

Un Global Compact  
COMMUNICATION ON ENGAGEMENT (COE)

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Period covered by this Communication on Engagement

From: January 2018

To: January 2020

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## Part I. Statement of Continued Support

17<sup>th</sup> January 2020

To our stakeholders:

I am pleased to confirm that the University of Greenwich reaffirms its support to the United Nations Global Compact and its Ten Principles in the areas of Human Rights, Labour, Environment and Anti-Corruption. This is our Communication on Engagement with the United Nations Global Compact. We welcome feedback on its contents.

In this Communication of Engagement, we describe the actions that our organization has taken to support the UN Global Compact and its Principles as suggested for an organization like ours. We also commit to sharing this information with our stakeholders using our primary channels of communication.

Sincerely yours,



Professor Jane Harrington  
Vice Chancellor  
University of Greenwich

## Part II. Description of Actions and Measurement of Outcomes

As part of our commitment to the Global Compact, the University of Greenwich pledged to participate in and engage with the UN Global Compact in the following ways:

- Ensure that the ten principles are central to and incorporated in our teaching offer in our relevant programmes delivered by the University of Greenwich including the Natural Resources Institute (NRI), a research institute based in our Faculty of Engineering and Science;
- Be guided by the ten principles in undertaking our research at the University of Greenwich;
- Engage with the UK Global Compact Network to promote through public engagement and education, the principles of the Global Compact.

## Our Values

### Inclusivity, Excellence, Determination, Ambition and Creativity

Our values are our essential shared beliefs and principles that define who we are, and inspire and motivate us in achieving our [Strategic Plan](#). Our [behaviours](#) are the qualities and ways of working we admire in each other and enhance our overall effectiveness as they're "how" we work together.

#### We are inclusive

- We are open-minded and open-hearted, embracing new people, ideas and ways of working to create a better world.
- As one of the most culturally diverse universities in the world, this is an inclusive community where everyone is welcome and feels nurtured.
- London is a city that requires you to be open-minded in every way and as a university we reflect the changing needs of our wider society.



- We like to challenge the way people think and introduce new ideas and concepts that will inform their world-view.
- Many of our students and staff strive to make a difference in their communities and pursue knowledge and learning because they want to improve the lives of others. This generosity of spirit is alive and well at our university.



#### We strive for excellence

- We set ourselves high standards in everything we do and never accept second best.
- We focus on doing the right things and doing them right.
- To be truly excellent requires discipline and rigour and a willingness to accept constructive criticism.
- Excellence is a habit that we practice diligently.

## We have the determination to succeed

- This is a university that operates in the real world where life is challenging.
- We encourage tenacity and resilience so that we can overcome adversity.
- Our most successful alumni are people who have real motivation to achieve their dreams and to transform the lives of others.
- A fierce determination to learn, improve and succeed has helped transform the lives of countless people worldwide.

## We are relentlessly ambitious

- We are relentlessly ambitious for every student that comes to the university.
- We develop confidence and self-belief so that our alumni are able to realise their full potential.
- For centuries Greenwich has been a focal point for ambitious ideas that have resulted in dramatic global progress. We continue to push for personal and collective advancement in the same way.



## We use our creativity

- This is a world that needs creativity more than ever.
- Finding innovative solutions to challenging, contemporary problems requires new ways of thinking and working.
- We develop, admire and celebrate those people who have the ability to think differently and then apply these innovative, creative ideas into the real-world.

## Responses to specific commitment in University of Greenwich Letter of Support

Ensure that the ten principles are central to and incorporated in our teaching offer in our relevant programmes delivered by the University of Greenwich including the Natural Resources Institute (NRI), a research institute based in our Faculty of Engineering and Science

The University of Greenwich (UoG) is keen to support the ten principles in our teaching offer. In particular the work of NRI is pivotal in this approach, focusing on food, agriculture, environment and sustainable livelihoods. NRI's work in these areas is recognised globally. Our staff work on cutting edge development issues and this is reflected in the teaching programmes offered by the Institute. Our portfolio of undergraduate and postgraduate courses continues to grow and develop, ensuring that **environmental, sustainable and ethical issues** are highlighted. Our commitment to the **Sustainable Development Goals (SDGs)** is also reflected in our teachings, some of which are included here:

### Environmental Science BSc

With its mix of social, natural and physical sciences and emphasis on sustainability, our Environmental Science, BSc Hons degree prepares students for careers that have real impact on the world. Students develop their understanding of the interactions between living systems and the physical landscape and its processes, and how society affects these. **They investigate solutions to environmental issues from scientific, political, legal and philosophical perspectives, documenting the human impact on the landscape and explore environmental conflicts and issues.** Our students go on to have careers in, amongst other areas, management roles in the **environmental, land, conservation and heritage sectors.**

### Physical Geography BSc

From climate change to conservation, students on our Physical Geography, BSc Hons degree, study some of the most important issues facing the world today. Students learn the main techniques of investigation and data analysis used in Physical Geography while covering landforms, oceans, atmosphere, flora and fauna. **Modules also explore the impact of human activity on the natural environment.** Popular career options for our Geography graduates include **conservation, environmental consulting, the civil service and teaching.**

### Agriculture for Sustainable Development, MSc

Food security and the role of agriculture in stimulating growth are key development issues in a challenging global environment. This course focuses on **agriculture in developing countries, integrating natural, social and economic sciences to introduce research methods in sustainable agriculture.** It draws on our unrivalled expertise in crop and livestock production, pest and disease management, agricultural marketing, biotechnology and agroforestry, and is supported by real case studies. **The course is delivered by research-active scientists of the NRI, who are actively implementing sustainable agriculture projects around the world.**

### Food Innovation MSc

This MSc in Food Innovation is aimed at graduates and professionals looking to build careers in the food science industry (and especially in product development). The course builds their knowledge and understanding of how ingredients are developed and launched, from concept to completion. It is based on the expertise of staff working in areas including human nutrition and public health, food chemistry and microbiology, product development, packaging, food

safety, legislation, and **sustainability**. The course prepares students for a career in product development science, with expertise in food and nutrition. They develop insight into the development of healthy and nutritious food and learn how to enhance **sustainability and creativity within food chains**.

### **Food Safety and Quality Management e-learning, MSc/PGDip/PGCert**

For professionals involved in the safe supply of food to consumers, this online Master's in Food Safety and Quality Management provides the knowledge and skills to advance their career. For those working in the food supply chain, our online MSc Food Safety and Quality Management provides an ideal opportunity to consolidate their experience and learn more about their industry. Students study safety and quality management systems following the **'farm-to-fork'** approach, as well as the agents of foodborne illness and the control and enforcement measures **that ensure our food is safe**. This online course is based upon the successful taught course, which has run since 2001. It benefits from the expertise and experience of the NRI food safety and quality management team, which has carried out research for over 40 years.

### **Applied Food Safety and Quality Management, PGDip/MSc**

Our Master's in Applied Food Safety and Quality Management is designed for professionals working in food manufacturing who wish to boost their career with a new qualification. On this course, students learn about the requirements for providing **safe and wholesome food** to consumers with our specialist course in applied food safety and quality management. We follow the **farm-to-fork** approach to address a wide variety of food safety and quality management issues. Topics include good governance and national control systems, food inspection and testing services. Students cover the **management of food safety and quality across the supply chain**, as well as how to design and implement safety and quality management systems to meet **national and international legislation**. The course is research-informed and is taught by staff at the award-winning NRI, with its unique knowledge base and industry experience.

### **Global Environmental Change, MSc**

With our MSc Global Environmental Change, students develop the knowledge and skills to address some of the world's major challenges. Study topics include **climate change, environmental law and policy, meteorology and sustainability**. This wide-ranging programme reflects the strength of unique expertise held within our prizewinning NRI whose academics have contributed to global initiatives such as the Intergovernmental Panel on Climate Change (IPCC) assessment reports.

## **Be guided by the ten principles in undertaking our research at the University of Greenwich**

The University of Greenwich expects the highest standards in the conduct of all research undertaken in its name. This includes research undertaken by staff, students, visiting or emeritus staff, associates, contractors and consultants.

### **Implementing ethical principles**

In order to embed these principles, and recognising its obligations to the wider research community, to the funders of research and to society as a whole to uphold the integrity of academic research, the University of Greenwich is committed to implementing the principles and commitments of the [UUK Concordat to support research integrity \(2012\)](#).

The UUK concordat's five commitments are:

- maintaining the highest standards of rigour and integrity in all aspects of research
- ensuring that research is conducted according to appropriate ethical, legal and professional frameworks, obligations and standards
- supporting a research environment that is underpinned by a culture of integrity and based on good governance, best practice and support for the development of researchers
- using transparent, robust and fair processes to deal with allegations of research misconduct should they arise
- working together to strengthen the integrity of research and to reviewing progress regularly and openly.

### Key policies

- [Code of Practice for Research](#) – presents the guiding principles and standards of good practice in research across all subject disciplines and fields of study in the university
- [Procedures for Investigating Research Misconduct](#) - documents the procedures that the university will adhere to when investigating any allegation of research misconduct
- [Research Ethics Policy](#) - encouraging a high quality research and enterprise culture, with the highest possible standards of integrity and practice
- [Academic Regulations for Research Awards](#) - the framework and criteria in the assessment, examination and awarding of a university research award.

### Annual Statement on Research Integrity

- [Annual Statement on Research Integrity 2017/18](#)

### Engage with the UK Global Compact Network to promote through public engagement and education, the principles of the Global Compact.

UoG is also a member of the UN Global Compact Network UK, attending both the AGM in June 2019 and the Making Global Goals Local Business UK Roadshow 2019, and will work to engage with the UN Global Compact Network UK to promote through public engagement and education, the principles of the Global Compact.

### PRME

UoG Business School supports the Principles of Responsible Management Education, an initiative of the UN Global Compact and its latest Sharing Information of Progress (SIP) Report can be found here: <https://www.unprme.org/reports/PRMEreportUoG2018.pdf>. The report describes what has been achieved so far and states:

*Becoming a PRME signatory has been a valuable spur to think more deeply about how to integrate the PRME principles into our teaching, research and operations.*

*Over the years, Business School programmes gained several professional accreditations which worked as drivers for the Business School to enhance and implement its Teaching and Learning strategy and all associated Quality Assurance processes. As a further drive to enhance our teaching and research practices and our students' learning we became signatories of the PRME in 2016 and have discussed, embedded, and put into practice the principles in most areas of our operations and student provision. Our goal is to develop future leaders who act responsibly and think globally, while respecting the individual. We embraced*

*the embedding of social, cultural and ethical learning objectives across our curriculum throughout all programmes and modules to help our staff develop new knowledge and equip our graduates with the tools to foster sustainable and equitable economic growth. We also successfully embedded the UN PRME principles into numerous research activities. Through our research we renew our commitment to advance knowledge and understanding about the role and impact of business in the creation of a sustainable society. The process of producing the first Sharing Information on Progress (SIP) has been an extremely valuable exercise for the University of Greenwich Business School to undertake, serving as a powerful impetus for continued change and further recognition of the influence of PRME and its six underlying principles. University of Greenwich Business School 4 By the next reporting date we aim to achieve greater awareness of the UN PRME initiative among our staff and students. Aside being an active advanced signatory to PRME, the Business School will establish a Steering Group to include staff, students and external advisory members, chaired by Petros Ieromonachou, Professor of Transport and Urban Systems. The PRME principles have been included in the new Learning Enhancement plan of the School, seeking to initiate and complete projects on education provision, research and engagement activities.*

*The Business School is committed to incorporating the PRIME principles in its teaching, research, stakeholder collaboration and campus leadership as well as extra-curriculum activities, and collaboration with our Trans-National Partners. We work towards maintaining and constantly improving our Faculty and University's sustainability profile, fostering research into sustainability and incorporating knowledge into our curriculum on suites of undergraduate and postgraduate program to make our graduates to incorporate sustainability principles in their professional career.*

*The School is committed to working towards maintaining and constantly enhancing the university's sustainability profile nurturing research into sustainability and integrating state-of-the-art knowledge into our curriculum thus making our students ready to be the leaders of sustainability in their future employment. This includes the use of research-led teaching in areas of sustainability, which have a combined yearly student uptake of several hundred students and instill in our students the principles of sustainability as a force of change for their daily lives and as a competitive advantage in their future employment.*

## **The 10 Principles of the UN Global Compact**

### **Human Rights**

[Principle 1](#): Businesses should support and respect the protection of internationally proclaimed human rights; and

[Principle 2](#): make sure that they are not complicit in human rights abuses.

The University's **Business, Human Rights and the Environment Research Group (BHRE)** undertakes research on the impact of commercial activities and business working methods on the enjoyment of **human rights and the environment**.



The BHRE Research Group was created in 2013 under the leadership of Dr Olga Martin-Ortega. It brings together the expertise and research interests of members of the School of Law on business and human rights, international environmental law and international criminal law.

