empower them to grow their businesses. The programme facilitates networking and deal making in the region, and several of the entrepreneurs have attracted additional investments and awards for their businesses.

I was one of the student category finalists in the FemBioBiz Accelerator Programme Season One and was fortunate to benefit from this training and pitch for my business idea. The experience reinforced my belief that there is a place for women to contribute meaningfully to economic development. I believe that all women who have been part of this programme are winners. We have learned the essential requirements for what is needed in entrepreneurship, the tools needed to develop a professional business plan, how to use pitch decks to raise funding, and more. The programme is a unique platform for female entrepreneurs to come forward, network, and learn about the ins and outs of successful business management.

## THE FUTURE OF STEM IN AFRICA

Scientific discovery and innovation are key tools to fuel progress and have a significant role in achieving the global and sustainable development goals. Investing in STEM pays back manifold over time, but the unfortunate reality is that many African governments have limited resources to fund these areas, and the lack of determination to do so is also detrimental. Increasing opportunities for STEM participation and learning through organisations such as NEPAD SANBio will hopefully encourage higher engagement among future generations and support the development of science-based innovation. CK

# LEARNING TO ADAPT

*Agriculture is central to the economies of many low and middle-income countries. As the effects of climate change continue to grow, effective adaptation strategies to mitigate its impact must be found. We hear from two Commonwealth Scholars – **Daniela Salite** and **Cuthbert Makondo** – on the challenges experienced within local communities.*

## WIDENING PERCEPTIONS

***Daniela Salite** explains the importance of understanding cultural beliefs to climate change as a means of developing sustainable strategies.*

**Around 80% of the population in Mozambique practice agriculture as their main economic activity, with 95% of these being rain-fed, small-scale, poor and subsistent farmers. Mozambique is among the most vulnerable countries in the world to natural disasters, with drought being the most common experienced. Drought has increasingly impacted farmers' food production and availability, livelihoods, and health. In extreme cases farmers face problems of food insecurity and hunger, which in turn can become a national emergency, requiring governmental and NGO interventions.**

Due to changing climatic conditions and an increase in extreme weather events, the occurrence of drought is expected to increase globally and to adversely affect farmers. Adaptation of the agricultural sector is therefore urgent in order to reduce farmers' vulnerability, enhance their resilience and self-reliance, and adapt to drought. However, to achieve this it is important to understand the factors that have influenced farmers' current adaptation to drought in order to develop feasible, sustainable, and successful adaptation strategies for the future.

### HIDDEN FACTORS

While attention has mostly centred on technical and economic limits to adaptation, there are also more hidden, under-explored, and often neglected factors influencing farmers' adaptation to the effects of climate change. These factors include their cultural beliefs, lifestyle and personal interactions, which form the basis of their activities. Drawing on my goal to continually help small-scale poor farmers to improve their yields, livelihoods, and income, through my doctoral studies I decided to explore the crucial role of culture in farmers' adaptation to drought. Specifically, I am exploring the role of cultural beliefs and their influence on people's perceptions of, and attitudes and behaviours towards, natural hazards. I believe this study will provide useful insights for identifying and understanding the current approach to adaptation practices used in local farming communities, the causes of their vulnerability, and culturally-friendly means of addressing them.

In 2017, I conducted a six-month fieldwork study in Gaza, southern Mozambique. This is one of the provinces most prone to drought, as it occurs in 7 out of every 10 years. As part of my research, farmers were asked about their beliefs regarding the causes of drought events in their communities.

### BELIEFS ABOUT CLIMATE CHANGE

My initial findings revealed that farmers have limited knowledge and understanding of scientific information about the causes of drought, but hold a variety of cultural (traditional and religious) beliefs. Although a number of farmers acknowledged that they had heard about climate change, when asked about their understanding of it, they showed a limited level of understanding. While some farmers viewed drought as a natural phenomenon, for example, 'it will rain when it is rainy season', others relied on information received through radio broadcasts from local authorities. Only 11% of farmers I interviewed responded that drought was somehow scientifically-related.

During the last drought, which occurred between 2014 and 2016, radio broadcasts confirmed that the drought was a result of the El Niño (the warming of sea surface temperature) phenomenon. However, El Niño is an uncommon word that most farmers had not heard previously (the majority of farmers are illiterate or have only attended primary school) and many struggled to pronounce the word correctly. Thus, farmers referred to El Niño as being aluminium (due to the similar pronunciation in Portuguese), an ice stone or animal in the ocean that blocks the rain, and explained that the onset of the rainy season means that the animal has died.

### DIVINE RETRIBUTION

Religion and tradition play an important role in farmers' lives and in explaining the occurrence of natural disasters. Farmers acknowledged the importance of respecting and following religion and tradition for a prosperous life. On one side, farmers see God

# LEARNING TO ADAPT

**Daniela Salite** *is a 2015 Commonwealth Scholar from Mozambique – she is studying for a PhD in Livelihoods (International and Rural Development) at the University of Reading*

> Cultural beliefs bind farmers together in solidarity in times of drought

## WIDENING PERCEPTIONS

as the creator of nature, and in total control of it, including the rain; and on the other side, farmers perceive that their ancestors are in heaven, and therefore closer to God, which gives them some sort of leverage in God's decisions towards rainfall. On that account, most farmers attribute drought to punishment from God and/or their ancestors for not behaving according to religion and tradition.

Farmers have a variety of explanations for wrongful behaviour, which are based on their value-laden perceptions of wrongful things that have recently occurred or are currently happening nationwide. The most prominent explanations given for punishment through drought were unnecessary abortion by young people and non-frequent realisation of rain-making ceremonies. Farmers asserted that unnecessary abortion is a sin through both the eyes of God and their ancestors and must, therefore, never be committed. They also believed that their ancestors were punishing them for the non-regular performance of rain-making ceremonies. In the past, these ceremonies were conducted regularly, whereas now they are only conducted when there are delays in the onset of the rainy season.

## A COLLECTIVE APPROACH FOR THE FUTURE

As such, current practices show that farmers employ a reactive, rather than preventative, approach to the impact of drought and climate change on agricultural production. When there are delays to the onset of the rainy season they collectively ask God or their ancestors for forgiveness and rain through prayers or the performance of rain-making ceremonies. Individually, farmers then turn to alternative activities to generate income and secure immediate food, such as the sale of livestock and labour migration, or seek help from the government, family, and friends.

Although cultural beliefs shape farmers' responses they do not necessarily help them to adapt to drought. Cultural beliefs bind farmers together in solidarity in times of drought and such collective responses provide a psychological support system to help them deal with the causes and recover from hardship. It is therefore important that the implementation of technological drought adaptation strategies take into account the wider impact cultural beliefs have on farmers, such as creating a collective approach to climate change adaptation, and the importance of order and timing in reacting to natural hazards. In incorporating these factors into future drought adaptation strategies, the likelihood of successful outcomes will be increased. CK

> Energy, water, and environmental degradation had the strongest contribution to the overall livelihood vulnerability scores

**Cuthbert Makondo** *is a 2015 Commonwealth Scholar from Zambia – he is studying for a PhD in Geography and the Environment at the University of Oxford*

13 CLIMATE ACTION

# FIGHT OR FLIGHT?

***Cuthbert Makondo*** *analyses the vulnerability, adaptation, and resilience of rural community households to climate change in Zambia*

**Zambia's total population is currently estimated at 16.5 million people, with 58% of the population residing in rural areas and relying on rain-fed agriculture as a source of livelihood. Agriculture accounts for 18-20% of the country's gross domestic product, employing two-thirds of Zambia's labour force. However, we expect a crop-yield reduction of approximately 66% under rain-fed conditions, a figure based on greenhouse gas doubling scenarios in the sub-Sahara.**

The ability of the agricultural sector to cope with increases in temperature and potential reductions in rainfall is negligible given low levels of investment, environmental degradation, market failure, and limited access to agricultural inputs. Furthermore, access to the power grid in rural areas is also limited. Of the 22% of the population with access to electricity, only 6% of the rural population has access, compared to 16% in urban areas. Multi-dimensional poverty levels are highest in rural areas and, according to climate projections, more people are likely to experience further hardship in the future.

Recent studies have uncovered rural-to-rural movements of people, migrating away from drought prone parts of southern Zambia into central Zambia in what may be coined 'adaptation-migration'. In this regard, responsive policy and adaptation actions are urgently needed. Without evidence, however, such policies and actions may yield little or no tangible results.

Generating the evidence to support policy development for impactful adaptation programmes has been an exciting challenge for me. Using multi-disciplinary methods, my research is focused on assessing rural households' vulnerability to climate change in both migration source and host areas. Rainfall data, soil quality, and environmental conditions were used as indicators of change.

## EVALUATING AGROECOLOGICAL ZONES

Two migration source areas in Zambia - Livingstone-Choma and Kabwe-Kapiri-Mposhi - have both experienced a reduction in rainfall resulting in increased droughts. To examine the climate change adaptive potential of households in these two areas, socio-economic attributes were assessed through both qualitative and quantitative techniques. This includes the ways by which climatic variabilities are recognised and responded to in order to identify gaps in existing adaptation and resilience policies.

