Tackling global challenges

St Andrews has been making strides in its aim to outperform the UK sector on research impact, despite its comparatively small size. In the last Research Excellence Framework assessment, for impact St Andrews came top in the UK for Geography and Environmental Sciences, second for Biology, and in the top five for Management, Classics and English. Intellectually vibrant work is carried out here with a strong record of close collaboration between disciplines.

One important contribution is to support cutting-edge research that addresses the challenges faced by developing countries. As part of the UK Government’s £1.5 billion fund, the University has attracted support from the Scottish Funding Council’s Global Challenges Research Fund for the last two years. This initiative enables UK scientists to take the lead in addressing the problems faced by developing countries, while delivering cutting-edge research. It provides a unique opportunity to build a global community of researchers committed to sustainable development and the eradication of poverty.

Following on from the success of the previous years, St Andrews has secured £490,000 for 2019-2020 from the fund. As a result, last September the University established the St Andrews Global Challenges Forum, led by Professor Nina Laurie from the School of Geography & Sustainable Development. The Forum also comprises Professor Derek Woollatt, Vice-Principal (Research and Innovation) and a team of nine academic champions from the scientific sciences and arts and humanities. It also benefits from an external Advisory Group of seven government, charity and National Academy stakeholders.

The Forum aims to develop strong and enduring partnerships between the University and developing countries to enhance the research and innovation capacity of both, and to deliver substantial impact on improved social welfare, economic development, and environmental sustainability. A measure of success will be that each programme has a legacy beyond the initial funding investment period.

The University has identified three priority areas to receive support: energy and innovation, global health and inequality, sustainability and environmental change.

In addition, the University aims to support up to nine PhD Global Challenge studenthips (three per theme) with an emphasis on international students from around the globe, taking a long-term view towards relationship building with those countries. This scheme builds on one of the University’s most ancient traditions, that of attracting the best minds from every corner of the globe.

The key development questions were presented to the Scottish Funding Council’s Global Challenges Research Fund and are featured in the next three pages beginning with one particularly successful research project by Professor Gillespie.

Professor Stephen Gillespie, School of Medicine

The worldwide application of a University of St Andrews innovation – tackling antimicrobial resistance in TB

According to the World Health Organisation’s Global Tuberculosis Report 2017, tuberculosis (TB) is the leading cause of death from infectious disease. Its incidence is even higher than HIV/AIDS, which is why we urgently need new tools to overcome it.

To tell whether a patient is responding or not to the effectiveness of new TB drugs, one must be able to count the number of live Mycobacterium tuberculosis from the patient’s lungs. The current culture-based tests take up to eight weeks and require expensive containment facilities beyond the means of most health facilities in regions where the disease is common.

Since 2009, Professor Stephen Gillespie and his team have been developing a new biomarker for TB, the Molecular Bacterial Load Assay (MBLA) test that can diagnose and quantify the TB in four hours and have tested it in a large-scale trial in four African centres. They are working with LifeArc, a product development charity, towards certification, the crucial step to allow the test to be used for patient diagnosis.

Professor Gillespie’s team hosted an international forum in St Andrews in June 2018 to explore how to make the test available in TB control programmes worldwide. Participants from 16 countries in Africa, Asia and Europe, participated in two days of hands-on training and a one-day conference to explore how to translate the test into clinical practice.

Invited speakers included representatives from organisations WHO, LifeArc, the Foundation for Innovative New Diagnostics (FIND), the Pan-African Consortium for the Evaluation of Anti-tuberculosis Antibiotics (PanACEA Consortium), and clinicians from TB hard burden countries. The key development questions were formulated and the conference proceedings will be published soon in the East African Science Journal – an accessible journal for potential MLA users and policy makers. In WHO’s Global Tuberculosis Report 2019, the MBLA was included as a promising new test for treatment monitoring.

This research project has had three key outcomes:

• The development of the TB MBLA test will allow researchers to detect and quantify all TB bacteria in four hours rather than eight weeks.

• The test therefore has the potential to save the lives of hundreds and thousands of the one million people killed each year by TB.

• It will simplify treatment decisions and reduce the cost for health services, researchers and pharmaceutical companies when making decisions about treatment.

Michael Dalymply, Executive Director, Diagnostics & Science Forsight at LifeArc, is eager to work with the University of St Andrews in order to “progress the assay from research use to a single where more patients can benefit from its adoption. Millions of people contract TB every year. With an appropriate diagnostic, patient treatment and recovery should be much improved.”

Professor Stephen Gillespie highlights the importance of the test: “For the first time, the MBLA allows healthcare workers to diagnose tuberculosis and to monitor the response to treatment rapidly. Its speed empowers those looking after TB patients to make better treatment decisions that can translate to better outcomes.”