Our current research focuses particularly on:

- Business and human rights
- Corporate human rights due diligence
- Socially responsible and sustainable public procurement
- The electronics industry supply chain
- Environmental and health governance
- Forests and forest commodities
- The extractive industries and conflict minerals.

## Academic Networks

The members of the BHRE are involved in numerous international academic networks and have links with other research groups and centres in the UK and across the world, including:

- Interest Group on Business and Human Rights of the European Society of International Law
- Business, Conflict and Human Rights
- CEIDA (Research Network on Corporate Social Responsibility in Extractive Industries in Developing Areas)
- Business and Human Rights (BHRight)
- European Business Ethics Networks (Special Interest Group on Business and Human Rights)
- IUCN Academy of Environmental Law
- Procurement Law Academic Network (LAN)
- [Global Network for the Study of Human Rights and the Environment](#)
- [IUCN Academy of Environmental Law](#)
- Research Group on Private International Law and Human Rights (in Spain)
- London Transitional Justice Network.

## Safeguarding

As part of providing a safe environment in which to work and study, and protecting the public, the University has a [Safeguarding Policy](#) and a **Safeguarding Officer network**. This framework should be used to report concerns that may arise about **children** (anyone under 18), **vulnerable adults** (those over 18 who are vulnerable to harm or exploitation due to their personal situation and/or social circumstances), and **radicalisation** (the process by which an individual becomes vulnerable to supporting terrorism and the extremist ideologies associated with terrorist groups).

Concerns can relate to students, staff or members of the public, and may relate to an individual's behaviour or how they are being affected by the behaviour of others.

Online courses available to all staff include:

- **Safeguarding essentials** (covering child protection)
- **Safeguarding against extremism** (covering Prevent and radicalisation)

NRI ([www.nri.org](http://www.nri.org)) is a specialist institute of the University of Greenwich. Combining the expertise of natural and social scientists, NRI engages in research, teaching, training, and consultancy to address significant challenges and opportunities in the sectors and countries in which we work. Our work supports the Principles of the UN Global Compact and the Sustainable Development Goals which is evidenced in our work focusing on sustainable trade and responsible business. More detail on our recent work to support Human Rights is highlighted later in this COE.

## Labour

[Principle 3](#): Businesses should uphold the freedom of association and the effective recognition of the right to collective bargaining;

[Principle 4](#): the elimination of all forms of forced and compulsory labour;

[Principle 5](#): the effective abolition of child labour; and

[Principle 6](#): the elimination of discrimination in respect of employment and occupation.

The University's **Department of Human Resources and Organisational Behaviour** focuses on developing a greater understanding of how work affects people's lives, and how people's behaviour at work affects an organisation's success. We are committed to developing our students' employability as managers and good organisational citizens of the future.

### Accreditation's and professional bodies

The department has long-standing links with the [Chartered Institute of Personnel and Development \(CIPD\)](#).

Our MA in human resource management leads directly to full chartered membership of the CIPD, while students on other Human Resource Management programmes may apply to become student members of the CIPD.

## Research

Our research activity ensures that our teaching and learning is kept fresh, relevant and up to date. The department is actively involved in research and has papers published in respected academic journals on a regular basis. [The Work & Employment Research Unit](#) and the [Leadership and Organisational Behaviour Research Unit](#) provide a focus for this work. Some staff have achieved international acclaim in their field of research and contribute to conferences all over the world.

## Equality, Diversity and Inclusion (EDI)

The University takes active steps to provide an inclusive environment for students, staff and visitors as outlined in the Public Sector Equality Duty of the Equality Act 2010. We value Equality, Diversity and Inclusion (EDI) and take active steps to provide an inclusive environment for students, staff and visitors irrespective of their age, disability, gender, gender

re-assignment, marriage or civil partnership, pregnancy or maternity, race, religion or belief (non-belief) and sexual orientation as outlined in the Public Sector Equality Duty of the Equality Act 2010.

## **Gender Pay Gap Report**

Universities, alongside all other employers of more than 250 people must publish and report specific figures about their gender pay gap. The University's Gender Pay Gap report is available through the following link: <https://docs.gre.ac.uk/rep/human-resources/gender-pay-gap-report>

## **Equality, Diversity and Inclusion Strategy**

The [Equality, Diversity and Inclusion Strategy 2019-2022](#) is a declaration of the University of Greenwich's commitment to place the promotion of equality, diversity and inclusion at the heart of the University. We believe that having a clear [Equality and Diversity Policy Statement](#) for staff and students reinforces our expectations of the values and behaviours that all members of the University community should exhibit. The policy outlines that the University will take steps to encourage staff, students and visitors to the University to:

- Treat others with respect at all times, and promote an environment free of all kinds of bullying and harassment.
- Actively discourage discriminatory behaviours or practices.
- Participate in training and learning opportunities that would enable them to adopt best practice.

### **Equality and Diversity training**

Courses are available to all staff – Equality and Diversity Essentials, and Managing Diversity

### **EDI Annual Report**

- [EDI Annual Report 2016-2017](#)
- [EDI Annual Report 2014-2015](#)

The University provides training to staff including an Equality and Diversity Essential Course and a Managing Diversity Course

More information is available at: <https://www.gre.ac.uk/hr/edi#disabilityinfo> which includes detailed information on:

### **Diversity and Network Groups**

**LGBT+ Staff Network**

**Disability Staff Network**

**Disability Named Contacts (DNC)**

**BAME Staff Network**

**Women Staff Network**

## **Union recognition**

Staff have a choice of Union representation including UCU, Prospect, Unison and the GMB

who are able to discuss, consult and negotiate on policies, terms and conditions of Employment for collectively bargained staff. Students have a very active Students Union (<https://www.greenwichsu.co.uk/>).

## **Anti-Slavery and human trafficking**

The University of Greenwich is committed to preventing acts of modern slavery and human trafficking from occurring within its business and supply chain, and imposes the same high standards on its suppliers.

Anti-Slavery and human trafficking statement for the financial year 2018/19 is made pursuant to section 54(1) of the Modern Slavery Act 2015 ('the Act') and constitutes the University of Greenwich's modern slavery and human trafficking statement for the financial year commencing 1 August 2018 and ending 31 July 2019. It also describes planned actions in 2019/20.

This statement has been approved the University's Governing Body, which, together with the Audit Committee, will review and update it as necessary on an annual basis. The full statement can be viewed through the following link:

[https://docs.gre.ac.uk/\\_data/assets/pdf\\_file/0010/1643860/Modern-Slavery-Act-Annual-Statement-of-Compliance-2018-19.pdf](https://docs.gre.ac.uk/_data/assets/pdf_file/0010/1643860/Modern-Slavery-Act-Annual-Statement-of-Compliance-2018-19.pdf)

## **Staff Training**

The University has a Learning and development Programme available to all staff which includes courses in Bribery Prevention; Data Protection; Equality and Diversity Essentials; Managing Diversity and Safeguarding against Extremism

Further information is available through our staff Development hub:

<https://www.gre.ac.uk/staff-development>

## **Aurora**

The University also supports the Aurora Programme which is organised by the Leadership Foundation for Higher Education for all people who identify as a woman. It was designed to help address the issue of the reducing numbers of women in senior posts in Higher Education. The Programme aims to enable a wide range of women in academic and professional roles to think of themselves as future leaders and to develop leadership skills and strategies.

We also have coaching schemes and work shadowing schemes to support staff development,

All of this is underpinned by our **Equality and diversity policy statement:**

The University of Greenwich is committed to promoting equality and diversity, and to providing an inclusive and supportive environment in which all individuals have the opportunity to contribute to their full potential. This is central to our commitment to excellence in all that we do: teaching, research and enterprise.

We believe that having a clear policy on equality for staff and students, as well as meeting our statutory requirements, under the Equality Act 2010, will further demonstrate this commitment, and be consistent with values and behaviours that all members of the greater university community should exhibit.

The University of Greenwich aims to create an environment in which students and staff are selected and treated solely on the basis of their merits, abilities and potential, regardless of age, disability, gender reassignment, marriage or civil partnership, pregnancy or maternity status, race, religion or belief, sex, sexual orientation, trade union membership or non-membership, socio-economic background, or on the basis of being a part-time or fixed term worker.

The University has responsibility for adhering to this statement and other University policies which it will inform. The whole University community has a responsibility to apply the principles of this statement in our policies, practice and behaviours. We recognise our responsibility to provide guidance and training on equality and diversity issues to both students and staff.

We welcome our general public sector equality duty to have due regard for the need to:

- Eliminate unlawful discrimination, harassment and victimisation
- Advance equality of opportunity, and
- Foster good relations.

The University will take steps to encourage staff, students and visitors to the University to:

- Treat others with respect at all times, and promote an environment free of all kinds of bullying and harassment
- Actively discourage discriminatory behaviours or practices
- Participate in training and learning opportunities that would enable them to adopt best practice.

The University is committed to taking action to change unfair and discriminatory practices wherever they occur.

The University will:

- Publicise and raise awareness of our equality and diversity policy statement and related policies amongst staff and students
- Operate a fair, open and transparent procedure for the recruitment of staff and students
- Provide fair and accessible opportunities for training and promotion for staff
- Operate fair and transparent procedures for student assessment, progression and attainment of awards
- Promote the use of inclusive language and avoid the use of words or phrases which are discriminatory or exclusive in all University publications and correspondence
- Ensure that any new or updated policies and procedures are analysed for any adverse impact they might have on equalities, and take any necessary action to mitigate this.
- Publish equality information annually, and publish equality objectives which show how we plan to tackle particular inequalities or disadvantages, and reduce or remove them.

This policy statement will apply to all other policies and procedures within the University.

NRI's recent work to support Labour rights in our project work is highlighted later in this COE

## Environment

[Principle 7](#): Businesses should support a precautionary approach to environmental challenges;

[Principle 8](#): undertake initiatives to promote greater environmental responsibility; and

[Principle 9](#): encourage the development and diffusion of environmentally friendly technologies.

### University of Greenwich Sustainability <https://www.gre.ac.uk/sustain/sustain>:

The University of Greenwich proudly applies sustainable development across its activities.

We recognise that meeting sustainable development objectives is crucial to our students, our planet and ultimately our future success.

The University takes a strategic approach to sustainability, focusing on areas that reduce our negative impacts and continually improve our ways of working. Applying sustainability principles in our estates and operations allows us to operate our campuses efficiently and responsibly. This optimises resource use, minimises spend and ensures compliance and has, for example, enabled us to reduce our energy and waste generation.

We also work to integrate sustainability into our teaching and research, and work with our staff, students and our wider community to help raise awareness and drive behavioural change. This is particularly important as the decisions and actions we take as individuals collectively contribute to our overall impact on the environment and society as well as the University' running costs.

Our most recent [Annual Sustainability Report for 2017-18](#) illustrates key progress, including cutting carbon emissions by 48.9% since 2005 and reducing waste generation by 30% since 2009. It provides details of improvements, actions and recommendations for staff and students to help take action to make our university even more sustainable.

Our [Sustainability Policy](#) sets out the direction, the areas we focus upon and the goals we seek. Strategies and policies support this:

- [Biodiversity Policy](#)
- [Fairtrade Policy](#)
- [Sustainable Food Policy](#)
- [Carbon Management Plan](#)
- [Travel Plan](#)

Our [Sustainability Management Board](#) has responsibilities to help develop and implement our strategy and to help achieve our goals.

We work with our Students' Union and students in a range of ways to help them to understand and apply sustainability in their learning, research, work and lives.

Our sustainability work is extensive and we would like to share this with you. [Visit our sustainability information and support hub](#) to explore what we are doing, and to find information about how you can learn and help us all move towards our sustainable vision.

In addition to the courses offered by the NRI and the Business School, the development of

environmentally friendly technologies are being encouraged across the University including Sustainable Building Design and Engineering, Construction Technology and Environmental Design,

The support of precautionary approaches to environmental challenges; initiatives to promote greater environmental responsibility; and the development and diffusion of environmentally friendly technologies is at the heart of the development work undertaken by the NRI. In the next section of this COE we will provide details of some of the projects we have undertaken to show how we put our expertise into practice.

## Anti-Corruption

Principle 10: Businesses should work against corruption in all its forms, including extortion and bribery.

The University of Greenwich Anti-bribery Policy sets out the university's approach to preventing incidents of bribery and corruption and is designed to comply with the relevant United Kingdom legislation (The Bribery Act 2010).

(Extract)

The University has an absolute commitment to acting ethically, lawfully and with integrity in all its dealings, wherever it operates in the world. As part of this commitment, bribery and corruption in any form is deemed to be unacceptable. This is not just a cultural response by the University to bribery and corruption, but is a compliance requirement underpinned by the law.