All of the 100 households studied in both agro-ecological areas rely on family farming and have no access to electricity. As such,

# LEARNING TO ADAPT

the households are entirely reliant on firewood and charcoal as their only energy source, with the cutting down of trees being necessary not only for farming practices, but for firewood and charcoal production. Deforested portions of land, soil erosion, and environmental degradation are evident in both areas. Potentially, this may impact future changes in climate as deforestation alters local hydrological cycles, resulting in long-term implications for agriculture.

After assessing 35 factors, we combined these into eight major components which contribute toward the overall Livelihood Vulnerability Indices (LVI)-Intergovernmental Panel on Climate Change (IPCC) score for the two studied areas.

Energy, water, and environmental degradation had the strongest contribution to the overall scores. While health and other socio-demographics did not differ much between the areas, they contributed in lowering Livingstone-Choma's overall LVI score. Consequently, the LVI-IPCC score for Livingstone-Choma is lower than Kabwe by 22%. Both areas remain vulnerable in the context of LVI interpretation. Measured on the scale of minus one to one (with minus one being the least, and one the most vulnerable), scores in both areas are towards one: moderate to most vulnerable.

## BUILDING HARMONY AND RESILIENCE

The policy framework for climate change adaptation is inadequate and lacks coherency. Adaptation tends to be addressed by a plethora of fragmented environmental and developmental policies.

This lack of harmony potentially counteracts efforts in building resilience. For example, strategies are generally positioned within the environmental sector, mostly focused on biophysical vulnerabilities with very little or no synergies with other sectoral plans. In most cases, projects of adaptation tend to be 'stand-alone', limiting effective integration for broader and robust responses.

There is also limited public and decision-maker understanding of climate change and its potential impact on the environment, economy, and infrastructure. This has tended to undermine political 'buy-in' for prioritisation and resource mobilisation for adaptation, resulting in reactive sectoral planning to address climate change impact, rather than clear prevention programming.

## THE NEXT STEPS

Donors and international development agencies tend to dominate the adaptation agenda at both national and community grassroot levels. Poor coordination and lack of communication limit efforts to integrate other important sectors like agriculture and energy. Similarly, stakeholder needs and interests are not adequately reflected in the centrally-driven adaptation responses. Local civil society organisations and communities have so far played a limited role. A participatory approach is specifically needed to ensure sustainability, and to ensure that the existing weak coordination framework within the Zambian donor community is addressed.

We need to ensure that publications addressing climate change and adaptation responses reach larger audiences. This can be achieved through greater dissemination of basic information through local media, and this is currently being explored through the inclusion of a climate change column in local newspapers. We also need to achieve high level engagement with policy makers through the Interim Climate Change Secretariat, who deal with reporting, coordinate resilience, and adapt programmes of action.

Taking my research further promises an integrated approach to development that could have the potential in addressing poverty and climate change resilience among the poorest on the continent. CK

# BLAZING A TRAIL



***Lucy McCombes**, Senior Lecturer, Leeds Beckett University, School of Events, Tourism and Hospitality Management, and **Adama Bah**, International Centre for Responsible Tourism West Africa,* *discuss how Leeds Beckett University Distance Learning Scholars united to pioneer a new responsible tourism product for The Gambia. In doing so, they helped ignite an old legend and establish it firmly into the 21st century.*

THE GAMBIA EMERGED AS A TOURIST DESTINATION IN THE 1960S WHEN SWEDISH TOURISTS STARTED TO VISIT. OVER THE YEARS, THE TOURISM INDUSTRY IN THE GAMBIA HAS BECOME FAMOUS FOR ITS SUN, SAND AND SEA PACKAGE HOLIDAYS. ACCORDING TO THE WORLD TRAVEL AND TOURISM COUNCIL'S 2018 TRAVEL & TOURISM ECONOMIC IMPACT REPORT, THE GAMBIA RECEIVED APPROXIMATELY 163,000 TOURISTS IN 2017, AND TOURISM ACCOUNTED FOR 20.1% OF ITS GDP AND 17.2% OF ITS TOTAL EMPLOYMENT.

# BLAZING A TRAIL

**Lamin Bojang** *is a 2010 Commonwealth Distance Learning Scholar from The Gambia – he studied for a PG Diploma in Responsible Tourism Management at Leeds Beckett University*

While there are clear advantages resulting from this growth, tourism faces a number of challenges which limit the extent to which local people benefit. The Gambia is at the mercy of international tour operators and chartered flights which demand very cheap rates. Furthermore, it faces constraints such as seasonality, low product innovation, lack of skilled staff, low access to finance, sex tourism, and high youth unemployment, resulting in a growing number of young people seeking employment opportunities in Europe.

In response to this situation, local government and other stakeholders established a more responsible approach to tourism development through the implementation of Gambia's Tourism Development Master Plan. This was designed to maximise the positive impacts of tourism, while nurturing the development of community-based cultural ecotourism and the hidden gem of the River Gambia.

## THE NINKI NANKA TRAIL

The story of the Ninki Nanka Trail to develop upriver tourism along the River Gambia starts in the 1980s, when the founders of Gambia River Excursions first came up with the idea. Its name builds on the important oral legend of the Ninki Nanka, a mythical dragon said to reside in the creeks of the River Gambia. The stories provide accounts of both a benevolent dragon bringing great fortune, and a malevolent dragon bringing danger and even death.

In 2006, the Ninki Nanka Trail concept was developed further and included in the Master Plan. The aim was to diversify the Gambian tourism product and increase local economic benefits through the involvement of local people in the development of community-based tourism along the river. It was designed to provide a contrast to package tourism by offering a range of cultural activities and sites of interest. These would illustrate the diverse culture and natural heritage of The Gambia, while providing an opportunity to interact with local people.

## SCHOLARS UNITE

Between 2010 – 2014, two cohorts of Commonwealth Distance Learning Scholars studying on the MSc Responsible Tourism Management course provided an important catalyst towards making the Ninki Nanka Trail concept a reality. Working in partnership with the University of the Gambia (UTG) and the International Centre for Responsible Tourism West Africa (ICRT-WA), Leeds Beckett recruited 25 dynamic, mid-career professionals already working in tourism in The Gambia and across West Africa. Through these scholarships we were able to unite a core group of tourism professionals who were passionate about using tourism as a force for good.

At the same time, staff from Leeds Beckett University were appointed by the World Bank (Gambia Growth and Competitiveness Project) to conduct a feasibility study of the Ninki Nanka Trail, which involved students from The Gambia and the UK developing and piloting the route and researching the potential opportunities and threats of the trail. The working connections of our student group provided us with great insight into the issues and access to local communities, government, and the industry. Positively, this initial study found that there was fantastic local support and encouraging market demand for this Gambian idea of a new Ninki Nanka Trail.

Following the graduation of our Distance Learning Scholars, a core group of Commonwealth Alumni and other key stakeholders have maintained their involvement in the development of the trail. This Ninki Nanka team has worked together on a range of market research, product development, and community capacity building initiatives, and carried out two further pilots as a means to perfect the route and improve the tourist experience.

Commonwealth Alumnus Lamin Bojang, who is Senior Product Development Officer for the GTB (Gambian Tourism Board), leads the development of community-based tourism across the country. Following his studies, Lamin has been able to make positive changes to responsible tourism within local communities:

"In Ndemban village [...] I helped put structures in place for the villagers to receive visitors, identify funding for guide training, support women's groups, and develop their homestays. My knowledge and confidence grew through my studies, and I hope that over time I can progress to a more senior role as there are certain changes in the industry that I can only achieve at a higher level".

Lamin currently works alongside two alumni working for the GTB who have both supported the Ninki Nanka Trail from the start. Fatou Ryai Raji, the Director of Product Development, has provided the catalyst for progressing the development of the village of Ndemban as a community-based tourism destination. Her work is supported by Lamin Fatty, another former Commonwealth Distance Learning Scholar and the Product Development Manager for the GTB. These responsible tourism pioneers are also connecting with a wider network of alumni from the MSc Responsible Tourism course from The Gambia and beyond who are contributing to the development of the Ninki Nanka Trail in many different ways.

*Pictured here are* **Adama Bah** *(from the International Centre for Responsible Tourism West Africa) and* **Lucy McCombes** *(Senior Lecturer, Leeds Beckett University, School of Events, Tourism and Hospitality Management)*

## THE FUTURE OF THE TRAIL

2018 marks our entry into a delivery phase for the Ninki Nanka Trail, offering a series of natural and cultural sites, experiences, and communities along the River Gambia which tell the historical and contemporary story of Gambian life, legend, and spirituality. As of 2018, The Gambia now has a new government 'Youth and Trade Roadmap for The Gambia: Tourism Sector Strategy 2018-22' and a 'Gambia National Development Plan 2018-21' that have incorporated the development of the Ninki Nanka Trail and upriver tourism into its plans for the future.

Moving forward with the aspirations for the Ninki Nanka Trail, our network of alumni will continue to be invaluable through their personal commitment and working roles within the tourism industry. Their skills and knowledge will be instrumental in improving the infrastructure and building the capacity of the communities and tourism businesses along the trail to deliver a viable, responsible, and high quality tourism product that can find itself a place in a very competitive global market. Our current challenge is to identify the resources needed to work with local guides and activity providers, women craft makers, restaurant/bar owners and workers, and boat crew, who provide products and services along the trail. Our ongoing plan is to connect and support these entrepreneurs and social enterprises through a "Ninki Nanka Enterprises Network" that will provide them with access to mentoring and capacity building to support them in improving their products and services to maximise the benefits from upriver tourism. We have also founded a Gambian charity called Ninki Nanka Encounters to help provide them with market access through the delivery of river-based trips along the trail designed to create mutually beneficial cultural encounters between tourists and local people.