Sustainable futures for international craft traditions

Weaver making dhaka (a plain weave cloth with colourful extra weft, typical of eastern Nepal) on a treadle loom, outside Kathmandu

The focus of Professor Rudy’s project was to build a network for empowering traditional artisans to sustain their own cultural heritage by increasing their own creative capacity and developing an appropriate market for artisan-designed work. For five months, Professor Rudy travelled together with Judy Frater, the Founder Director of the Somaiya Kala Vidya (SKV), a successor school for artisans in the desert region of Kutch, India. Together they travelled to several locations around India to meet community leaders and interview traditional artisans. One goal was to meet potential partners for expanding SKV’s successful model into these areas. Using an artisan-to-artisan peer mentoring approach, SKV emphasised the importance of design education in increasing the value of craft traditions, building the capacity of artisans, and raising the socio-economic status of artisan communities.

Of these regions, they found two where the model would work well in the Himalayas and the other in Rajasthan. They developed projects with Avani in Uttar Pradesh, which is a community built on the principles of sustainability and local empowerment. Fusing traditional techniques with sustainable technologies, Avani’s farmers and artisans produce exquisite, one-of-a-kind textiles, art supplies and lifestyle products.

The other location was the Bihani College in Rajasthan, which connects rural areas to help them and individuals take control of their lives and the wellbeing of their communities.

Two successful weavers from Kutch were sent to take part in an artisan-to-artisan training programme with the weavers at Avani. The Kutch weavers were able to help the Avani weavers find old cloth samples that represented a nearly lost local tradition, and to adjust these old designs for an urban market.

Finally, the project formed the basis of an initial corpus, extending the work on traditional craft traditions to an international forum in St Andrews in June 2018.
Dr Tim Raub, School of Earth & Environmental Sciences
Understanding drought cycles across South-Central Africa

The reduction in the number of trees has resulted in a loss of income for the communities living around the mountains, and they have experienced floods and soil erosion due to rapid water run-off from the mountains during the rainy season. Together with local faculty officials, Dr. Raub's team has been using non-destructive cancerous growths on the trees in order to assess the best climate signatures. It suggests that this information can help forecast environmental risk for the future, which will influence the Malawian government to build resilience into their growing strategy of providing energy through hydroelectric power.

Crucial to the work is the team that Dr. Raub has assembled which includes agribusiness entrepeneurs and industry partners. The work allows for research on not only the reforestation but also the market and dynamics behind energy solutions. An example of a community-scale hydroelectric project is under study in the south of the country. Here, at the MEGA Hydro project near Phalombe, an 8MW megawatt plant is under construction in a sensitive area where most illicit Mulanje cedar harvesting takes place. Ensuring the future of this tree in the scheme will not only give the benefit of an abundant, clean, renewable energy supply, but these plants can also serve a future for the threatened environment.

Dr Jaremy McMullin, School of International Relations
Motoring from war to peace: understanding long-term reintegration trajectories of ex-combatant youth in Liberia's motorcycle taxi unions

Liberia's eduction cycle is in turmoil with several parking lots in cities and towns across several parking lots in cities and towns. Dr. McMullin's primary research interest is post-war transition and reintegration of ex-combatants, particularly within African states.

Dr McMullin said, “This research challenges the false narratives and assumptions that reintegration in Liberia is a solved problem. Our research shows that key findings of this research have been validated across the country, but this ‘cloud forest’ pine is only endangered by illicit harvesting for off-grid biomass burning. Mulanje Mountain is the centre of a community-scale hydroelectric project in under study in the south of the country. Here, at the MEGA Hydro project near Phalombe, an 8MW megawatt plant is under construction in a sensitive area where most illicit Mulanje cedar harvesting takes place. Ensuring the future of this tree in the scheme will not only give the benefit of an abundant, clean, renewable energy supply, but these plants can also serve a future for the threatened environment.

Dr Juliana Bowles, School of Computer Science
Global solutions for managing medications for patients with multiple long-term health conditions

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Dr. Carlo's Eduardo Ayapanta Pinto Public Health, University of Sao Paulo, Luiz Henrique, and Ana Gomes da Breda did a workshop for the Family Medicine Residency Program at the Rio de Janeiro Health Department. Here, at the MEGA Hydro project near Phalombe, an 8MW megawatt plant is under construction in a sensitive area where most illicit Mulanje cedar harvesting takes place. Ensuring the future of this tree in the scheme will not only give the benefit of an abundant, clean, renewable energy supply, but these plants can also serve a future for the threatened environment.