This Policy sets out the University's approach to preventing incidents of bribery and corruption and is designed to comply with the relevant United Kingdom legislation (The Bribery Act 2010); the legislation is applicable wherever in the world the incident takes place and thus affects all University activities.

The required standards of integrity confer a level of personal responsibility upon individuals. This Policy thus applies to:

- All locations and geographic functions of the University
- All partners, agents, offices and subsidiary companies
- All the University's students and staff, including temporary workers, irrespective of location or work, as well as Members of the University Court.

Each staff member, Member of Court, student, contractor and others acting on the University's behalf are responsible for complying with the relevant legislation, the terms of this Policy and associated procedures. They must all identify the risk of bribery and consider the duty to make appropriate disclosures in reporting instances of bribery as necessary,

Further information and a complete copy of our policy is available through the following link: <https://docs.gre.ac.uk/rep/human-resources/anti-bribery-policy>

Our staff have mandatory training for bribery prevention.

**The University Finance Committee** has overall responsibility for advising the Court on all issues pertaining to financial and estates management within the University. The Committee monitors the financial position of the University on a regular basis.

Our Accounts are audited annually by external Auditors and are published on our website. Our latest accounts are available at:

[https://docs.gre.ac.uk/\\_data/assets/pdf\\_file/0006/1688676/UoG-Financial-Statements-Year-Ended-31st-July-201902122019\\_A2.pdf](https://docs.gre.ac.uk/_data/assets/pdf_file/0006/1688676/UoG-Financial-Statements-Year-Ended-31st-July-201902122019_A2.pdf)

## **Public Interest (Whistleblowing) Disclosure Policy and Procedure**

This policy sets out the arrangements and obligations that apply when an individual wishes to make a public disclosure about the conduct of the university or colleagues.

The University is committed to the highest standards of openness, probity and accountability and encourages a free and open culture in dealings between its officers, employees and all people with whom it engages in business and legal relations. In particular, the University recognises that effective and honest communication is essential if concerns about breaches or failures are to be effectively dealt with and the organisation's success ensured. It seeks to conduct its affairs in a responsible manner taking into account the requirements of the funding bodies and the standards in public life set out in the reports of the Committee on Standards in Public Life (see appendix 1 for the seven principles of public life articulated by the committee).

The Public Interest Disclosure Act 1998 (the Act) gives legal protection to employees and former employees against being dismissed or penalised as a result of publicly disclosing certain serious concerns. It aims to promote greater openness in the workplace and all University's employees are obliged by their contract of employment to give honest and faithful service to their employer. This includes an obligation not to disclose confidential information about the University's affairs.

However, where an employee discovers information which they believe shows malpractice/wrongdoing within the University then this information should be disclosed without fear of reprisal, and may be made independently of line management. Employees are expected to use this procedure rather than air their complaints outside the institution. It would not be a breach of this policy, however, where a disclosure is made to a prescribed third party such as HSE or HMRC. Wider disclosure, for instance to the media, is not to a prescribed third party and such disclosures, even where made in the public interest, may not be protected under the Act and may be considered a breach of this policy.

Employees who raise genuine concerns under this policy will not under any circumstances be subjected to any form of detriment or disadvantage as a result of having raised their concerns.

More information is available at: <https://docs.gre.ac.uk/rep/human-resources/public-interest-whistleblowing-disclosure-policy-and-procedure>

## **Public Services International Research Unit**

The Public Services International Research Unit (PSIRU) examines the social, economic and political aspects of privatisation and liberalisation in water, energy, waste management, health



care and social care. It also addresses the general questions of the role and structure of public services and public finance, both in the EU and in developing countries.

We look at the role of multinational companies and the international financial institutions, especially the World Bank. PSIRU addresses a range of related issues, including: **corruption**, digitalisation, public enterprise, public sector pay, public-private partnerships and PFI, pension funds, and social network analysis.

We also carry out research commissioned by a range of bodies, principally from international and national trade unions and voluntary sector bodies, and from other institutions including the European Commission, ILO and **UNRISD**.

PSIRU participates in research projects, networks and proposals in partnership with other researchers across Europe and the rest of the world. As part of its core work, PSIRU maintains an extensive database on public services and privatisation

<https://www.gre.ac.uk/business/research/centres/public-services>

NRI is fully committed to this principle both in its everyday working and in its project work – more information follows.

## Natural Resources Institute, University of Greenwich



The Natural Resources Institute (NRI) ([www.nri.org](http://www.nri.org)) is a specialist institute of the University of Greenwich. Combining the expertise of natural and social scientists, we engage in research, teaching, training, and consultancy to address significant challenges and opportunities in the sectors and countries in which we work. Having recently celebrated our 125<sup>th</sup> anniversary, NRI continues its award-winning research which was recently recognized by the award of its third Queens Anniversary Prize.

Among these challenges are the issues of food and nutrition security, agriculture and sustainable development in the face of **climate change, land and environmental management, markets and responsible business, capacity strengthening, and gender and inequality**

**NRI's work is focused on making a significant contribution to achievement of the UN Sustainable Development Goals. The Institute carries out strategic and applied research that is focused on the food and agricultural sectors of developing countries with broad objectives of contributing to poverty reduction, economic growth,**

## **food/nutrition security and sustainable development**

NRI operates a Quality Management System which is certified through the British Standards Institute to ISO 9001:2015. Our registration number is: FS54723.

NRI is a leader in natural resources research, promoting efficient management and use of renewable natural resources in support of sustainable livelihoods. Research is primarily focused on developing and emerging economies. NRI's presence and research partnerships in developing countries, and its training and capacity building programmes, provide the platform for the Institute to develop and disseminate key technologies and knowledge. This has resulted in substantial impact at farmer and community level, and has made significant contributions to the international research community. Much of the work also involves interaction with the developed world where it is equally applicable. Our Research Groups listed below contain further information including group members, projects and publications. Our Research and Development work is also organised to address [thematic challenges](#) (listed below).

## **NRI Research Groups:**

### **Chemical Ecology and Plant Biochemistry**

The Chemical Ecology Group works on the identification and use of naturally-produced chemicals for control of pests, particularly in the developing countries.

### **Development Studies**

Our research addresses poverty and vulnerability, and how poor people themselves, governments, the private sector and civil society can help overcome them

### **Ecosystem Services**

Climate change and biodiversity loss are two of the biggest global challenges in the coming decades, primarily due to their impacts on the provision of ecosystem services.

### **Food Systems**

The Food Systems Research Group addresses challenges and opportunities relating to the spectrum of activities from food production to consumption.

### **Molecular Virology and Entomology**

We aim to develop and disseminate improved diagnostic tools to detect plant pests and pathogens and understand complex plant-virus-vector interactions that will identify sustainable control measures.

### **Pest Behaviour**

The work of the Pest Behaviour Group ranges from laboratory-based research to analyse the basic physiology and behaviour of pests and vectors through field-based studies of pest behaviour and ecology to translational research where knowledge of pest behaviour is used to develop innovative control technologies.

### **Plant Health**

We aim to provide concerted application of natural and social sciences to reduce the losses caused by pests and diseases.

### **Postharvest Science and Technology**

The Postharvest Science and Technology Group works on durable and perishable crops after harvest to reduce losses, enhance financial or nutritional crop-value, and assure food safety.

## **Development Programmes Overview**

NRI's Development Programmes address significant developmental challenges and opportunities arising from global trends, emergent policy issues, capacity limitations and problems in the sectors and countries in which we work. We aim to contribute to enhanced livelihoods and poverty reduction in some of the world's poorest countries. We apply our

knowledge and experience to bring about improvements in food security and nutrition, sustainable agricultural productivity and natural resource management, market access and income generation. We assist local organisations in strategy and skills development and use the results of our work to inform policy processes and debates. The programmes draw on the interdisciplinary strengths of NRI working in collaboration with a broad range of partners.

#### **Food Loss, Waste Reduction and Value Addition**

Improving resource use through value addition, technical solutions for food loss and waste, and providing guidance to researchers and practitioners.

#### **Food Systems for Improved Nutrition**

Developing, evaluating and supporting the implementation of sustainable strategies to increase access to nutritious diets for all people.

#### **Sustainable Agricultural Intensification**

Increasing food production efficiency to feed a growing global population, while maintaining ecosystem services, conserving biodiversity and promoting social equity.

#### **Climate Change, Agriculture and Natural Resources**

Responding to climate change by understanding the challenges posed by climate variability and developing mitigation and adaptation strategies.

#### **Capacity Strengthening for Agricultural Development and Food Security**

Supporting individuals and organizations to strengthen their ability in high-quality demand-led research and learning, leading to developmental impact.

#### **Gender and Social Difference**

The Gender and Social Difference programme conducts innovative and high-quality research and practice for demonstrable impact on equality and gender justice.

#### **Land, Rural Institutions and Governance**

The programme aims to assist policy and institutional innovation for sustainable, socially inclusive economic development in rural areas.

#### **Sustainable Trade and Responsible Business**

Generating knowledge on the impact of trade and private sector initiatives in support of equitable and environmentally sustainable development.

#### **Root and Tuber Crops in Development**

Improving nutrition, food security and incomes through research and development, capacity building and policy advice.

**Highlighting some of NRI's work which particularly supports the UN principles and sustainable development goal includes:**

#### **Food security, agriculture and nutrition**

Better nutrition for a growing population is a major challenge of our time. However, to improve nutrition, more understanding is needed of patterns of consumption, dietary practices and food systems. By improving standards for collecting and measuring data and developing innovative methodologies for evaluating agriculture and food systems, scientists will be able to build a robust evidence base, which in turn will guide actions to improve nutrition. Examples of NRI's work in this area include two projects carried out under the research initiative known as 'IMMANA' or 'Innovative Metrics and Methods for Agriculture and Nutrition Actions', funded with UK Aid from the UK government through the Department for International Development (DFID) and coordinated by the Leverhulme Centre for Integrative Research on Agriculture and Health (LCIRAH).

#### **Root and tuber crops in development**

Root and tuber crops, including cassava, sweet potato, yams, potato, cocoyams and other minor root crops, are important to agriculture, food security and income for 2.2 billion people

in developing countries. Several factors constrain the contribution of root and tuber crops to development; they are often affected by pests and diseases passed on through vegetative propagation and, compared to cereal crops, they are bulky and have a relatively short shelf-life. NRI's team of experts undertakes world-leading research and **development activities to address key challenges** at all stages of root and tuber crop value chains, from farm to fork. NRI's strategies for root and tuber crop development are economically sound, **environmentally**, culturally and socially appropriate and gender sensitive, to ensure broad-based beneficial development outcomes. This snapshot of our work looks at managing yams to safeguard against biodiversity loss, adding value through farm production, processing and business development, and mitigating the impacts of El Niño and crop diseases on cassava production.

### Managing yams in Madagascar

Since the 1950s when aerial photographs were more widely taken in Madagascar, the east African island has lost approximately 40–50 percent of its forest cover, of which a large area is habitat to a globally unique biodiversity. The tragedy of this is the pressure it is putting on much-loved mammalian species like the lemur, but the loss is much wider than one species.

What causes forest destruction? Well, it is a complex mixture of population growth, pressure for farming land, extraction of timber and minerals combined with extreme poverty (Madagascar is 207 of 213 countries in the World Bank ranking of Gross National Income) and severe governance problems resulting in weak internal security.

What links forest and biodiversity loss to yams? The diversity of yams is particularly interesting because it covers many different climatic zones of the country and so represents an important national (and global) resource against future **environmental** change. A team from the Royal Botanic Gardens, Kew, led by Dr Paul Wilkin, and supported by a grant from the Darwin Initiative has been working in Madagascar to identify species of yam. So far, they have located 40 species of which 33 are endemic and at least 12 are threatened.

The future of Madagascar's yams depends upon finding a way to either manage the resource *in situ* or discouraging wild harvesting by promoting yams as a food for cultivation by small-scale farmers. Kew Gardens approached NRI for the latest phase of their project to seek expert advice from Professor Ben Bennett on developing markets for indigenous plants, and from Dr Debbie Rees on the storage of roots and tubers. Ben and Debbie have been helping to develop a commercialisation plan which will see farmers growing and selling more yams, while also storing yams for food during the lean season when previously they might have gone to the forest to harvest rare indigenous plants.

### Developing cassava value chains in Africa

Across Africa, the tropical root crop cassava is used for a multitude of purposes. In many places it is prepared and eaten daily, providing an important source of carbohydrates, while processing the roots offers a whole range of other possibilities for farmers and entrepreneurs.

Traditionally, cassava is processed into a wide range of products, many of which are fermented. Since 2014, the project 'Cassava Adding Value for Africa Phase II' (CAVA2) has focused on the development of value chains for non-traditional uses of the crop, such as High Quality Cassava Flour (HQCF), starch and ethanol. Led by NRI and Nigeria's Federal University of Agriculture, Abeokuta, and funded by the Bill & Melinda Gates Foundation, the project works in Ghana, Malawi, Nigeria, Tanzania and Uganda.