Time will tell where the story of the Ninki Nanka Trail goes next. We have built up an exciting momentum to move forward and invite you to The Gambia to experience the trail for yourselves and join us in spreading the word about a responsible approach to tourism development along the River Gambia. CK

**In Ndemban village [...] I helped put structures in place for the villagers to receive visitors, identify funding for guide training, support women's groups, and develop their homestays.**

***To find out more visit the following:***

- Leeds Beckett University, MSc Responsible Tourism Management course: **www.courses.leedsbeckett.ac.uk/responsibletourism_msc/**
- Gambia Tourism Board: **www.visitthegambia.gm/**
- International Centre for Responsible Tourism – West Africa: **www.icrtwestafrica.org/**

# BLAST FROM THE PAST

# There are currently no measures in place to prevent wheat blast.

**Md Tofazzal Islam** *is a 2012 Commonwealth Academic Fellow – he studied Biotechnology (Climate Change and Biodiversity) at the University of Nottingham*

*In 1985, wheat blast, a devastating fungal plant disease, was detected in Brazil, where it poses a serious threat to approximately 3 million hectares of wheat-growing areas in South America.* ***Md Tofazzal Islam*** *discusses the threat the disease now poses in Bangladesh and his ongoing research to mitigate it.*

In 2016, wheat blast was detected across eight districts in Bangladesh - the first report of the disease in Asia. The airborne disease spread to an estimated 15,000 hectares of land, approximately 16% of the cultivated wheat land area in Bangladesh. As an immediate response, the government instructed infected crops to be burned in an attempt to prevent the further spread, with crop losses of nearly 100%. Wheat is the second biggest food crop in Bangladesh and detection of the disease poses a serious threat to food security in the country. There are currently no measures in place to prevent wheat blast.

Tofazzal, who is a Professor in the Department of Biotechnology at Bangabandhu Sheikh Mujibur Rahman Agricultural University (BSMRAU), approached the detection of the disease through two hypotheses - whether the pathogen had evolved in host plants in Bangladesh because of climate change, or if it had been brought to Bangladesh through seeds imported from South America. The pathogen had previously been confined to the South American region since its discovery in 1985.

To determine the genetic identity and origin of the wheat blast epidemic, Tofazzal collaborated with scientists at research institutes in the UK, using cutting edge pathogenomics – technology which identifies the presence of a particular disease beyond any doubt.

Given the potential for the disease to spread quickly, and with devastating impact to food security and livelihoods within the farming community, Tofazzal, with his UK collaborator Sophien Kamoun, developed an open data sharing platform to engage the global scientific community in rapidly determining the genetic identity and homogeny of the pathogen. Through the dedicated website, 31 researchers at 14 institutions (in seven countries, spread across four continents) collaborated over a six-week period to confirm that the pathogen was a lineal of the South American wheat blast fungus *(Magnaporthe oryzae)*, and most likely came to Bangladesh through grain imports. Following this confirmation, and with support from the Bangladesh government, Tofazzal was able to develop agricultural management options for farmers affected by the fungal disease, as well as a series of training programmes on detection and prevention.

In 2017, wheat blast re-emerged in Bangladesh and was suspected to have damaged more than 1,000 hectares of wheat in West Bengal. In this area the disease also now poses a threat to wheat crops in India. Tofazzal reached out again to global collaborators in his role as national and international project lead, uploading further results and findings to the open data platform and using this data to share updates and news with agricultural extension services in Bangladesh. Following this detection, Tofazzal and fellow collaborators from the UK were awarded a project grant from the Biotechnology and Biological Sciences Research Council (BBSRC) to conduct research using the very latest genome editing methods to modify wheat plants to resist fungal infection. The team now have two measured approaches to tackling wheat blast. One is to develop wheat varieties that are durably resistant to the wheat blast disease, and the other is to explore the use of plant probiotic bacteria to biologically control the pathogen.

As a result of this further work, in 2018 Tofazzal and his team received the Islamic Development Bank Science, Technology and Innovation Prize for their innovative project on the 'Development of novel blast resistant wheat variety by using CRISPR-Cas9 genome editing'. They continue to work towards developing a means of mitigating wheat blast and Tofazzal feels confident that this can be achieved in the next few years.

Tofazzal's key mission is to resolve the threat of wheat blast in his country and to support the development of fellow researchers. He is currently in the process of realising a career-long dream to establish the Institute of Biotechnology and Genetic Engineering at BSMRAU, a centre of excellence in biotechnology and genetic editing through which scientists and researchers in Bangladesh and across the region will have access to cutting edge technology. Through the creation of this centre, Tofazzal believes he and other researchers will have the confidence and resources to address new challenges. CK



# SMALL STATES AND ECONOMIC SUCCESS

***Lino Briguglio** explains why some small states succeed economically, in spite of their vulnerability*

**Lino Briguglio** *is a 1979 Commonwealth Scholar from Malta – he studied for a PhD in Economics at the University of Exeter*

**While small states face severe economic disadvantages due to their size, a number of such states register relatively high income per capita and high rates of economic growth. This seeming contradiction can be explained through the Vulnerability and Resilience Framework.**

## THE MEANING OF ECONOMIC VULNERABILITY

The concept of economic vulnerability is most relevant to small states because they are considered to be highly exposed to external shocks, mostly due to their high degree of trade-openness. This is often the result of their small domestic market, which renders such states heavily dependent on exports and therefore on external economic conditions. At the same time, these states tend to have very limited natural resource endowments, leading to a high dependence on imports, again exposing them to conditions outside their control.

In my 2014 study, I associated economic vulnerability with four variables, namely trade openness, export concentration, dependence on strategic imports, and proneness to natural disasters. Using these variables, I constructed an Economic Vulnerability Index (EVI), which confirmed a clear tendency for small states, particularly islands, to be more economically vulnerable than larger ones.

The concept of vulnerability has been given considerable importance in major international conferences on small states. Some of these states are middle-income countries, giving the impression of economic strength, when in reality their economies are very fragile.

Working with other experts, I realised that if the concept of vulnerability was to be operationalised and used in the interests of small island states, vulnerability needed to be measured in the form of an index. The incentive for developing such an index came mostly from the small island developing states (SIDS) themselves. This was notably evident through the Alliance of Small Island States (AOSIS) - an intergovernmental organisation established in 1990, with the main purpose of consolidating the voices of SIDS to address global warming in the run up to and during the 1994 Barbados Global Conference.

## SMALL ISLAND ECONOMY

In the case of many small states, the international donor community recognises that GDP per capita should be supplemented by an EVI when devising schemes for concessionary funding support, but in practice, the GDP per capita indicator remains the main measure in dispensing aid.

The World Bank eligibility for International Development Association concessionary support depends essentially on Gross National Income per capita below an established threshold, but there exists what is known as the small island economy exception for islands with a population of up to 1.5 million people, and which are considered to be significantly vulnerable due to size, geography, and very limited credit-worthiness and financing options.

However, most middle-income small states remain in a situation of non-eligibility for concessionary finance from major multilateral lenders, even though they experience a high degree of economic vulnerability. So far there does not seem to be a policy consensus from multilateral sources to factor in the multiple dimensions of vulnerability in allocating development finance, possibly tailored to enable such states to withstand their vulnerability through resilience-building policies and institutions.

## THE MEANING OF RESILIENCE

Resilience may be considered as the opposite of vulnerability, and it is generally associated with the ability to recover quickly from the effect of an adverse incident. In the studies I produced, the term 'economic resilience' has been used to refer to policy-induced measures which enable countries to withstand or bounce back from the negative effects of economic vulnerability.