Dr Bowles and her team also explored the suitability of the techniques to improve healthcare programs and recommendations in Brazil. Long-running narratives with continuous budget cuts and political upheaval in Brazil have meant that a large part of the general population is unable to get access to basic healthcare, with considerable effects for patients with long-term conditions. She gave a lecture about the different uses to young GPs in rio de Janeiro, and this has opened up access to the adults and children with numerous features which would be more suited to their clinical practice, such as restricted access to some temporary locality and supplies.

Professor Ifor Samuel, School of Physics & Astronomy
Evaluation of a portable light source for photodynamic therapy

Light source supplied to Brazilian collaborators for testing the use of PDT to kill cutaneous leishmaniasis

Professor Samuel and his team are exploring how to apply a portable light source for photodynamic therapy (PDT), a technology they have already developed to skin cancers, to treat a major neglected tropical disease.

The project builds upon existing partnerships in the University’s museum of Costa Rica to strengthen existing indigenous systems of organisation and commercial work, making them more resilient to the homogenising forces of globalisation and unfeul-physics development. Communities such as San Vicente in the north and Boracay and Rio Curré in the south, have participated with Dr. Brown and Jamie Allan Brown, the University of Victoria, and communities for the design of the photodynamic craftsmanship workshops, for which communities have gained significant rights, strength and identity. Each community has identified their main community and eco-

Dr. Brown has received significant research funding for a project on sustainable artisan production in indigenous communities in Costa Rica. The project seeks to empower these communities, through the promotion of their artisan crafts, towards a sustainable future to ease awareness of their culture and way of life.

As each community at severe risk of natural disasters, project initiatives also contributed toward building community resilience, emergency service participation and internationally recognised training with the International Council of Museums (ICOM) to safeguard not only crafts but also tangible and intangible heritage.

Brown says, “MGCI has worked with the communities of Santa Rita and Santa Cruz since 2012. The Community Craft and Culture project has also been successful in helping communities to focus on their cultural traditions and strengthen their cultural relationships while also strengthening partnerships with the National Museum of Costa Rica and ICOM Costa Rica. These small, community-based organisations have strong roots and big ambition. It is an honour for us to assist them in achieving their goals.”

Dr Margaret Leighton, School of Economics & Finance
Twukee Pamoja. Working together to give children in Tanzania a better start

Early childhood care, development and education are gaining ground on the global agenda and this has been a particular focus of Dr Leighton's work. Recently, she has partnered with Save the Children on an intervention to develop and implement the Early Childhood Development Program for poor children in the Dar es Salaam region. The purpose of the project is to pilot, test and generate learning about how interventions can effectively be delivered in low-resource contexts, such as rural Tanzania, to support children's development and early learning. Based on Dr Leighton's recommendations, a research design and sampling framework were put in place and the project over the course of its implementation. The project builds on existing partnerships in the University’s museum of Costa Rica to strengthen existing indigenous systems of organisation and commercial work, making them more resilient to the homogenising forces of globalisation and unfeul-physics development. Communities such as San Vicente in the north and Boracay and Rio Curré in the south, have participated with Dr. Brown and Jamie Allan Brown, the University of Victoria, and communities for the design of the photodynamic craftsmanship workshops, for which communities have gained significant rights, strength and identity. Each community has identified their main community and eco-

Dr Leighton's research on children in Tanzania is relevant to the increasing focus on children's rights. Tanzania is aued to be one of the most children's rights, but it has also been identified as an enabling environment for these changes.

Implemented in two five-year phases, it will establish a number of early-childhood education and training programs in Tanzania. The Early Childhood Development Program for poor children in the Dar es Salaam region. The purpose of the project is to pilot, test and generate learning about how interventions can effectively be delivered in low-resource contexts, such as rural Tanzania, to support children's development and early learning. Based on Dr Leighton's recommendations, a research design and sampling framework were put in place and the project over the course of its implementation. The project builds on existing partnerships in the University’s museum of Costa Rica to strengthen existing indigenous systems of organisation and commercial work, making them more resilient to the homogenising forces of globalisation and unfeul-physics development. Communities such as San Vicente in the north and Boracay and Rio Curré in the south, have participated with Dr. Brown and Jamie Allan Brown, the University of Victoria, and communities for the design of the photodynamic craftsmanship workshops, for which communities have gained significant rights, strength and identity. Each community has identified their main community and eco-

Dr Leighton says, “Working with the Ching Hutchinson Foundation and the University’s museum of Costa Rica, we have created the opportunity for our research to be relevant and responsive to the development of the country. The project is designed to add to our research insights which have such immediate impact.”

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