Now in its final year of implementation, the project has surpassed its overall target of mobilising 2.1 million tonnes of fresh cassava roots from smallholder farmers with a value of over \$89 million. CAVA2 has introduced new varieties and management practices to smallholder farmers and set up linkages between farmers and markets. Smallholders have responded to

the market opportunities by adopting improved production techniques and varieties, and increasing their yields by between 33 and 110 percent depending on the country. CAVA2 has worked with enterprises to **improve processing techniques and technologies**. By facilitating enterprises to acquire machines such as ‘flash dryers’, for rapid drying of large volumes of cassava, the project has expanded and developed processing capacity which in turn offers farmers more ‘avenues for sales’ for their cassava roots.

In Bukedea, eastern Uganda, cassava farmer Amugu Emutu Zaitun proudly displays one of her three cassava gardens which she planted with a high-yielding variety provided by CAVA2. The project linked her and fellow members of the P’kwi cooperative to a number of companies, including Uganda Breweries Ltd, where she sells her improved cassava. Through CAVA training on good agronomic practices, Zaitun’s yield increased, as did the size of her plots. “We found adding value to cassava was good. Number 1 you get clean cassava for eating, and it is used as a cash crop,” she explains. She went on to train others using the knowledge she’d gained from CAVA, which gave her extra income to construct a better house, save money, buy animals and educate her son up to university level. “Now my livelihood is improved, we’re peaceful, we do things in a unique way. There’s happiness,” concludes Zaitun, smiling. Further project information: [www.cava2.org](http://www.cava2.org)

### **Insects, pests, and human and plant health**

At NRI, we deal with both beneficial and harmful insects, and other pests including rodents and birds, which have an impact on human and plant health. Here we highlight four examples that show how our work in this area is exploring the use of naturally derived repellents to protect crops from being eaten by insects, **generating sustainable technologies** for rodent pest management in Africa, and building on recent discoveries to control pests that severely hamper crop production and threaten human health.

### **Protecting crops at home and abroad using naturally-derived repellents**

Insect repellents are widely used to protect people and their animals against biting insects. Staff from NRI’s Chemical Ecology Group are exploring how similar chemicals can be used as a safe way to protect fruit and vegetable crops from insect pests.

Protecting crops from being eaten by insects is one of the many challenges faced by growers of fruit and vegetables. It is a worldwide problem, which threatens the economic sustainability of horticulture, and the growing demand for more healthy food that is free from pesticide residues.

In collaboration with staff at the horticultural research institute, NIAB EMR, and businesses in the UK and abroad, the team has been developing nature-identical repellents to protect crops from insect pests, with minimal risk to the **environment**. These chemicals are produced naturally by plants to ward off herbivorous insects, and to attract predator insects which feed on crop pests.

Through a project funded by Innovate UK, the team has tested repellents for use in protecting fruit and vegetable crops in the UK and Bangladesh. Formulations were developed by project partners at Russell IPM, designers and manufacturers of pheromone lures and biopesticides, and local micro-encapsulation technology company, Celescence Technologies Limited. Micro-encapsulation is a means of formulating chemicals inside microscopic beads, from which the active ingredients are released slowly over time. This early-stage project has already led to the development of one commercial product, the MagiPal attractant for beneficial insects, produced and marketed by Russell IPM.

Work has continued this year, exploring how repellents could protect fruit against a fruit fly commonly called 'spotted wing drosophila'. After arriving in the UK in 2012, this invasive pest is now one of the biggest threats to UK horticulture. The team is working with NIAB-EMR to develop a 'push-pull' system which uses insect repellents and attractants to provide year-round crop protection against spotted wing drosophila.

This collaborative work is funded by the Agriculture and Horticulture Development Board (AHDB) and through a studentship from the Biotechnology and Biological Sciences Research Council (BBSRC) awarded to NRI PhD student, Christine Faulder, and is part of NRI's ongoing commitment to research in support of UK horticulture.

### **Managing rodents in Africa, the eco-friendly way**

Many farmers are aware that rodents are a problem, causing damage to crops, stored food and personal possessions. However, knowledge among farmers about the level and scope of damage is often limited. For example, rodents can transmit more than 60 different diseases; the symptoms of many may be confused with other more familiar diseases such as malaria.

NRI's Steve Belmain, Professor of Ecology, is collaborating on a multidisciplinary, international project entitled 'Ecologically Based Rodent Management for Sustainable Agriculture and Food Security in Africa' or 'EcoRodMan'. This project aims to strengthen the generation of appropriate, cost-effective and **sustainable technologies for rodent pest management in small-scale, rural farming communities across sub-Saharan Africa**. Ecologically sustainable methods of rodent control include the use of fertility control and investigating the ecosystem services provided by predators such as owls, genets and domestic cats and dogs.

Most importantly, the project's objectives are to build Africa's research capacities across a range of specialities related to ecologically based rodent management including population dynamics, chemical ecology, animal behaviour, taxonomy, social anthropology, economics, agronomy, value chains and quality assurance, technology adoption, and end-user participatory research. The project team involves researchers based in Ethiopia, Namibia, South Africa, Swaziland, Tanzania, Uganda and the UK.

During the past year, Professor Belmain led a training workshop with 30 new PhD students from seven African countries as part of the EcoRodMan and RatTech projects, providing information on ecological research methods, experimental design and more practical issues such as how to give a scientific presentation and write a scientific research paper.

More about the project can be found here: [ecorodman.nri.org](http://ecorodman.nri.org)

*EcoRodMan is funded by the African Union through their Food, Nutrition Security and Sustainable Agriculture research programme.*

### **African cassava whitefly: Phase I success and Phase II follow-up**

Since the 1990s, an unprecedented increase in the abundance of African cassava whitefly (ACW), (*Bemisia tabaci*) has occurred in East and Central Africa. Associated losses in cassava production in nine East and Central African countries were estimated to be as high as 47 percent and the areas affected are continuing to expand. The key driver(s) of the increased ACW pest-pressure – called 'superabundance' – remained unknown.

Four years ago, the African Cassava Whitefly Project began to address this problem, bringing together a specialist team of researchers from 17 institutions based in 13 countries. Funded by the Bill & Melinda Gates Foundation, this project aimed to provide a rigorous understanding of the cause(s) of superabundance and to build human capacity in Africa to boost vector

entomology expertise in National Agricultural Research Organisations.

The project team has invested over 120 person-years of effort by the participants since 2014, including twelve full-time MPhil/PhD students working under project scholarships.

Key discoveries were that:

- there are at least three 'cryptic' species of *B. tabaci* that colonise cassava in sub-Saharan Africa, but only one is frequently associated with super-abundance. Cryptic species are distinct and separate, yet appear indistinguishable from each other.
- this species has extremely high survival on cassava, particularly the 'elite' disease-resistant, cassava varieties that were distributed to control the cassava mosaic disease pandemic.
- 10–15 African and Latin American cassava genotypes with good whitefly resistance were identified and candidate resistance genes have been identified in cassava.

Based on these discoveries and new understanding, a second phase of the African Cassava Whitefly Project was recently approved. This new four-year phase aims to take key discoveries from Phase I and use them to begin to implement ACW control. It will also create and field-test a pipeline of novel control technologies, thus ensuring that new solutions become available in the future. Through these discovery and implementation activities, the new project's goal is to increase cassava productivity and reduce food insecurity for millions of farmers and their families in sub-Saharan Africa.

### Sustainable Agricultural Intensification

Increasing agricultural productivity is essential to feeding a fast-growing population and has the potential to lift rural families out of poverty. Sustainable Agricultural Intensification (SAI) provides the means to do this with limited available resources, while protecting our living **environment** and conserving natural and agricultural biodiversity. NRI's work in this field includes managing agroecosystems to enhance natural pest regulation and reduce dependence on agrochemicals, and farmer-led research to improve nutrition, incomes and food safety.

### Farmers leading the way: PAEPARD Multi-Stakeholder Partnerships in Malawi and Uganda

Enabling farmer organisations to lead the identification of research priorities and engage actively in the research process is crucial to ensure that research directly addresses local needs and **environmental** conditions, and has the potential for significant impact in rural communities. The Platform for an Africa-Europe Partnership for Agricultural Research for Development (PAEPARD) is a multi-stakeholder agricultural research initiative which aims to do just that. Supported by the European Commission, PAEPARD facilitates partnerships between organisations in Africa and Europe in the field of agricultural research for development with a view to contributing to the achievement of the **Sustainable Development Goals**. Most of these partnerships involve collaboration between researchers, farmer organisations, non-government organisations and the private sector.

NRI has been a member of the PAEPARD consortium since its inception in 2009, through its membership of the Agrinatura network, and has participated in two of the four projects supported through a Competitive Research Fund. One of the projects, led by the Uganda Christian University, is promoting the use of indigenous leafy vegetables to enhance nutrition and increase income for farmers in Uganda. Dr Debbie Rees is leading NRI's inputs to the project which, over the past three years, has contributed to a 12 percent increase in

consumption of leafy vegetables such as Nakati (*Solanum aethiopicum*), which resembles a tomato or an eggplant, in the target areas in Central and Eastern Uganda. At the same time, the income of 300 farmers involved in the research has doubled.

The second project is led by the National Smallholder Farmers' Association of Malawi (NASFAM) in partnership with Lilongwe University of Agriculture and Natural Resources (LUANAR), and in collaboration with organisations in Zambia and South Africa. NRI's Dr Bruno Tran and Professor Ben Bennett are providing technical support. The project has identified and tested several pre- and post-harvest practices that are reducing the risk of aflatoxin in groundnut. Aflatoxin is a dangerous toxin produced by fungi that can occur in some food crops and poses serious health risks to consumers, especially to pregnant women and young children. The project has so far worked with over 6,000 farmers in Malawi and Zambia with encouraging results.

### Food loss, waste reduction and value addition

NRI has been working to reduce losses and waste after harvest since the food crisis of the 1970s. Experts from our Food Loss and Waste Innovation Centre use their experience, technical insight and capability to devise solutions to postharvest loss through **innovative technologies**, strategies and information systems.

### Capacity strengthening

NRI recognises that capacity strengthening for agricultural development and food security is fundamental for lasting development impact and to achieve the **Sustainable Development Goals**. Researchers and other stakeholders in smallholder agricultural systems need new skills to work together effectively, to engage in high-quality demand-led research and learning, and to deliver innovative solutions to promote sustainable development – especially in the face of climate change. Policy makers and civil society organisations require enhanced capacity to demand, evaluate and utilise evidence so that impact is achieved. This section includes a selection of NRI's activities in this field.

### Enhancing research capacity through SENTINEL: highlighting trade-offs along pathways to agricultural development

The increasing pressure on the world's resources to meet food security and nutritional needs and to create wealth, is a serious threat to biodiversity, the **environment**, and ecosystem services. For development to be sustainable, the achievement of food security, improved nutrition, and the protection of ecosystem services are needed. Recognising and understanding the trade-offs and potential conflicts between social, economic and **environmental** objectives is essential if policy makers are to reach informed decisions on appropriate agricultural development pathways and investments.

NRI, together with four other UK Universities and partners from the University of Ghana, Copperbelt University Zambia, the Ethiopian Development Research Institute, and the Regional Universities Forum for Capacity Building in Agriculture (RUFORUM) are collaborating on a project led by the International Institute of Environment and Development (IIED), funded under the UKRI Global Challenges Research Fund 'Growing Research Capability' call. Entitled 'Social and Environmental Trade-offs in African Agriculture' (SENTINEL), the four-year project aims to enhance the capacity of UK and African researchers to co-develop excellent and relevant interdisciplinary research on impacts, risks and trade-offs of different agricultural development pathways.

NRI developed the methodology for the initial capacity assessment in African partner research



organisations and contributed to the overall capacity-development strategy. The focus covered individual, organisational and institutional capacities. In addition, a short questionnaire to assess capacities and gaps in African agricultural universities was completed by over 50 senior managers attending the 2017 RUFORUM Annual General Meeting in Malawi. They particularly highlighted the need for support and mentorship for researchers, and enhanced communication to non-academic audiences. A capacity needs assessment workshop held at the University of Ghana in January 2018 identified research team leadership, interdisciplinary collaboration, managing partnerships, communication with end users of research and influencing policy, as capacity needs. These suggestions are being incorporated into the project's capacity-development activities.

### **Sustainable trade and responsible business**

Processes of economic globalisation are leading to changing patterns of international trade, with an expansion in global value chains and production networks, growing south-south trade, and expanding regional and domestic markets. **NRI's Sustainable Trade & Responsible Business programme** aims to generate knowledge on the development potential, limitations and implications of a growing range of sustainable production and trade initiatives. **These include sustainability standards, corporate sustainability supply chain strategies, responsible business initiatives, sector and landscape transformation approaches, pro-poor and sustainable value chains and inclusive economic development.** The programme focuses principally upon agriculture and forestry, but also covers other sectors, such as apparel. There is a specific emphasis on smallholders and workers, and on issues of poverty reduction and inequality, **human and labour rights** and **environmental** impacts. The programme responds to several of the **Sustainable Development Goals (SDGs)**.