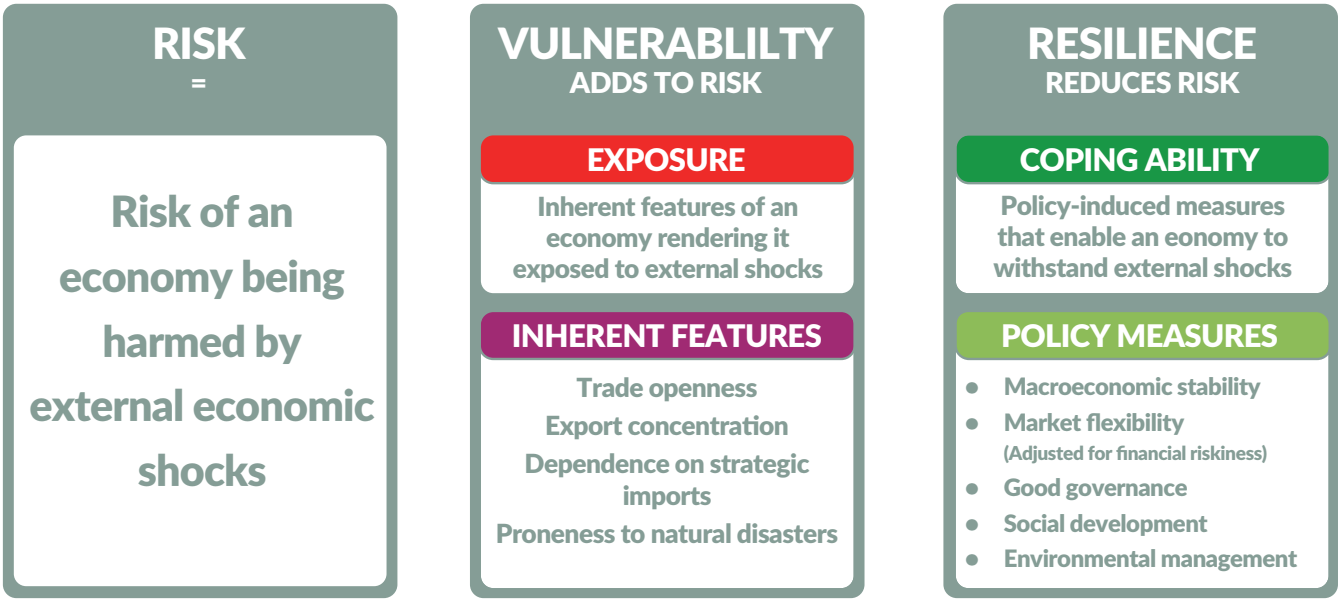


Fig. 1: The Vulnerability and Resilience Framework

Based on this concept, I constructed an economic resilience index containing policies conducive to macroeconomic stability (which allows policy manoeuvre following external shocks), prudent market flexibility (which enables the economy to adjust following external shocks), social development (which enable the economy to function without the hindrance of civil unrest), good political governance, and good environmental management. The index did not exhibit any correlation between economic resilience and country size, but it clearly emerged that the resilience index was highly correlated with GDP per capita of countries.

## THE VULNERABILITY AND RESILIENCE FRAMEWORK

The Vulnerability and Resilience Framework (V & RF) refers to the juxtaposition of vulnerability and resilience, and relates to the risk of a country being harmed by external shocks (see figure 1). The figure shows that the risk of such harm increases with economic vulnerability, and this is associated with inherent conditions that expose a country to shocks, including trade openness, dependence on strategic imports, and export concentration. On the other hand, the risk of such harm decreases with economic resilience, through policy-induced measures conducive to economic stability, market flexibility, social development, good political governance, and good environmental management.

On the basis of this conceptual framework, and using the data derived from the Vulnerability and Resilience Indices described above, I constructed four country scenarios, (see figure 2), where many small states demonstrate relatively high exposure to external shocks and relatively high resilience.

The main implication of the V & RF is that small states tend to be highly economically vulnerable and should not be construed as an argument for complacency on the part of SIDS. A number of policy options are available to these states, possibly enabling them to minimise the harmful effects of external economic shocks.

## STABILITY, FLEXIBILITY AND GOOD GOVERNANCE

The V & RF argumentation and its empirical application suggests that it is important for small states to adopt policy measures that strengthen their economic resilience. Moreover, small states would preferably embed resilience building measures into their plans and strategies, by promoting macroeconomic stability, prudent market flexibility, and good political, social, and environmental governance.

Resilience building requires appropriate policy measures and institutional frameworks to implement such measures. The most economically successful small states are those that have put in place appropriate institutions in the pursuit of macroeconomic stability, market flexibility, and governance.

Institutions involve considerable overhead outlays, and are therefore likely to be highly costly per capita for small states. For this reason, the international donor community, in supporting the economic development of small states, should take cognisance of these states' high degree of economic vulnerability and assign major importance to reinforcing resilience building in order to enable these states to strengthen their ability to withstand and cope with economic shocks. CK

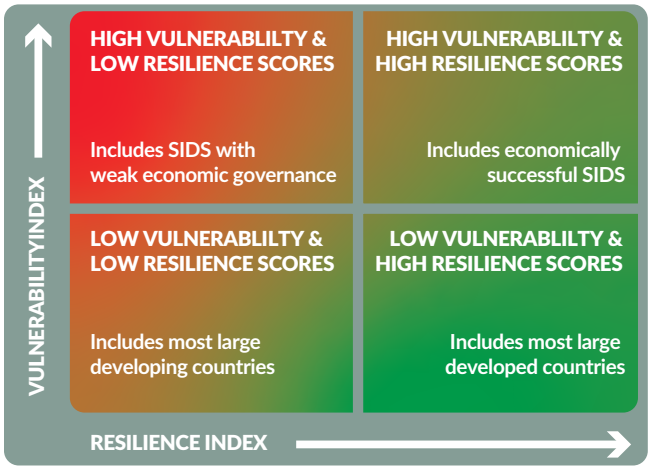


Fig. 2: Four Country Scenarios

9 INDUSTRY, INNOVATION AND INFRASTRUCTURE

# THE G
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# BANGL

***Forkan Sarker** explains how natural fibre composites, such as jute fibres coated with grap*

***Forkan Sarker** is a 2015 Commonwealth Scholar from Bangladesh - he is studying for a PhD in Textile Science and Technology at the University of Manchester*

Jute fibre, when treated with graphene, can potentially replace glass fibre-based composites

# OLDEN
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*hene, could boost the farming economies of several jute-producing countries*

Jute is extracted from the bark of the white jute plant *(Corchorus capsularis)* and is a 100% bio-degradable, recyclable, and environmentally friendly natural fibre. It is also the second most-produced natural fibre in the world after cotton and is at least 50% cheaper than flax and other similar natural fibres.

In Bangladesh, there is continuous economic growth with a strong commitment to infrastructure development alongside cheap manufacturing costs. The textile and garments industry is the largest in Bangladesh, earning almost 75% of export currency. The main production is focused on conventional clothing products and there is a huge opportunity to add greater value to textile products, especially fibre-reinforced composites.

Jute is farmed primarily in Bangladesh, the second largest producer of jute fibre in the world and its largest exporter, earning jute the title 'The Golden Fibre of Bangladesh'. In recent years, however, Bangladesh has fallen behind its other competitors in applying recent technological advancements to the material and by not diversifying the fibre's applications beyond traditional uses, such as clothing and rope making. These advancements could help boost the economy and the welfare of farmers in Bangladesh.

## ECO-FRIENDLY ALTERNATIVES

Despite their environmental credentials, natural fibre composites suffer from poor mechanical and interfacial properties, which means that they are not strong enough for some industrial applications. Researchers from the University of Manchester's School of Materials and the National Graphene Institute have been working on a collaborative project exploring the impact of coating jute fibres with graphene oxide and graphene flakes to improve fibre strength.

The breakthrough could lead to the manufacturing of high performance and environmentally friendly natural fibre composites that could replace their synthetic counterparts in major manufacturing areas, such as the automotive industry, naval vessels, household products, and even in the aerospace industry. This makes the modified jute extremely appealing to different industry sectors looking to create a cheaper and more environmentally-friendly alternative to synthetic composites. Natural fibre composites are attracting significant interest due to their potential for replacing synthetic composites, such as glass fibre, which cost more and are environmentally damaging. The natural composites could also boost the farming economies of countries such as Bangladesh, India, and China where jute is mainly produced.

# THE GOLDEN FIBRE OF BANGLADESH

## STRONGER TOGETHER

A key mission of my research is to understand and analyse the manufacturing process of jute composite, to identify the current problems faced and to propose potential solutions.

As part of my research, I produced data showing how graphene could be critical in the creation of cheaper, more environmentally-friendly alternatives to synthetic composites for end-uses in major manufacturing areas such as the automotive industry, shipbuilding, durable wind turbine blades, and low-cost housing.

Microvoids (a microscopic void in the crystal structure of a metal) present in the original jute fibres create air pockets which can produce unacceptable void content that could result in an interfacial laminate failure. I have utilised the benefits of Graphene 2D materials to remove flaws and improve the mechanical performance of the fibres. The results have been extremely positive and show that the jute fibres with a graphene coating have an enhanced bonding strength with resin of around 236%, with the flexible strength and stiffness increasing by nearly 100% and 73% respectively when compared to the untreated fibres.

This research is promising to businesses and various industries because it indicates that jute fibre, when treated with graphene, can potentially replace glass fibre-based composites. Most recently, research on natural fibre – especially in the field of structural composites – is gaining popularity because of its renewability, biodegradability, low cost and weight, making natural fibre the go-to material to help boost a country's economy and tackle climate change impact.

## A NEW JUTE FIBRE ARCHITECTURE

Natural fibres still have some processing challenges. Relatively low fibre content in the manufacturing of composites has been observed due to their poor fibre individualisation and inherent flaws. In order to create high-performance natural fibre composites, particularly for structural application, a higher fibre content with a low amount of flaws is desired. Currently I am working with colleagues to develop a new jute fibre architecture that will allow threefold fibre content in the preform. We believe this new jute fibre preform will outperform other natural fibre based preforms. If we can apply the outcome of this research on an industrial scale it could increase the demand for jute fibre by two or three times.

This will result in a positive change of the economic status of our farmers in Bangladesh by expanding the applications for jute and increasing industry demand. My next plan is to scale up the production process of this new preform in Bangladesh. The Robotics and Textile Composites Group (which comprises postdoctoral researchers, experimental officers and students) is one of the largest manufacturing groups in the world working at the interface of robotics, textile preforming, and composites. This group, as part of the University of Manchester and under the leadership of Professor Prasad Potluri, will provide further support in collaboration with the project and the development of the machines necessary to scale up the production process. We believe this research and collaboration will help in retrieving the lost glory of jute fibre. CK

Nahid Hossain - www.flickr.com/people/56345562@N02

# RECOGNISING QUALITY RESEARCH

*The **Taylor & Francis Commonwealth Scholar Best Journal Article Prize** is offered for the most outstanding article published in a recognised peer-review journal of high standing by a current or recent doctoral Commonwealth Scholar. The winner of the 2018 Taylor & Francis Commonwealth Scholar Best Journal Article Prize and four fellow entrants summarise their research.*

## DR CHIGOZIE UTAZI

Improved access to childhood vaccination in low and middle-income countries is one of the most significant successes recorded in the global health arena in recent decades. Despite this progress, indicators of the performance of vaccination programmes such as coverage levels and the number of individuals vaccinated continue to be measured through national or regional statistics, which mask epidemiologically-relevant heterogeneities or 'coldspots' of low coverage, that may lead to sustained disease circulation, even when overall coverage levels are high.

Chigozie's research assesses the performance of childhood vaccination programmes in low and middle-income countries. He has applied novel geostatistical techniques to map vaccination coverage at a high spatial resolution in children under five years. Using measles vaccination as an example, the output maps for the pilot countries Nigeria, Mozambique, and Cambodia revealed significant disparities in vaccination coverage which were not captured by large area summaries. In Nigeria in particular, his research estimated that in 2013 approximately 17 million children aged under 5 were unvaccinated. Only 4% of districts in the southern part of the country attained 80% coverage – 80% being one of the components of the WHO Global Vaccine Action Plan (GVAP).

Funded by the Gates Foundation, in conjunction with WHO and Global Alliance for Vaccines and Immunization, his work forms part of the evidence base to guide the design and implementation of vaccination programmes in high-burden countries. Specifically, the output maps, which are available at multiple spatial scales, have been utilised by programme managers in the funding organisations to plan intervention programmes.

Following the publication of his research, Chigozie and fellow researchers are continuing to scale up their work, applying the techniques presented in mapping the coverage of childhood vaccinations in other low and middle-income countries in Africa and Asia. The team are also developing an open web visualisation tool that will host country-specific output maps to increase the accessibility of these datasets. It is hoped that the sharing of this data will support the work of other researchers and inform stakeholders and government policymakers.

**Dr Chigozie Utazi**, *2010 Commonwealth Scholar from Nigeria, PhD Statistics, University of Manchester and Lancaster University – winner for his article 'High resolution age-structured mapping of childhood vaccination coverage in low and middle income countries', published in Vaccine in February 2018.*

# RECOGNISING QUALITY RESEARCH


**Dr Fred Ikanda**, *2009 Scholar from Kenya, PhD Social Anthropology, University of Cambridge – noted for his article 'Animating 'refugeeness' through vulnerabilities: worthiness of long-term exile in resettlement claims among Somali refugees in Kenya', AFRICA, Journal of the International African Institute, in May 2018.*

## DR FRED IKANDA

The refugee problem poses a major challenge to attaining the global development goal of lasting peace. This is especially the case in Africa, where protracted refugee situations have turned the temporary refugee state into a more or less permanent phenomenon.

I conducted an anthropological study from August 2011 to August 2012 at the Dagahaley refugee camp in northeastern Kenya, which has hosted Somali refugees since 1992, following the outbreak of civil war in Somalia. Third-country resettlement is commonly awarded to refugees who can demonstrate that they have vulnerabilities that permit them to be exempted from the difficult camp conditions. The very act of selecting those who are most vulnerable encourages refugees to stay vulnerable, rather than helping them to move forward with their lives.

Resettlement - the act of selecting and moving refugees to a new place where they can acquire permanent refugee status and integrate into society - is an incredibly attractive option for those living in Dagahaley camp. Many people perceive that a successful return to Somalia, if conditions improved, would be more feasible if they were resettled in Western countries with good economic prospects, than if they remained in the camps. But resettlement is elusive: according to the United Nations High Commissioner for Refugees (UNHCR), only 1% of the refugee population in Kenya are resettled every year.

My research investigated the need for officials to develop criteria for deciding who is most vulnerable and how they should be prioritised for resettlement. The metric of assessing resettlement legibility, however, should not encourage refugees to invest in preserving their vulnerabilities.


**Dr Alirat Olayinka Agboola**, *2011 Scholar from Nigeria, PhD International Real Estate Market, University of Aberdeen – noted for her article 'Understanding property market operations from a dual institutional perspective: The case of Lagos, Nigeria', Land Use Policy in September 2017.*

## DR ALIRAT OLAYINKA AGBOOLA

Rapid urbanisation across the developing world is driving the widespread adoption of formal systems of urban land management which seek to unify disparate historical tenure arrangements to provide more secure land rights. However, inadequate and poorly designed legislation in most African economies has led to the emergence of a dual system of land delivery: the formal and informal.

This study examines the Nigeria Land Use Act and considers how provisions of the Act inform and influence traditional landholding systems, the operation of the property market, and the activities of the "omo-onile". Omo-onile (literally translated as "children of the owners of land") are original descendants of the first settlers in particular locations of the market, and may claim rights to land under customary law.

By adopting a qualitative research strategy, this paper identifies a number of inconsistencies in the provisions of the Act. It concludes that the recognition given to the traditional landholding system by the Act has not been effective in tackling informality and illegality in the Lagos property market.

The paper provides insight into how informal institutions of norms, culture, and conventions of a property market characterise property ownership and affect transaction processes. It shows how informal institutions may be used to circumvent formal institutions of a market when formal rights to land are poorly delineated and assigned. In these conditions market actors will incur higher transaction costs in the process of policing transactions and enforcing contractual agreements.

## DR ANA NAMBURETE

Ultrasound (US) imaging is among the first steps in pregnancy care. Following initial US-based screening for foetal brain anomalies, referral to expensive and specialised magnetic resonance (MR) imaging is granted only to a few foetuses beyond 20 gestational weeks for diagnostic confirmation. While it is possible in specialist centres to quantify foetal brain development subjectively, doing so on a large scale in routine clinical practice is impractical, especially in resource-constrained settings.

Through a collaboration with the Nuffield Department of Women's and Reproductive Health at the John Radcliffe Hospital (Oxford), my work capitalises on 'big data' stores of US images from thousands of pregnancies collected from an ethnically diverse foetal cohort (including data from Kenya, Brazil, and other developing nations). My research team has developed fully-automated software to analyse 3-D brain US scans using artificial intelligence (or machine learning) techniques. These custom-designed tools are capable of using the brain patterns observable in US data to describe normal brain development from a large population across a wide gestational age range (14-34 weeks, spanning the second and third trimesters of pregnancy). The scans have been used to create a population atlas (or average 'consensus' image) of the brain during the foetal period, for the first time demonstrating that US and MR images of the brain contain complementary information.

In a clinical setting, our tools can automatically compare a patient's scan to the brain atlas for anomaly detection. Specifically, we aim to apply them to detect brain areas affected by malnutrition at early stages of pregnancy, and to track the effect of nutritional interventions until birth. In developed countries, this tool can circumvent the reliance on secondary and possibly delayed MRI-based assessment, allowing early detection and tracking of cerebral anomalies from the first clinical visit. In resource-constrained settings, it has the added benefit of offering affordable, routine brain assessment to some communities for the first time. Obstetric specialists may also use the atlas for training purposes, and to guide visual inspection of pathology-affected brain regions.

Ultimately, the goal of our research is to establish ultrasound as a neuroimaging modality in order to reduce costs and delays, and ultimately broaden the access to diagnostic brain imaging worldwide.

**Dr Ana Namburete**, *2011 Scholar from Mozambique, DPhil Biomedical Engineering, University of Oxford – noted for her article 'Fully-automated alignment of 3D fetal brain ultrasound to a canonical reference space using multi-task learning', published in Medical Image Analysis in February 2018.*



## DR CHRISTOPHER MCQUAID

Cassava brown streak disease (CBSD) is a crop disease that affects yields of cassava, an important subsistence crop across sub-Saharan Africa. Cassava is a key famine-relief crop; a staple for millions, it endures in poor soils with little rain to provide food in the hardest of times. In the last decade, however, East Africa has seen a significant increase in presence of CBSD. This disease can cause yield losses of up to 70%, and even in mild cases can make crops inedible and impossible to market. In total, viral diseases of cassava cause billions of dollars-worth of loss annually.

Relatively little is known about CBSD and how it spreads across a region. A key factor here is how important in its dispersal the insect that carries the disease is compared to the movement of infected planting material through informal trade. We used mathematical modelling to address this problem, using as a case study the central Ugandan district of Nakasongola, where the disease is widespread. Firstly, we identified the relative importance of different dispersal mechanisms. Secondly, we considered the effect of different control options. Finally, we looked at how the implementation of different control options simultaneously could be synergistic or antagonistic in effect.

The results of this research are now able to inform the design and implementation of control programmes. Basic scientists are also able to say with confidence that the informal trade of planting material, long suspected to be significant in disease spread, is indeed a key culprit.