### **Sustainable global supply chains, responsible business and forest-agriculture landscape initiatives**

Significantly increasing the sustainability of global production, trade and consumption is critical for the achievement of the **UN Sustainable Development Goals**. Under the **Sustainable Trade and Responsible Business Programme**, NRI explores diverse dimensions of sustainable production and trade, particularly in the agriculture, forestry and apparel sectors.

Corporate behaviour change approaches and **responsible business initiatives** are expanding, moving beyond product sustainability certification and guidance on corporate reporting to include new legal forms for enterprises, public benchmarks rating corporate performance, impact-oriented corporate reporting standards, and new digital technologies for increasing worker voice. Cutting-edge NRI research unpacks how these **responsible business initiatives** work and if they are effective in influencing corporate sustainability performance and impact.

NRI is currently leading the Monitoring, Evaluation and Learning (MEL) of the DFID Responsible, Accountable and Transparent Enterprise (RATE) Programme. This includes evaluating the programme and strengthening the MEL capacity of the 12 partner organisations: Global Reporting Initiative, Ethical Trading Initiative, B Lab, UN Global Compact, ShareAction, Shift, Fairtrade, ISEAL, UK National Contact Point, British Academy Research Programme on **Modern Slavery and Human Rights**, and World Benchmarking Alliance.

Landscape-based and jurisdictional approaches balance competing stakeholder interests and the delivery of multiple social, economic and **environmental** goals, and are increasingly seen as important for achieving forest conservation and sustainable agriculture. The initiatives are relatively young and NRI evaluation activities are contributing to understanding of their potential and limitations.

DFID's 'Partnerships for Forests Programme' catalyses investment in forest partnerships for sustainable forests and land use. NRI led the evaluative learning design team and is currently delivering thematic studies on high-value, low-intensity forest products, restoration mechanisms, and 'Produce-Protect' which sources products from areas producing sustainably and protecting forests and livelihoods, and engaging in evaluative studies on individual Forest Partnerships. MEL for this programme is led by development consulting firm, LTS International.

### Gender and social difference

Our innovative and high-quality research and practice in gender and social difference aims to make a demonstrable impact by reducing inequalities and achieving gender justice in sustainable development. The ultimate aim is to contribute to theory, policy and practice to benefit the lives of women, men, girls and boys, as a matter of **human rights**, gender justice and good development. This selection of our work includes projects identifying and integrating different user preferences for roots, tubers and bananas (RTB) products into breeding programmes, improving understanding of women's time and maternal and child dietary intake to guide actions to improve nutrition, and exploring farmers' decision making in cassava value chains.

### Using innovative tools to measure women's time use and mother and child nutrition

Rural women in sub-Saharan Africa carry a double burden of productive and reproductive work – farming and taking care of the household. **Managing this workload** often involves women making trade-offs which may affect their ability to feed and take care of themselves and their children. Better understanding of women's time and maternal and child dietary intake is important for agricultural programmes seeking to improve women's empowerment and nutrition outcomes. However, time use and dietary practices are difficult to measure – current methods are labour-intensive, such as direct observation and diaries, or prone to errors, such as recall.

NRI's Dr Kate Wellard, Jan Priebe and Dr Lora Forsythe, in collaboration with researchers from the London School of Hygiene and Tropical Medicine and the Africa Innovations Institute in Uganda, are testing two low-cost innovative tools with women in Eastern Uganda. Mobile phones send an automated interactive response call every four hours asking about each woman's activities and about the foods that she and her infant have eaten since the last call. Wearable cameras automatically take images every 30 seconds, capturing the woman's activities, the food she is eating and her interactions with her infant throughout the day. The images are reviewed by the mothers and project team the following day in an enjoyable interactive session to reconstruct their activities and dietary practices.

Preliminary findings show that study participants found use of both the wearable cameras and mobile phones acceptable; the project team is finding that the tools provide a richer picture of opportunities and constraints of the food environment. The two innovative methods are currently being validated against traditional methods of direct observation and 24-hour recall to assess their efficacy. Next steps would be to evaluate them in different country contexts. Ultimately, the data collected will be used to guide actions to ensure that agricultural activities are more nutrition and gender sensitive.

*This project is funded through the UK Department for International Development's IMMANA programme.*

## Land, rural institutions, governance and finance

NRI's work in this field aims to assist policy and institutional innovation for sustainable, socially inclusive economic development in rural areas, particularly in Africa, with a focus on improved governance of land and natural resources, extending market participation by small farmers, strengthening rural advisory services and the social impact of agricultural and other investments. Examples of NRI's current work in this area includes the development of a market-based, innovative risk financing solution called Risk-Contingent Credit (RCC), and progress **on making agri-investment more inclusive and responsible**, while protecting rural communities' land rights through DFID's LEGEND programme.

### Protecting land rights whilst promoting sustainable agri-investment: LEGEND

As private sector investment in agribusiness expands and market participation of smallholder farmers increases, uncertain and insecure land rights continue to prevent vulnerable rural people from taking opportunities and overcoming poverty, particularly in Africa.

NRI provides the technical leadership for LEGEND, DFID's programme on Land: Enhancing Governance for Economic Development. Led by Julian Quan, Professor of Land and Development Practice at NRI, the team has been making progress this year on how to make agri-investment more inclusive and responsible, while protecting rural communities' land rights.

Assisted by LEGEND, high-profile companies in East and southern Africa, including Illovo Sugar, Africa's major sugar producer, and forestry investor Portucel, are now developing sustainable business plans and strengthening community engagement practices. In West Africa, investors are also scaling back on overambitious plans to transform whole districts into oil palm plantations, and developing smaller estates by leasing land from local communities on equitable terms, while creating new opportunities for small-scale farmers as outgrowers. LEGEND is also assisting emerging social investors to build community enterprises in projects that utilise untapped potential of degraded savannah woodlands as sources of high-value natural products through marketing products such as baobab fruit in Mozambique and providing tourism services in northern Tanzania, while strengthening women's participation.

Initiatives like these cannot be pursued at scale unless rural people's land rights are documented and secured, and the governance of land investments improved. Through LEGEND, NRI has worked with consortium partners ODI and IIED to assess how governments, donors, civil society and private sector partners can work together and to empower communities legally, ensure investors and rural people understand the risks of land investment, eliminate corrupt practice, reduce land conflicts, and map and secure land rights. The team is currently undertaking a major study to inform donor policy and practice on how to document and deliver land rights at scale, learning lessons from DFID's major programmes in Ethiopia and Rwanda and building long-term sustainable land and property registers to support development needs in Africa for decades to come.

For more information, see: [landportal.info/partners/legend](http://landportal.info/partners/legend)

## Climate change, agriculture and natural resources

Responding to climate change is one of the most urgent challenges facing humankind. The most severe impacts are likely to be suffered by the poorest and most vulnerable in society who live in more fragile **environments** and have the least resources to adapt and recover. The majority of the world's poor continue to live in rural areas and their livelihoods are heavily dependent upon agriculture and natural resources, which will be severely affected by climate change. Therefore, there are serious implications for their food security, health and well-being. NRI's work in this field aims to understand these challenges better, to build adaptive

capacities, and to develop appropriate strategies for sustainable and equitable rural adaptation. Highlights of our work include contributing to the IPCC's Special Report on Climate Change and Land, and training the next generation of scientists through one of our dedicated postgraduate programmes.

### **The IPCC Special Report on Climate Change and Land**

Set up in 1988 by the World Meteorological Organization and the **United Nations Environment Programme**, the Intergovernmental Panel on Climate Change (IPCC) is the international body for assessing the science related to climate change. The Panel provides policymakers with regular assessments of the scientific basis of climate change, its impacts and future risks, and options for adaptation and mitigation.

NRI's Professor John Morton is currently working on the IPCC's Special Report on Climate Change and Land. Professor Morton previously wrote sections on smallholder and subsistence agriculture for the Nobel Prize-winning Fourth Assessment Report (2007) and jointly led the chapter on rural areas for the Fifth Assessment Report (2014). The current report covers the interactions between climate change, land degradation and food security. Land degradation processes like desertification are both exacerbated by climate change while also exacerbating it. Similarly, climate change adds to the threat of food insecurity for huge numbers of the world's population, but the ways in which food is produced and distributed in the world contribute to climate change through emissions of greenhouse gases.

There are potential policies that can address combinations of these problems while contributing to sustainable development, but discussion is needed on the decision-making and governance under which such policies can be identified and implemented. Professor Morton is working on the final chapter of the report, 'Chapter 7: Risk Management and Decision Making in Relation to Sustainable Development', together with colleagues from India, Canada, Ecuador, France, Latvia, New Zealand, South Korea, Sudan, Sweden, UK, and USA. The chapter synthesises findings from earlier chapters of the report on key risks from the interactions of climate change, responses to climate change, land degradation, and food insecurity, and identifies policy responses to those risks. It then discusses both formal and informal decision-making processes in the face of climate-related risks, and modes of governance which are needed to strengthen climate action.

Project work covered by our annual report includes: Food security, agriculture and nutrition; Root and tuber crops in development; Insects, pests, and human and plant health; Sustainable Agricultural Intensification; Food loss, waste reduction and value addition; Capacity strengthening; Sustainable trade and responsible business; Gender and social difference; Land, rural institutions, governance and finance; Climate change and agriculture and natural resources.

NRI's full annual review can be seen at: <https://www.nri.org/publications/annual-review/38-annual-review-2017-2018/file> and is included in this COE.

## **Due Diligence**

NRI has put in place in place a Due Diligence process which we apply to the Project Partners we work with. This process covers requirements such as recognition and effective procedures covering anti-slavery, anti-fraud, corruption, bribery, financial stability, Whistleblowing, safeguarding and ethics,

More information and regular updates on our work are available through our website: [www.nri.org](http://www.nri.org)

# NATURAL RESOURCES INSTITUTE

Knowledge for a sustainable world



ANNUAL REVIEW  
2017–2018

 UNIVERSITY of  
GREENWICH | 125  
YEARS  
NRI | Natural Resources Institute | NRI Est 1894

## Annual Review 2017–2018

The Natural Resources Institute (NRI) is a specialist institute of the University of Greenwich. Combining the expertise of natural and social scientists, we engage in research, teaching, training, and consultancy to address significant challenges and opportunities in the sectors and countries in which we work.

Among these are the challenges of food and nutrition security, agriculture and sustainable development in the face of climate change, land and environmental management, markets and responsible business, capacity strengthening, and gender and inequality. These global challenges are addressed through our thematic areas of work which are covered in this Annual Review.

[www.nri.org](http://www.nri.org)

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**Front cover photo:** Research scientist Ms Leonia Mlaki (Tanzania Agricultural Research Institute – Mikocheni) inspecting cassava leaves for nymphs of whitefly (*Bemisia tabaci*) in Chambezi, Tanzania, as part of the African Cassava Whitefly Project. Photo: Sharon van Brunschot

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## Foreword

**Professor David Maguire, Vice Chancellor, University of Greenwich**

This year's Annual Review from our Natural Resources Institute demonstrates the excellence of their research across a diversity of issues, which aims to improve the lives of some of the world's poorest people. Their teams are consistently awarded prestigious grants from major funders including the UK Department for International Development, the Bill & Melinda Gates Foundation, UK Research Councils and the European Union, in areas such as food and nutrition security, sustainable business and finance models, controlling major pests and diseases, and gender and social difference. Importantly, the world-leading researchers at NRI are also experienced lecturers, who engage their students in an exciting range of undergraduate and postgraduate programmes, and who supervise a growing group of dynamic postgraduate research students. Their teaching contributes to the University of Greenwich's silver rating in the Teaching Excellence Framework in recognition of high-quality resources, teaching and personalised provision. Enjoy reading and discover their work.

## Introduction

**Professor Andrew Westby, Director of NRI**

A warm welcome to NRI's Annual Review 2017–2018. This year's edition is bigger and better, reflecting the broad range of work we do together with our international partners. Remaining focused on our core theme 'Knowledge for a sustainable world', this selection of our work highlights how we respond to global challenges by designing sustainable solutions that make a difference.

As NRI's portfolio of projects expands and our team continues to grow, it is important to mention and give thanks to our dedicated team of professional services and administrative staff, who consistently take on more tasks as they steadfastly support NRI's staff, students and mission – read more about this team on page 59.