**Dr Christopher McQuaid**, *2010 Scholar from South Africa, PhD Mathematical Biology, University of Bath – noted for his article 'Spatial dynamics and control of a crop pathogen with mixed-mode transmission', published in PLoS Computational Biology in July 2017.*

12 RESPONSIBLE CONSUMPTION AND PRODUCTION

# PAST INNOVATIONS

***Agriculture is one of the main components which sustains Belize's economy. The livelihood of over one third of the total labour force is dependent on agriculture. Sugar, citrus, bananas, peppers, and marine products are the most dominant agricultural exports. Vegetables, root crops, maize, and beans are typically produced by small farmers and are consumed by the domestic market. However, agriculture in Belize faces an important challenge – producing enough food to sustain an ever-growing population whilst simultaneously protecting the natural environment.***

# FUTURE APPLICATIONS

**Even centuries after ancient civilizations have added to Amazonian soils with biochar, the soils remain fertile.**

**Gerardo Aldana** *is a 2016 Commonwealth Scholar from Belize - he is studying for a PhD in Agriculture, Food and Rural Development at Newcastle University*

***Gerardo Aldana** analyses an ancient agricultural activity – the use of biochar – which has the potential to sustain Belize's expanding agricultural demand.*

In order to obtain optimum production yields, formerly pristine lands may be converted and expanded for agricultural purposes, and the use of agrochemicals may be increased. If agricultural activities are improperly managed, Belize's natural environment may be at stake. Natural ecosystem services may deteriorate and consequently affect Belize's tourism sector, which (in tandem with agriculture) is a key driver of Belize's economy. It is therefore vital to pay attention to the relationship between agriculture and the natural environment.

## A 2,000 YEAR OLD SOLUTION

Agricultural activities can vary between offering solutions, for example obtaining food security, to creating problems, such as the agrochemical contamination of soils and drinking water, improper waste management, and its greenhouse gas contribution. These problems may be inevitable unless agricultural stakeholders are able to adopt innovative and appropriate technologies which support sustainable agriculture. To resolve these issues, an adaptable solution must be devised. A unique strategy for increasing food productivity and protecting the environment has been found: the use of biochar in agricultural systems.

Biochar is a carbonaceous material produced from waste biomass through the process of pyrolysis and can be used to suit a myriad of agricultural applications. Biochar has been studied as a means to ameliorate soils of poor fertility, mitigate soils contaminated by agrochemicals, discourage deforestation, and effectively store carbon within the soil, amongst other benefits. Though the concept of applying biochar to soils is novel to present day researchers, the practice of using biochar as a soil enhancer has been present for over 2,000 years. Important studies which have contributed to biochar research include findings pertaining to anthropogenic biochar-rich dark soils in the Amazonian forests. Even centuries after ancient civilizations have added to Amazonian soils with biochar, the soils remain fertile. This soil management strategy was not only a practice unique to the Amazon, but was also common in different ancient civilisations throughout the world.

## BIOCHAR IN PRACTICE

Biochar implementation is of particular interest and pertinence to Belize due to its potential to increase soil fertility and absorb pesticides in soils managed by both conventional and smallholder farms. Since biochar properties depend on feedstock type and other production parameters, its physicochemical characteristics determine the purpose of its application. For example, some biochars pyrolysed at higher temperatures (≥ 700°C) may be more suited for pesticide absorption, while biochars produced at lower temperatures may be better suited for soil enhancement. Therefore farms which suffer from pesticide leaching may use biochars suited for pesticide absorption, while farms that have issues with soil fertility may use biochar for soil amendment. Given that Belize produces approximately 395,000 short tonnes of sugar cane bagasse, 143,000 short tonnes of a

# PAST INNOVATIONS, FUTURE APPLICATIONS

combination of citrus peels, pulps and seeds, and 3,000 short tonnes of shrimp farming waste, using this available agricultural waste as feedstock for the production of biochar grants us a great opportunity to obtain a zero-waste agricultural system.

## CHALLENGES AND OPPORTUNITIES

Though biochar has great potential to be a solution that may harmoniously intertwine agricultural productivity and environmental protection, agricultural stakeholders such as farmers, advisors, and policymakers face great challenges when implementing new innovative strategies. Stakeholders may only adopt new strategies for sustainable agriculture if the information is effectively disseminated. Once agricultural stakeholders can conceptualise the benefits of using biochar, any constraints that hinder its implementation may become miniscule and new opportunities will arise. Several Belizean smallholder farmers are already acquainted with the effects of biochar on soil; however the biochar is only produced in small quantities. Different biochar production systems must be identified to suit both industrial scale and smallholder farms. As is the case in Belize, most agricultural stakeholders understand the need to sustain food production and in parallel protect the natural environment. For Belizeans, protecting the environment does not only enable economic growth, but it also preserves cultural heritage by enabling a sense of identity and place.

My research, conducted at Newcastle University, will focus on the effects of biochar as a buffer zone to prevent agrochemicals from contaminating pristine ecosystems that are located adjacent to agricultural areas. My study uses feedstock typically found in subtropical regions for the production of biochar, along with different subtropical soil types that have been collected in Belize. Apart from laboratory studies and fieldwork, I have been provided with training at Enviresearch in the UK, an organisation that has a community of experts from a range of backgrounds: agronomy, chemistry, environmental fate, ecology, endocrine disruption, risk assessment, and regulatory affairs. Enviresearch provides regulatory and risk assessment services in Europe for the global chemical industry and I decided to train there in order to understand the mechanisms of biochar in numerical pesticide fate models.

My studies also include social research that focuses on the perspectives of Belizean stakeholders on the implementation of biochar in Belize's agricultural systems. I hope to continue biochar research in Belize to contribute to the innovative agricultural practice that Belize and other countries may be able to adopt. CK

# ALUMNI NEWS

*The updates below (listed by year of award) summarise just some of the achievements of our global alumni. To let us know about your successes, email* ***alumni@cscuk.org.uk***

## 1974

**Satyendra Prakash KAUSHIK** received a Living Legend Award in 2016 by the Indian Association of Surgical Gastroenterology for his life time career contributions to the super speciality of Surgical Gastroenterology.
(Medical Fellow from India, Gastroenterology Surgery, Middlesex Hospital London)

## 1977

**Kok Tong HO** was awarded the honorary degree of Doctor of Medical Science by the University of New South Wales. He recently established a scholarship aimed at providing financial assistance to indigenous Australian medical students.
(Medical Scholar from Singapore, Medicine, Royal Free Hospital School of Medicine)

## 1978

**Peter Michael BOEHM** has been appointed to represent Ontario in the Senate by Prime Minister Justin Trudeau. He was previously Deputy Minister for the G-7 Summit and Personal Representative for the Prime Minister.
(Scholar from Canada, PhD in History, University of Edinburgh)

## 1979

**Monique MERCIER** has been appointed to the Board of Directors of the Bank of Canada. She is currently the Executive Vice-President and Chief Governance Officer of TELUS Corporation.
(Scholar from Canada, MPhil in Politics, University of Oxford)

## 1981

**Andrew John PETTER** has received the Peter Lougheed Award for Leadership in Public Policy. The awards are given to exceptional candidates who contribute to public policy in their province, region and country. Andrew has also been appointed to the Order of Canada for his commitment and leadership in advancing university-community engagement and higher education throughout the country.
(Scholar from Canada, LLM Law, University of Cambridge)

## 1985

**Iqbal MUJTABA** has been appointed Associate Dean (Learning, Teaching & Quality) in the Faculty of Engineering & Informatics at the University of Bradford.
(Scholar from Bangladesh, PhD Chemical Engineering, Imperial College London)

## 1986

**Wayne John FAIRBROTHER** has been awarded the 2017 Teschemaker Cup in recognition of his work as Director and Senior Staff Scientist at Genentech, a biotechnology company working towards the production of drugs to treat diseases prevalent in humans and reduce the effects of chronic conditions.
(Scholar from New Zealand, DPhil Chemistry, University of Oxford)

**Nobina ROBINSON** has been appointed Executive Fellow at the University of Calgary and a Senior Fellow at the C.D. Howe Institute. This comes after a distinguished career in which she was Chief Executive Officer at Polytechnics Canada.
(Scholar from Canada, BA Classics, University of Oxford)

▲ Nobina Robinson

## 1987

**Stephen JOLLY** has been appointed Director of the Saatchi Institute, a private think tank which explores complex global questions through the lens of communications.
(Scholar from the United Kingdom, University of British Columbia)

## 1989

**Vinay Kumar BAHL** has been appointed Dean (Academic) at the All India Institute of Medical Sciences in New Delhi.
(Scholar from India, Cardiology, Glenfield Hospital)

**Mohammed Kamal HOSSAIN** received a gold medal from the Bangladesh Academy of Agriculture for his outstanding contributions in the forestry sector in Bangladesh.
(Scholar from Bangladesh, PhD Forestry, University of Aberdeen; 2002 Academic Fellow)

**Ayub Nabi KHAN** has been awarded the International Holden Medal Award for Education by the Textile Institute Manchester. He is the first Bangladeshi to win the award which recognises outstanding contributions in technology based education.
(Scholar from Bangladesh, PhD Textile Technology, University of Manchester)

## 1990

**Daniella TILBURY** has been appointed the first Commissioner for Sustainable Development by the Government of Gibraltar. In this new role she will be leading on the embedding of sustainable development principles across government as well as overseeing the new sustainable development framework.
(Scholar from Gibraltar, PhD Higher Education for Sustainability, University of Cambridge)

# ALUMNI NEWS

▲ George Onyango *(right)*

▲ Md Tofazzal Islam

▲ Anthony Muchai Manyara

## 1996

**Joshua Anthony FRYDENBERG** has been appointed Treasurer in the Australian Government. He previously served as Environment Minister after being elected to Parliament in 2010 to the constituency of Kooyong in Melbourne.

(Scholar from Australia, MPhil International Relations, University of Oxford)

## 1999

**Seini Manumatavai TUPOU** has been appointed the Director General of the Pacific Islands Forum Fisheries Agency (FFA).

(Scholar from Tonga, PhD Law, University of Nottingham)

## 2000

**Erica E. M. MOODIE** has been awarded the 2018 Principal's Prize for Outstanding Emerging Researchers from McGill University for her work in the Department of Epidemiology, Biostatistics and Occupational Health.

(Scholar from Canada, MPhil Epidemiology, University of Cambridge)

## 2002

**Prasanta Kumar SAIKIA** has led a team of researchers to the discovery of two new species of spider. With further research this discovery has the potential to help bolster pest management in agricultural practices.

(Academic Fellow from India, Conservation of Biodiversity, University of Leeds)

## 2003

**Cornelia NDIFON** has launched the Cornelia Ndifon Rural Health Foundation in Namibia which provides support and information to protect health, prevent diseases and improve educational performance of learners and the general wellbeing of Namibian men and women.

(Scholar from Nigeria, MPH Public Health (International), University of Leeds)

## 2004

**Pravin AGRAWAL** has been appointed part-time Director for Bharat Heavy Electricals Ltd. Agrawal is presently joint secretary in the Department of Heavy Industry (DHI), Ministry of Heavy Industries and Public Enterprises.

(Distance Learning Scholar from India, PG Diploma Sustainable Development, Staffordshire University)

## 2005

**Busnur MANJUNATHA** has been elected Secretary of the Mangalore Chapter of the Association of British Scholars in India.

(Academic Fellow from India, Effects of Pollution on Biogeochemistry of Indian Ocean, University of East Anglia)

## 2007

**Mian ATIQ-UR-REHMAN** has received an award from the Pakistan Army Frontier Corps North Command for his vast contribution as a social worker and volunteer, through which he has supported children with thalassemia and advocated for disease prevention in Pakistan.

(Professional Fellow from Pakistan, Public Health, Black Health Agency)

**Steven RAYAN** has been awarded a New Teacher Award from the College of Arts and Science at the University of Saksatchewan following his appointment as Assistant Professor in the Department of Mathematics and Statistics in 2016.

(Scholar from Canada, DPhil Differential Geometry, University of Oxford)

## 2010

**George ONYANGO** has received the Diversity and Inclusion Gender Equality Champion Award by Daima Trust Ltd in Kenya for his work as Director of the Dandora Dumpsite Rehabilitation Group (DADREG).

(Professional Fellow, Public Health, International HIV/AIDS Alliance)

## 2012

**Md Tofazzal ISLAM** has been awarded the Islamic Development Bank (IsDB) Innovation Prize for 2018 for his contribution to a project oriented around novel blast resistant wheat and genome editing.

(Academic Fellow from Bangladesh, Biotechnology, University of Nottingham)

▲ Eric Gyan

**Shoshanna SAXE** has been selected as part of Canada's Clean 50 outstanding contributors to clean capitalism.
(Scholar from Canada, Engineering, University of Cambridge)

## 2013

**Ankur VAIDYA** has been appointed Deputy Director of the Integrated Child Development Scheme (ICDS), which works on improving the health and nutrition status of children up to six years of age.
(Distance Learning Scholar from India, Public Health, University of Liverpool)

## 2016

**Anthony Muchai MANYARA** has been awarded the International Public Health Prize for the highest achieving International graduate from the MSc Public Health programme at the University of the West of England.
(Shared Scholar from Kenya, MSc Public Health, University of the West of England)

## 2018

**Eric GYAN** has received the Alumni Laureate Award from the University of Nottingham in recognition of his outstanding contribution in founding the Med Cancer Care Foundation, an NGO which supports cancer screening in Ghana, and in developing a nationwide cervical cancer project to raise awareness of early cancer detection.
(Split-site Scholar from Ghana, Molecular Medicine, University of Nottingham)

# OBITUARIES

## 1968

**Yves TESSIER** was a cardiologist and worked for the majority of his career at the Hospital Saint-Sacrement in Quebec City, after completing a Medical Scholarship at the University of London. Yves passed away on the 18th November 2017. (Medical Scholar from Canada, Cardiology, University of London)

## 1995

**Samantha HETTIARACHCHI** was a Sri Lankan academic who worked at the University of Moratuwa, specialising in coastal engineering in the Civil Engineering Department. Samantha initially worked as an academic staff member and conducted research, winning two national merit awards from the National Science Foundation in Sri Lanka. Samantha completed a Commonwealth Academic Fellowship at Imperial College London, before going onto become the Head of the Civil Engineering Department at the University of Moratuwa between 1997 and 2000. Samantha passed away in April 2018. (Academic Fellow from Sri Lanka, Coastal Engineering and Management, Imperial College London)

## 2010

▲ Uduak Udom

**Uduak Christabel UDOM** was a pioneering Nigerian optometrist, holding many 'firsts' in Nigeria, Africa, and the field of optometry. She became the first female President of the Nigerian Optometric Association between 2006 and 2008, and the first female President of the African Council of Optometry (AFCO) in 2008. After her time at the AFCO, she served as President of the World Council of Optometry between 2015 and 2017. Following her Professional Fellowship, Uduak was elected the first President of the Commonwealth Scholars and Fellows Alumni Association Nigeria (COSFAN), and connected with many alumni across Nigeria in this position. Uduak passed away on the 14th January 2019. (Professional Fellow from Nigeria, Public Health, World Council of Optometry)

## 2014

**Catherine NANOZI** was a senior nutritionist at Cathy's Wellness Centre in Uganda. Catherine passed away in May 2018. (Shared Scholar from Uganda, Public Health, University of Glasgow)

# EVENTS

## SCHOLARS' PRESENTATION DAY SYMPOSIUM

Scholars attended the annual Scholars' Presentation Day Symposium, held at the University of Nottingham in August 2018

## FOOD SECURITY AND DEVELOPMENT

A CSC Lecture hosted by the University of Reading in August 2018

## CSC COMMONWEALTH RUTHERFORD FELLOWS EVENT

Rutherford Fellows attended a Commonwealth Rutherford event, held at The British Library in October 2018

## CSC WELCOME EVENT

Scholars attended the annual CSC Welcome Event, held at the QEII Centre, Westminster, in November 2018

## SOCIAL ENTREPRENEURSHIP FOR DEVELOPMENT IMPACT

A workshop was held at Woburn House, London, in December 2018

## RESEARCHER EXCELLENCE

A workshop was held at Woburn House, London, in January 2019

## CULTURAL INTELLIGENCE WORKSHOP

A one day workshop in partnership with Common Purpose, held at the University of Glasgow in February 2019

## INTERDISCIPLINARY FUTURES: ENHANCING RESEARCH AND IMPACT

A Rutherford Fellow event organised by The Leicester Institute for Advanced Studies, held in Leicester in February 2019

# EVENTS


## BANGLADESH

Alumni held a workshop on applying for postgraduate study for students and faculty members at the North South University in Dhaka in November 2018


## GHANA

Alumni attended a lecture on 'The role of science and technology for peace and development' in commemoration of the World Science Day for Peace and Development in Accra in November 2018

## NIGERIA

Alumni attended an end of year workshop on 'Galvanising strategic partnerships for attainment of the Sustainable Development Goals'. The event was hosted by the Commonwealth Scholars and Fellows Alumni Association Nigeria (COSFAN) in Abuja in December 2018

## ST LUCIA

Alumni in St Lucia teamed up with workers from the Integrating Water, Land and Ecosystems Management in Caribbean Small Island Developing States project (IWEco) to commemorate the International Day for Disaster Reduction, held on 13 October annually, by leading a tree planting ceremony in Soufriere in October 2018


## UGANDA

Alumni participated in a panel discussion on the topic of 'Accountable leadership – a tool for promoting good governance in Uganda for sustainable development' in Kampala in December 2018

## ZAMBIA

The Commonwealth Alumni Association of Zambia (CAAZ) delivered a mentorship workshop for students at the University of Zambia in Lusaka in August 2018

## ZAMBIA

Alumni in Zambia took part in a panel discussion on the importance of developing entrepreneurial skills among young people in Lusaka in November 2018