Next year, 2019, will be a significant year for NRI: we will be celebrating our 125-year Anniversary. This occasion is an opportunity to recall pioneering work from our history, including locust control, safeguarding against foodborne diseases, controlling tsetse and blackfly, and the discovery of aflatoxin. We must also use this opportunity to look to the future, and engage all generations in the endeavour of creating a sustainable world. NRI's new MSc programme in Global Environmental Change focuses on what changes to our environment could mean for us, on a global level, both in the past and in the future – find out more on page 50.

More details about celebrations and activities will be announced throughout the year, and through #NRI125. Join us!

Photo: Planting cassava stem cuttings on the farm of Akutu Augustine, the 'Professor of Cassava', in Amuria District, Uganda.

# HIGHLIGHTS FROM THE YEAR



## FOOD SECURITY, AGRICULTURE AND NUTRITION

Better nutrition for a growing population is a major challenge of our time. However, to improve nutrition, more understanding is needed of patterns of consumption, dietary practices and food systems. By improving standards for collecting and measuring data and developing innovative methodologies for evaluating agriculture and food systems, scientists will be able to build a robust evidence base, which in turn will guide actions to improve nutrition. Examples of NRI's work in this area include two projects carried out under the research initiative known as 'IMMANA' or 'Innovative Metrics and Methods for Agriculture and Nutrition Actions', funded with UK Aid from the UK government through the Department for International Development (DFID) and coordinated by the Leverhulme Centre for Integrative Research on Agriculture and Health (LCIRAH).



## Developing methods to better understand diets and access to animal-source foods in rural Tanzania

Julia de Bruyn

**Information about how diets and access to nutrient-rich foods vary throughout the year is vital to inform strategies to sustainably address undernutrition in vulnerable households. Undernutrition describes the various states which may arise from inadequate dietary intake or frequent illness: including short-term outcomes such as thinness (wasting), longer-term outcomes such as short stature (stunting), as well as the diverse consequences of vitamin and mineral deficiencies.**

A project funded through the UK Department for International Development's IMMANA programme is developing and testing a novel method to collect household-level information about diets and food resources, which is suitable for use in remote, low-literacy settings.

To better understand the role of animal-source foods (including milk, meat, fish and eggs) in human diets in low-income countries, there is a need for information on access to these foods across different seasons. Milk consumption has been associated with improved growth in stunted children, increased arm muscle mass and improved cognitive function, but information on the availability of milk from the indigenous cattle kept by African pastoralists and agropastoralists is currently lacking.

This project, led by Dr Julia de Bruyn, a nutrition researcher at NRI, will explore the contribution of milk to the diets, incomes and food security of cattle-owning households in villages of Manyoni District in Tanzania. These communities are located within the Rift Valley in a semi-arid area of the country. Households rely largely on subsistence farming of staple crops, supplemented by livestock-keeping, and face the chronic risk of food insecurity due to low and irregularly-timed rainfall. Picture-based record charts evaluated through this project have the potential for wider use in agriculture-nutrition research, to document variation in dietary patterns, access to food resources, and asset ownership over time.

Photo: A woman and two of her children in a remote village of Sanza Ward in central Tanzania, where cow's milk is the most commonly consumed animal-source food and meat and eggs are infrequently eaten.





## Estimating the type and amount of nutrients lost, from harvest to market

Aurélie Bechoff

Across the world, vast amounts of food are lost or wasted after harvest every year. These postharvest losses happen at different stages as a food crop moves from harvest to consumption, a journey known as the 'value chain'. Significant quantities of food crops are lost postharvest even in places with high rates of food insecurity, compounding the problem; if people's diets are not rich enough in important nutrients such as proteins, vitamins or minerals, it can cause them to suffer from deficiencies. Postharvest losses associated with food insecurity could have serious health, developmental and economic consequences.

Funded by IMMANA, the NUTRI-P-LOSS project led by NRI's Aurélie Bechoff, is developing a methodology to estimate the type and amount of nutrients lost postharvest in key staple food crops in sub-Saharan African countries, from harvesting through to storage. NUTRI-P-LOSS is carried out in partnership with scientists from the National Agriculture Research Organisation in Uganda, The University of Zimbabwe, Purdue University in the USA, and the International Potato Center.

The Zimbabwean and Ugandan project teams conducted surveys with farmers and different stakeholders to discuss their perceptions of the amount of food lost at different postharvest

stages, and the causes of this loss. Samples from key crops (cowpea, maize and sweet potato) were collected and are being analysed to identify the changes in nutrients as they move from harvest to consumption.

Across sub-Saharan Africa, insects are a major cause of postharvest losses. They multiply quickly in crops that are not well-protected during storage and consume and damage significant quantities of stored crops intended for use as household food. Additional studies in the NRI laboratories have analysed the effect of storage duration and the presence of different types of stored product insect pests on the nutrient content of stored cowpea and maize.

Photo: Cowpeas on sale at a market in Accra, Ghana.



## ROOT AND TUBER CROPS IN DEVELOPMENT >

Root and tuber crops, including cassava, sweet potato, yams, potato, cocoyams and other minor root crops, are important to agriculture, food security and income for 2.2 billion people in developing countries. Several factors constrain the contribution of root and tuber crops to development: they are often affected by pests and diseases passed on through vegetative propagation and, compared to cereal crops, they are bulky and have a relatively short shelf-life. NRI's team of experts undertakes world-leading research and development activities to address key challenges at all stages of root and tuber crop value chains, from farm to fork. NRI's strategies for root and tuber crop development are economically sound, environmentally, culturally and socially appropriate and gender sensitive, to ensure broad-based beneficial development outcomes. This snapshot of our work looks at managing yams to safeguard against biodiversity loss, adding value through farm production, processing and business development, and mitigating the impacts of El Niño and crop diseases on cassava production.



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## Managing yams in Madagascar

Ben Bennett and Debbie Rees

Since the 1950s when aerial photographs were more widely taken in Madagascar, the east African Island has lost approximately 40–50 percent of its forest cover, of which a large area is habitat to a globally unique biodiversity. The tragedy of this is the pressure it is putting on much-loved mammalian species like the lemur, but the loss is much wider than one species.

What causes forest destruction? Well, it is a complex mixture of population growth, pressure for farming land, extraction of timber and minerals combined with extreme poverty (Madagascar is 207 of 213 countries in the World Bank ranking of Gross National Income) and severe governance problems resulting in weak internal security.

What links forest and biodiversity loss to yams? The diversity of yams is particularly interesting because it covers many different climatic zones of the country and so represents an important national (and global) resource against future environmental change. A team from the Royal Botanic Gardens, Kew, led by Dr Paul Wilkin, and supported by a grant from the Darwin Initiative has been working in Madagascar to identify species of yam. So far, they have located 40 species of which 33 are endemic and at least 12 are threatened.

The future of Madagascar's yams depends upon finding a way to either manage the resource *in situ* or discouraging wild harvesting by promoting yams as a food for cultivation by small-scale farmers. Kew Gardens approached NRI for the latest phase of their project to seek expert advice from Professor Ben Bennett on developing markets for indigenous plants, and from Dr Debbie Rees on the storage of roots and tubers. Ben and Debbie have been helping to develop a commercialisation plan which will see farmers growing and selling more yams, while also storing yams for food during the lean season when previously they might have gone to the forest to harvest rare indigenous plants.

Photo: The NRI & Kew Gardens team, along with local NGO Feedback Madagascar, trekking across country to carry out fieldwork on sustainable yam markets in rural southern Madagascar. Forest communities are isolated, so the team carried sleeping equipment along with their fieldwork gear.



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## Developing cassava value chains in Africa

Andrew Westby and Gillian Summers

**Across Africa, the tropical root crop cassava is used for a multitude of purposes. In many places it is prepared and eaten daily, providing an important source of carbohydrates, while processing the roots offers a whole range of other possibilities for farmers and entrepreneurs.**

Traditionally, cassava is processed into a wide range of products, many of which are fermented. Since 2014, the project 'Cassava Adding Value for Africa Phase II' (CAVA2) has focused on the development of value chains for non-traditional uses of the crop, such as High Quality Cassava Flour (HQCF), starch and ethanol. Led by NRI and Nigeria's Federal University of Agriculture, Abeokuta, and funded by the Bill & Melinda Gates Foundation, the project works in Ghana, Malawi, Nigeria, Tanzania and Uganda.

Now in its final year of implementation, the project has surpassed its overall target of mobilising 2.1 million tonnes of fresh cassava roots from smallholder farmers with a value of over \$89 million. CAVA2 has introduced new varieties and management practices to smallholder farmers and set up linkages between farmers and markets. Smallholders have responded to the market opportunities by adopting improved production techniques and varieties, and increasing their yields by between 33 and 110 percent depending on the country. CAVA2 has worked with enterprises to improve processing techniques and technologies. By facilitating enterprises to acquire machines

such as 'flash dryers', for rapid drying of large volumes of cassava, the project has expanded and developed processing capacity which in turn offers farmers more 'avenues for sales' for their cassava roots.

In Bukedea, eastern Uganda, cassava farmer Amugu Emutu Zaitun proudly displays one of her three cassava gardens which she planted with a high-yielding variety provided by CAVA2. The project linked her and fellow members of the P'kwi cooperative to a number of companies, including Uganda Breweries Ltd, where she sells her improved cassava. Through CAVA training on good agronomic practices, Zaitun's yield increased, as did the size of her plots. "We found adding value to cassava was good. Number 1 you get clean cassava for eating, and it is used as a cash crop," she explains. She went on to train others using the knowledge she'd gained from CAVA, which gave her extra income to construct a better house, save money, buy animals and educate her son up to university level. "Now my livelihood is improved, we're peaceful, we do things in a unique way. There's happiness," concludes Zaitun, smiling. Further project information: [www.cava2.org](http://www.cava2.org)

Photo: Zaitun in one of her cassava gardens in Bukedea district, eastern Uganda.



## Making farmers doubly resilient to ‘El Niño’ and cassava diseases: DualCassava

Maruthi Gowda

Over the last three years, the ‘El Niño’ weather pattern has resulted in prolonged droughts, crop failures and severe food shortages in large swathes of eastern and southern Africa. NRI is currently leading the ‘DualCassava’ project which aims to mitigate the impacts of El Niño and two cassava diseases on the food security and economic development of smallholder farmers.

Cassava is highly tolerant to drought which makes it one of the most resilient food crops grown in Africa, with annual production estimated at over 250 million tonnes, though this total is increasingly constrained by two serious virus diseases: cassava mosaic disease (CMD) and cassava brown streak disease (CBSD).

Funded by the African Union, the project is led by NRI’s Professor Maruthi Gowda and implemented in collaboration with local partners in Malawi and Tanzania and aims to use a holistic approach to address issues along the entire cassava value chain. DualCassava will introduce drought-tolerant, virus-free cassava in predominantly maize-growing, drought-prone areas as a way of promoting crop diversification and thus increasing food security.

This year the project team has trained 220 farming families on how to grow and process cassava and distributed over 60,000 improved cassava stem cuttings for growing on approximately 150 acres of land in affected areas in Malawi and Tanzania. In the coming

cropping season, the aim is to distribute stem cuttings to grow cassava on over 750 acres of land. The project aims to catalyse value addition by training farmers and industrial partners to use cassava for economic gains by using it as a substitute for expensive maize in poultry feed production, and by connecting farmers to processing factories to produce high quality cassava flour.

The team is also investigating the social and economic impact of droughts and viral diseases on farmers, developing disease-resistant varieties, and using advanced tissue culture and molecular biology techniques such as Next Generation Sequencing to speed up the process of identifying virus resistance genes in African cassava germplasm.

The physical and human capacity of local partners will be enhanced by training PhD students at NRI, conducting local workshops and setting up a molecular virus diagnostic laboratory in Malawi.

Photo: Symptoms of Cassava Mosaic Disease (CMD) on cassava leaves in Tanzania.



## INSECTS, PESTS, AND HUMAN AND PLANT HEALTH

At NRI, we deal with both beneficial and harmful insects, and other pests including rodents and birds, which have an impact on human and plant health. Here we highlight four examples that show how our work in this area is exploring the use of naturally derived repellents to protect crops from being eaten by insects, generating sustainable technologies for rodent pest management in Africa, and building on recent discoveries to control pests that severely hamper crop production and threaten human health.



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## Protecting crops at home and abroad using naturally derived repellents >

David Hall, Daniel Bray, Steven Harte, Dudley Farman and Mandela Fernandez-Grandon

**Insect repellents are widely used to protect people and their animals against biting insects. Staff from NRI's Chemical Ecology Group are exploring how similar chemicals can be used as a safe way to protect fruit and vegetable crops from insect pests.**

Protecting crops from being eaten by insects is one of the many challenges faced by growers of fruit and vegetables. It is a worldwide problem, which threatens the economic sustainability of horticulture, and the growing demand for more healthy food that is free from pesticide residues.

In collaboration with staff at the horticultural research institute, NIAB EMR, and businesses in the UK and abroad, the team has been developing nature-identical repellents to protect crops from insect pests, with minimal risk to the environment. These chemicals are produced naturally by plants to ward off herbivorous insects, and to attract predator insects which feed on crop pests.

Through a project funded by Innovate UK, the team has tested repellents for use in protecting fruit and vegetable crops in the UK and Bangladesh. Formulations were developed by project partners at Russell IPM, designers and manufacturers of pheromone lures and biopesticides, and local micro-encapsulation technology company, Celescence Technologies Limited. Micro-encapsulation is a means of

formulating chemicals inside microscopic beads, from which the active ingredients are released slowly over time. This early-stage project has already led to the development of one commercial product, the MagiPal attractant for beneficial insects, produced and marketed by Russell IPM.

Work has continued this year, exploring how repellents could protect fruit against a fruit fly commonly called 'spotted wing drosophila'. After arriving in the UK in 2012, this invasive pest is now one of the biggest threats to UK horticulture. The team is working with NIAB-EMR to develop a 'push-pull' system which uses insect repellents and attractants to provide year-round crop protection against spotted wing drosophila.

This collaborative work is funded by the Agriculture and Horticulture Development Board (AHDB) and through a studentship from the Biotechnology and Biological Sciences Research Council (BBSRC) awarded to NRI PhD student, Christine Faulder, and is part of NRI's ongoing commitment to research in support of UK horticulture.

Photo: A prototype repellent dispenser being tested in a pear orchard at NIAB-EMR in East Malling, Kent, UK.



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## Managing rodents in Africa, the eco-friendly way >

Steve Belmain

Many farmers are aware that rodents are a problem, causing damage to crops, stored food and personal possessions. However, knowledge among farmers about the level and scope of damage is often limited. For example, rodents can transmit more than 60 different diseases; the symptoms of many may be confused with other more familiar diseases such as malaria.

NRI's Steve Belmain, Professor of Ecology, is collaborating on a multidisciplinary, international project entitled 'Ecologically Based Rodent Management for Sustainable Agriculture and Food Security in Africa' or 'EcoRodMan'. This project aims to strengthen the generation of appropriate, cost-effective and sustainable technologies for rodent pest management in small-scale, rural farming communities across sub-Saharan Africa. Ecologically sustainable methods of rodent control include the use of fertility control and investigating the ecosystem services provided by predators such as owls, genets and domestic cats and dogs.

Most importantly, the project's objectives are to build Africa's research capacities across a range of specialities related to ecologically based rodent management including population dynamics, chemical ecology, animal behaviour, taxonomy, social anthropology,

economics, agronomy, value chains and quality assurance, technology adoption, and end-user participatory research. The project team involves researchers based in Ethiopia, Namibia, South Africa, Swaziland, Tanzania, Uganda and the UK.

During the past year, Professor Belmain led a training workshop with 30 new PhD students from seven African countries as part of the EcoRodMan and RatTech projects, providing information on ecological research methods, experimental design and more practical issues such as how to give a scientific presentation and write a scientific research paper.

More about the project can be found here: [ecorodman.nrl.org](http://ecorodman.nrl.org)

*EcoRodMan is funded by the African Union through their Food, Nutrition Security and Sustainable Agriculture research programme.*

Photo: The Bushveld gerbil (*Gerbilliscus leucogaster*) is a rodent often causing more than 50% losses to maize soon after germination. It is found across southern Africa, particularly in dry savannah grasslands and deserts.



## African cassava whitefly: Phase I success and Phase II follow-up >

John Colvin

Since the 1990s, an unprecedented increase in the abundance of African cassava whitefly (ACW), (*Bemisia tabaci*) has occurred in East and Central Africa. Associated losses in cassava production in nine East and Central African countries were estimated to be as high as 47 percent and the areas affected are continuing to expand. The key driver(s) of the increased ACW pest-pressure – called ‘superabundance’ – remained unknown.

Four years ago, the African Cassava Whitefly project began to address this problem, bringing together a specialist team of researchers from 17 institutions based in 13 countries. Funded by the Bill & Melinda Gates Foundation, this project aimed to provide a rigorous understanding of the cause(s) of superabundance and to build human capacity in Africa to boost vector entomology expertise in National Agricultural Research Organisations.

The project team has invested over 120 person-years of effort by the participants since 2014, including twelve full-time MPhil/PhD students working under project scholarships.

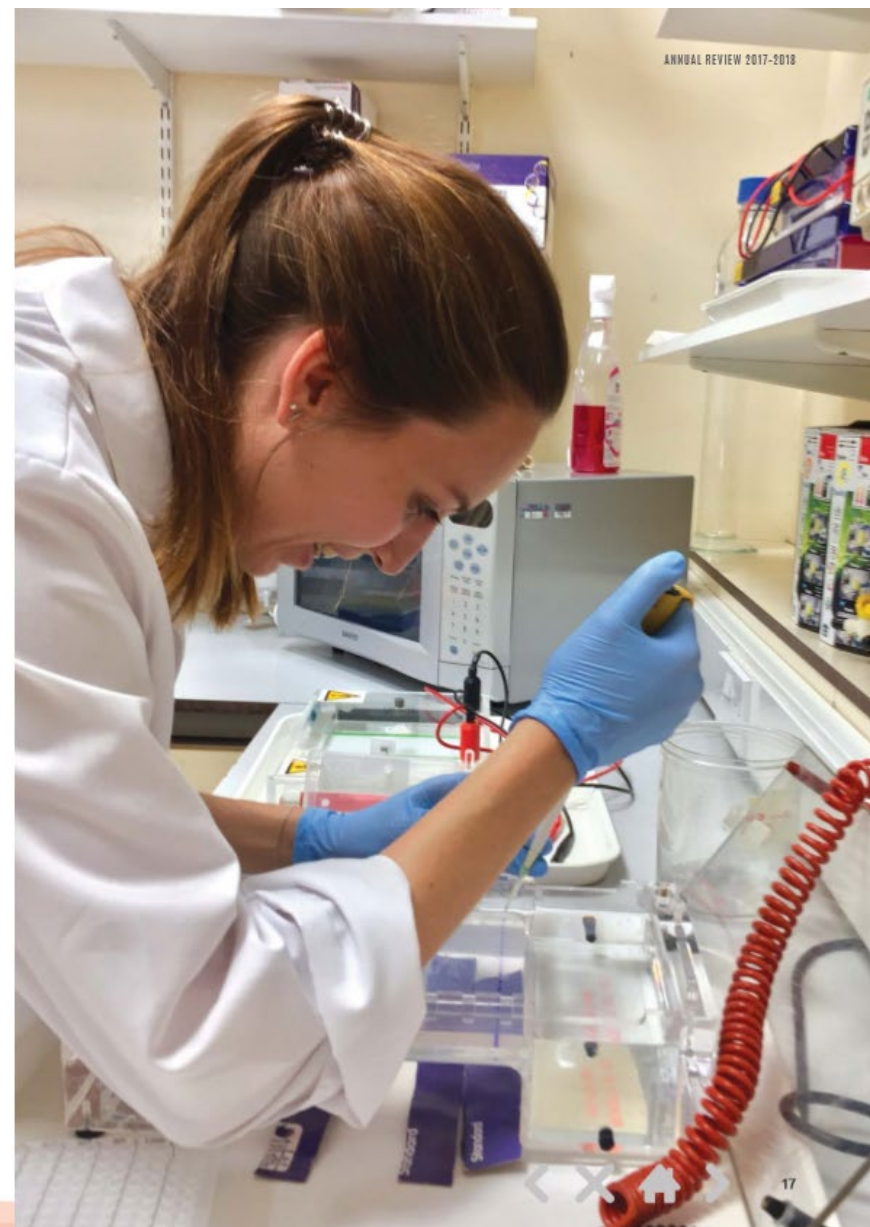
### Key discoveries were that:

- there are at least three ‘cryptic’ species of *B. tabaci* that colonise cassava in sub-Saharan Africa, but only one is frequently associated with super-abundance. Cryptic species are distinct and separate, yet appear indistinguishable from each other.

- this species has extremely high survival on cassava, particularly the ‘elite’ disease-resistant, cassava varieties that were distributed to control the Cassava Mosaic Disease pandemic.
- 10–15 African and Latin American cassava genotypes with good whitefly resistance were identified and candidate resistance genes have been identified in cassava.

Based on these discoveries and new understanding, a second phase of the African Cassava Whitefly project was recently approved. This new four-year phase aims to take key discoveries from Phase I and use them to begin to implement ACW control. It will also create and field-test a pipeline of novel control technologies, thus ensuring that new solutions become available in the future. Through these discovery and implementation activities, the new project’s goal is to increase cassava productivity and reduce food insecurity for millions of farmers and their families in sub-Saharan Africa.

Photo: Student Ms Sarah Mieulet (École d’Ingénieurs de Purpan, Toulouse) working in the laboratories at NRI, as part of an internship on the African Cassava Whitefly Project. Sarah is using molecular tools to differentiate populations of whitefly (*B. tabaci*) from across east Africa.



## Dealing with dengue: understanding mosquito egg-laying sites >

Richard Hopkins

Mosquitoes are the vectors of many diseases. The yellow fever mosquito, *Aedes aegypti*, transmits several viruses including dengue, Zika and chikungunya, as well as yellow fever. The World Health Organization estimates that 50 million cases of dengue occur every year, with more than 2.5 billion people living at risk of contracting the disease in over one hundred countries. *Ae. aegypti* is the main vector of dengue virus, which is transmitted by female mosquitoes when they take a blood meal. There is no vaccine to protect against dengue, and vector control is the main recourse to reduce the spread of this disease.

A team from NRI, led by Professor Richard Hopkins, is currently working on a project to understand more about *Ae. aegypti*, and to ultimately develop solutions to control their spread. Together with the Oswaldo Cruz Foundation (FIOCRUZ) in Rio de Janeiro, Brazil, the team is investigating *Ae. aegypti* egg laying.

*Ae. aegypti* are found in urban environments, and lay eggs in a wide range of containers. Adult female *Ae. aegypti* lay their eggs on the inner, moist walls of containers, usually above the waterline. Females lay around 100 eggs at a time, which stick to the container walls where they dry out, and where they can survive for months. Once an egg hatches it can take as little as 8–10 days from an egg to an adult, and

this rapid reproduction makes understanding the choice of oviposition sites a key stage in vector control. This year, the team has been working on the chemical composition of the water that *Ae. aegypti* lay eggs in and on the containers that they choose.

This understanding will inform future development of targeted traps or repellents to reduce the incidence of people getting bitten by this mosquito and minimise the risk of being infected by dengue or other dangerous diseases.

*Funded by the UK's Medical Research Council, the project comes under the umbrella of 'research on neglected tropical diseases'.*

Photo: Blood-feeding *Aedes aegypti*, the main vector of dengue virus, which is transmitted by female mosquitoes when they take a blood meal.





## SUSTAINABLE AGRICULTURAL INTENSIFICATION >

Increasing agricultural productivity is essential to feeding a fast-growing population and has the potential to lift rural families out of poverty. Sustainable Agricultural Intensification (SAI) provides the means to do this with limited available resources, while protecting our living environment and conserving natural and agricultural biodiversity. NRI's work in this field includes managing agroecosystems to enhance natural pest regulation and reduce dependence on agrochemicals, and farmer-led research to improve nutrition, incomes and food safety.



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## Improving agroecosystems management: enhancing natural enemies of legume pests in Africa

Phil Stevenson, Sarah Arnold and Steve Belmain

Producing adequate food sustainably for a growing population requires interventions that function with natural habitats rather than deplete them. Legumes such as beans, pigeonpea and lablab are important crops for nutrition security providing protein, micronutrients and vitamins and are grown and consumed by millions of farming families across eastern Africa. However, although they are regionally very important food plants, they are known as 'orphan crops' as they are not traded around the world and receive little attention by research networks to improve them. Yield gaps – the difference between potential and actual yield – are severe, owing to various constraints including pest damage which disproportionately affects poor farmers. Pest control is usually dependent on agrochemicals that have negative impacts on users, consumers and on the beneficial insects that provide pollination or natural pest regulation (NPR).

Natural enemies include a broad range of arthropods including spiders, mites, ladybirds, hoverflies and parasitoid and predatory wasps as well as bats, birds, toads and turtles, among others. They naturally diminish pest populations, which reduces farmers' reliance on synthetic insecticides. As with pollinators, non-crop habitats such as field margins provide food resources like nectar and alternative prey, and refuge to support populations of predators and parasitoids of pests. Their occurrence and biology in smallholder ecosystems, however, are poorly understood, particularly in Africa.