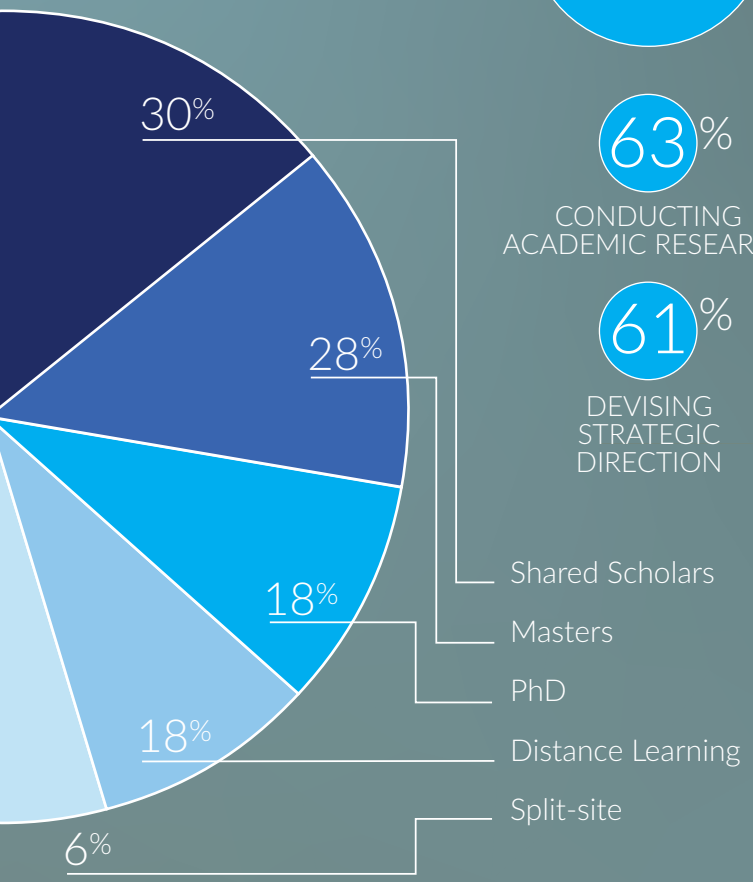
# THE CSC IN NUMBERS

*In Autumn 2017, we asked Commonwealth Alumni to tell us about their activities from the past two years. This is a sample of what they told us.*

**672** RESPONDED

LIVNG IN **64** COUNTRIES

## CSC PROGRAMMES



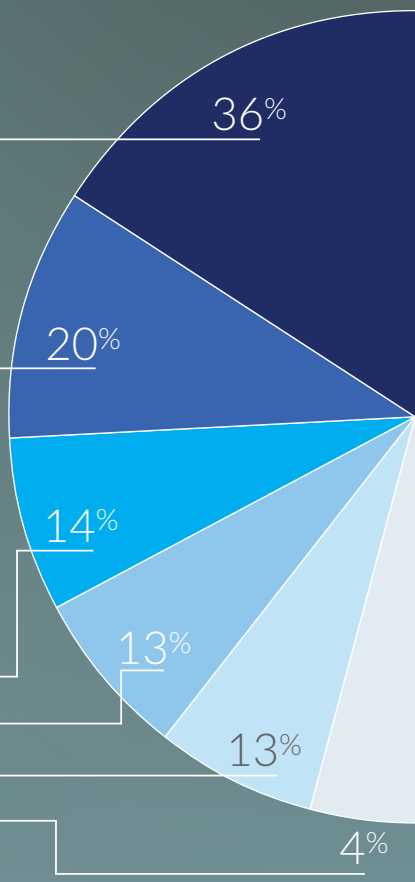

**63%** CONDUCTING ACADEMIC RESEARCH

**59%** TEACHING STUDENTS

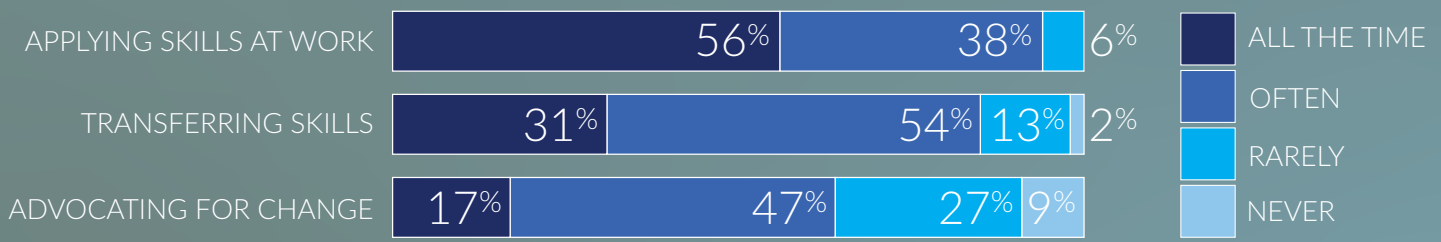
**61%** DEVISING STRATEGIC DIRECTION

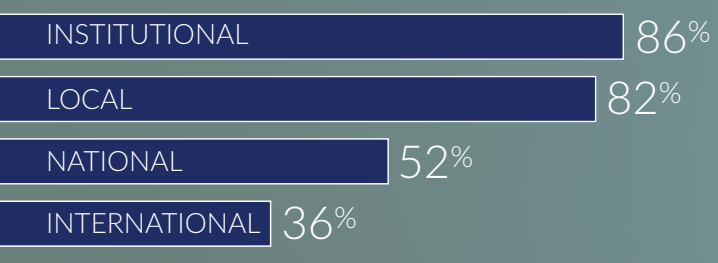
**43%** MANAGING OR CHANGING COMPANY OR DEPARTMENT

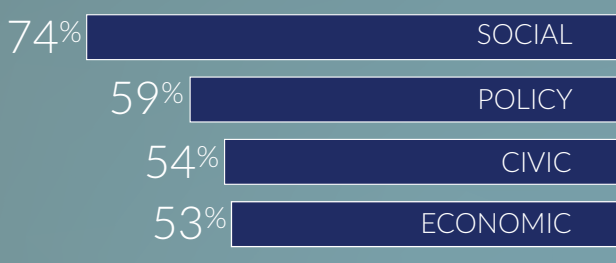
## ALUMNI DESTINATIONS




## HOW ARE THEY USING WHAT THEY LEARNED?




Source: 2017 Longitudinal Alumni Survey

evaluation@cscuk.org.uk

# GET INVOLVED!

*You can stay part of the CSC community through events across the Commonwealth, promoting our scholarships and fellowships to potential applicants, and joining our alumni associations and other networks.*

## REGIONAL NETWORKS

Connect with Commonwealth Scholars and Fellows in the same university or region in the UK

***Scotland***

***North West***

***North East***

***Wales and Northern Ireland***

***Midlands and Oxford***

***South West***

***South East***

For full details, visit **cscuk.dfid.gov.uk/networks/regional-networks**

## KNOWLEDGE HUBS

The CSC's nine Knowledge Hubs provide a platform for Commonwealth Scholars and Alumni studying and working in similar disciplines to network and exchange ideas to support a shared sustainable development outcome.

As a member of a Hub you can post news about your current work and research, share links to reading and publications, and ask and answer questions related to your work.

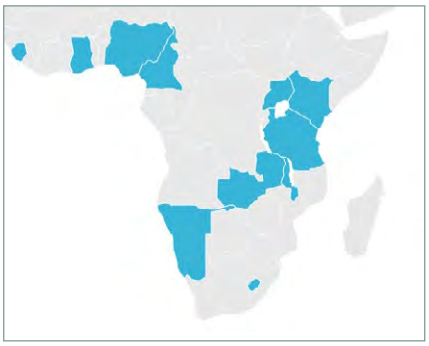
The nine Knowledge Hubs are focused on the following sustainable development outcomes:

- Achieving sustainable agriculture and rural development
- Attaining sustainable economic growth
- Achieving inclusive education
- Strengthening climate change resilience and mitigation
- Ensuring gender equality and equal opportunity
- Strengthening global governance
- Increasing global health coverage
- Enhancing science, technology, and innovation
- Promoting peace, justice, and fair representation for all

For full details about the Hubs and to join, visit **cscuk.dfid.gov.uk/networks/knowledge-hubs/**

## ALUMNI ASSOCIATIONS

Meet and network with past, present, and future Commonwealth Scholars and Fellows



### *Africa*

***Cameroon***
***Ghana***
***Kenya***
***Lesotho***
***Malawi***
***Mauritius***
***Namibia***
***Nigeria***
***Sierra Leone***
***Tanzania***
***Uganda***
***Zambia***

### *Caribbean*

***Barbados***
***Grenada***
***Guyana***
***Jamaica***
***St Lucia***
***Trinidad and Tobago***

### *Europe*

***Gibraltar***

### *N. America*

***Canada***

### *South Asia*

***Bangladesh***
***India***
***Malaysia***
***Pakistan***
***Sri Lanka***

For full details, visit **cscuk.dfid.gov.uk/alumni/associations**

For further details about these activities and more, visit **www.dfid.gov.uk/cscuk**

COMMONWEALTH SCHOLARSHIPS

# COMMON KNOWLEDGE

ISSUE #7 MARCH 2019

*2018 Gambian Commonwealth Scholars with Richard Middleton, Chair, Commonwealth Scholarship Commission at the CSC Welcome Event, London, November 2018*

Commonwealth Scholarship Commission in the UK

Woburn House, 20-24 Tavistock Square
London WC1H 9HF
United Kingdom
**info@cscuk.org.uk**
**dfid.gov.uk/cscuk**

linkd.in/commonwealthscholarships
twitter.com/commschols
fb.me/commonwealthscholarships
flickr.com/cscuk