Led by Professor Phil Stevenson of NRI and Royal Botanic Gardens, Kew, a new research project aims to identify the important species

that deliver effective NPR, taking forward recent findings with research colleagues in Kenya, Malawi and Tanzania. Entitled 'Natural Pest Regulation on Orphan Crop Legumes in Africa', the project will develop approaches that augment NPR through improved agroecosystems management. The research will provide key evidence for the benefits of NPR and establish how this can be optimised through better landscape management or manipulation and how natural pest regulation can function alongside other management practices. More about the project can be found here [www.agricultureecosystems.org](http://www.agricultureecosystems.org)

Funded by GCRF-BBSRC under the Sustainable Agriculture in Sub-Saharan Africa (SASSA) call.

Photo: A ladybird feeds on an aphid infestation on beans in Tanzania.



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## Farmers leading the way: PAEPARD Multi-Stakeholder Partnerships in Malawi and Uganda

Tim Chancellor

Enabling farmer organisations to lead the identification of research priorities and engage actively in the research process is crucial to ensure that research directly addresses local needs and environmental conditions, and has the potential for significant impact in rural communities. The Platform for an Africa-Europe Partnership for Agricultural Research for Development (PAEPARD) is a multi-stakeholder agricultural research initiative which aims to do just that. Supported by the European Commission, PAEPARD facilitates partnerships between organisations in Africa and Europe in the field of agricultural research for development with a view to contributing to the achievement of the Sustainable Development Goals. Most of these partnerships involve collaboration between researchers, farmer organisations, non-government organisations and the private sector.

NRI has been a member of the PAEPARD consortium since its inception in 2009, through its membership of the Agrinatura network, and has participated in two of the four projects supported through a Competitive Research Fund. One of the projects, led by the Uganda Christian University, is promoting the use of indigenous leafy vegetables to enhance nutrition and increase income for farmers in Uganda. Dr Debbie Rees is leading NRI's inputs to the project which, over the past three years, has contributed to a 12 percent increase in consumption of leafy vegetables such as Nakati (*Solanum aethiopicum*), which resembles a tomato or an eggplant, in the target areas in Central and Eastern Uganda. At the same time, the income of 300 farmers involved in the research has doubled.

The second project is led by the National Smallholder Farmers' Association of Malawi (NASFAM) in partnership with Lilongwe University of Agriculture and Natural Resources (LUANAR), and in collaboration with organisations in Zambia and South Africa. NRI's Dr Bruno Tran and Professor Ben Bennett are providing technical support. The project has identified and tested several pre- and post-harvest practices that are reducing the risk of aflatoxin in groundnut. Aflatoxin is a dangerous toxin produced by fungi that can occur in some food crops and poses serious health risks to consumers, especially to pregnant women and young children. The project has so far worked with over 6,000 farmers in Malawi and Zambia with encouraging results.

Photo: Farmers in Uganda evaluating indigenous leafy vegetables including Nakati (*Solanum aethiopicum*).



## FOOD LOSS, WASTE REDUCTION AND VALUE ADDITION >

NRI has been working to reduce losses and waste after harvest since the food crisis of the 1970s. Experts from our Food Loss and Waste Innovation Centre use their experience, technical insight and capability to devise solutions to postharvest loss through innovative technologies, strategies and information systems.



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## Understanding postharvest losses to help design strategies to reduce them

Tanya Stathers

**Growing and protecting a crop during its field stages is just the initial part of farming. Knowing when and how to harvest, transport, dry, thresh and store the crop ensures a family's food and nutrition security. This knowledge allows the farming household to maintain the crop's quality as a nourishing source of food until the next harvest season, or as seed to be planted, or as a commodity that can be sold to generate income, without experiencing high postharvest losses.**

The 2008 food crisis led development agencies involved in improving food security across sub-Saharan Africa (SSA) to seek a more accurate understanding of the level of losses occurring postharvest. In response and with funding from the European Commission, an NRI-led research team screened and extracted postharvest loss (PHL) figures from the scientific literature and created an algorithm which combined these with contextual data – such as the weather during harvesting and drying, production figures, proportion of grain stored on farm or marketed, and presence of key storage pests such as the larger grain borer *Prostephanus truncatus*, which can double storage losses of maize. This contextual data was supplied by a network of colleagues from across 37 SSA countries to create the African Postharvest Loss Information System (APHLIS). APHLIS provided science-based estimates of the weight losses occurring at each stage along the postharvest value chain for nine cereal crops.

As realisation of the importance of reducing postharvest losses increased, the demand for science-based estimates of PHLs occurring along the value chains of key legume and root and tuber food crops grew. With financial support from the Bill & Melinda Gates Foundation, APHLIS [www.aphlis.net](http://www.aphlis.net) is being expanded to include these important staple food crops, to provide data on the nutritional and financial value of the PHLs which occur, and to offer user-friendly tools for the rapid measurement of PHLs, and warning systems for food safety risks such as aflatoxin, a dangerous toxin produced by fungi that can occur in some food crops. APHLIS enables users to understand how much of each focal crop their country or province is losing at each postharvest stage, and to then design their postharvest loss reduction investment strategies.

Photo: Maize in Ghana being loaded for transportation, one of the steps in the crop's value chain where postharvest losses can occur.



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## NRICassavaBag: a simple solution to a global food loss and waste problem

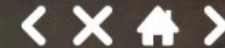
Ben Bennett and Keith Tomlins

Whilst cassava has many advantages for small-scale farmers as a resilient source of food security and income, particularly in drought-prone areas, commercialisation in some countries has been stymied by the very short shelf-life – as little as 72 hours – of roots after harvest. In hot climates like Nigeria with poor infrastructure, many farmers simply cannot get their cassava to market before it starts to spoil. In 2017, the ‘NRICassavaBag’ was chosen as the preferred solution in the global Cassava Innovation Challenge funded by the Rockefeller Foundation, which sought to develop and test an innovative way to manage Postharvest Physical Deterioration (PPD) in fresh cassava. NRI’s solution is a polypropylene bag that cures the cassava naturally, heals wounds sustained during harvesting and slows down the ‘ticking clock’ of the deteriorating cassava.

In the past year, the NRI team and colleagues at Nigeria’s Federal University of Agriculture, Abeokuta (FUNAAB), have been conducting experiments and commercial field trials based on the NRICassavaBag approach. Initial scoping studies show that many cassava roots are handled up to 15 times between harvest and use in a factory. The NRICassavaBag method builds on earlier knowledge that cassava’s deterioration after harvest can be managed if product temperature and humidity are controlled, and the handling improved.

Starting with small bags of fresh cassava and working towards large, ‘Jumbo’ 0.6mt bags, the team has now developed an approach that can assure at least eight days of storage and minimal loss in starch which is critical for commercial operations. Working closely with two Nigerian cassava processing factories and a Nigerian bag making company, the team now has a solution for PPD that works and appears to be cost effective. If taken up on a wide scale, the technique could bring massive benefits across the cassava-growing world with minimum costs.

Photo: The NRICassavaBag ‘Jumbo’ version being tested for the first time at Psaltry Starch Ltd, Oyo State, Nigeria. This was the first time the team tried out the new discharge mechanism to allow cassava stored in the bag to be dropped straight into the factory feed hopper for processing.



## Reducing the impact of plastic packaging: innovations, research and advice

Lori Fisher

**The impact of plastic on the planet urgently needs to be controlled, whether by ending littering, preventing further contributions to the eight million tonnes of plastics dumped in the oceans or reducing dependence on fossil fuels. In response to public pressure, major UK producers and retailers have rallied behind the UK Plastics Pact. This agreement includes pledges to make all packaging reusable, recyclable or compostable by 2025.**

The priority now is to reduce packaging, either by adopting reusable alternatives or by redesigning products. When these options are not viable, due to food safety or perishability reasons, alternative sustainable packaging applications, such as edible coatings and bioplastics are being researched.

NRI plant biologists, Dr Lori Fisher and Dr Debbie Rees, have recently collaborated with AgriCoat Natureseal UK, a developer of innovative edible coatings. Variants of Semperfresh, a coating based on a mix of sugar and fatty acids (sucrose esters), were tested at the Produce Quality Centre (PQC) – a collaboration between the Natural Resources Institute (NRI) at the University of Greenwich and NIAB EMR, a

horticultural research institute, at East Malling, Kent. The results verified the effectiveness of coatings on avocados and pears, providing retailers with the option to sell unpackaged fruits with a longer shelf life.

Specialist understanding of plant postharvest responses combined with NRI's experience working within global supply chains, and a recent investment in the facilities at the PQC, have well positioned the team to provide the necessary impartial advice growers and suppliers now need. The team provides support to test novel solutions and determine their effects on the quality of fresh produce to prevent unwanted food waste.

Photo: Test results of the innovative edible coating 'Semperfresh' verified its effectiveness on avocados and pears, providing retailers with the option to sell unpackaged fruits with a longer shelf life.



## CAPACITY STRENGTHENING >

NRI recognises that capacity strengthening for agricultural development and food security is fundamental for lasting development impact and to achieve the Sustainable Development Goals. Researchers and other stakeholders in smallholder agricultural systems need new skills to work together effectively, to engage in high-quality demand-led research and learning, and to deliver innovative solutions to promote sustainable development – especially in the face of climate change. Policy makers and civil society organisations require enhanced capacity to demand, evaluate and utilise evidence so that impact is achieved. This section includes a selection of NRI's activities in this field.



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## Focus on food quality: NRI and the World Food Programme

Linda Nicolaidis

**The World Food Programme (WFP) of the United Nations assists 80 million people in around 80 countries each year, delivering food assistance in emergencies and working with communities to improve nutrition and build resilience. WFP staff are often the first people on the ground after an emergency, delivering assistance in some of the world's most difficult, hard-to-reach areas.**

For many years, NRI has been collaborating with WFP, providing specialist advice on the storage management of products used as part of WFP's global food assistance programmes. Over this time, NRI staff have also developed a range of training programmes to support WFP staff and suppliers responsible for maintaining the quality and shelf-life of locally produced stored food and commodities.

During the past year, staff from the NRI's Food and Markets Department have been working with WFP's Food Safety and Quality Unit to strengthen the quality assurance system that is used by WFP globally to ensure food meets specified safety and nutritional requirements of the beneficiaries – people who are living through dangerous and difficult crises such as wars, natural disasters and displacement.

The NRI team gave a series of training sessions for WFP staff working in the last mile of the food assistance operation, to enhance the

knowledge and understanding of the Hazard Analysis and Critical Control Point (HACCP) approach used to manage food safety. Courses were given in Cameroon, Ethiopia, Kenya, Rwanda, South Africa, Togo and Uganda.

Additionally, in Madagascar, NRI and WFP have been exploring the potential for developing the value chains of breadfruit and cassava. Led by the Madagascar Ministry of Agriculture and Livestock, WFP is supporting development projects which aim to improve the conservation and processing of these two crops. It is hoped that this will provide a stock of healthy food during the lean season and offer an alternative, diverse diet. The team identified opportunities for strengthening community capacity and technical services of Madagascar's National Office for Nutrition and seeks to strengthen the technical and managerial capacities of women's groups and farmers' organisations to manage and pursue the project.

Photo: Strengthening community capacity in Madagascar, where NRI and WFP have been exploring the potential for developing the value chains of breadfruit and cassava.



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## Enhancing research capacity through SENTINEL: highlighting trade-offs along pathways to agricultural development

Adrienne Martin

The increasing pressure on the world's resources to meet food security and nutritional needs and to create wealth, is a serious threat to biodiversity, the environment, and ecosystem services. For development to be sustainable, the achievement of food security, improved nutrition, and the protection of ecosystem services are needed. Recognising and understanding the trade-offs and potential conflicts between social, economic and environmental objectives is essential if policy makers are to reach informed decisions on appropriate agricultural development pathways and investments.

NRI, together with four other UK Universities and partners from the University of Ghana, Copperbelt University Zambia, the Ethiopian Development Research Institute, and the Regional Universities Forum for Capacity Building in Agriculture (RUFORUM) are collaborating on a project led by the International Institute of Environment and Development (IIED), funded under the UKRI Global Challenges Research Fund 'Growing Research Capability' call. Entitled 'Social and Environmental Trade-offs in African Agriculture' (SENTINEL), the four-year project aims to enhance the capacity of UK and African researchers to co-develop excellent and relevant interdisciplinary research on impacts, risks and trade-offs of different agricultural development pathways.

NRI developed the methodology for the initial capacity assessment in African partner research organisations and contributed to the overall capacity-development strategy. The focus

covered individual, organisational and institutional capacities. In addition, a short questionnaire to assess capacities and gaps in African agricultural universities was completed by over 50 senior managers attending the 2017 RUFORUM Annual General Meeting in Malawi. They particularly highlighted the need for support and mentorship for researchers, and enhanced communication to non-academic audiences. A capacity needs assessment workshop held at the University of Ghana in January 2018 identified research team leadership, interdisciplinary collaboration, managing partnerships, communication with end users of research and influencing policy, as capacity needs. These suggestions are being incorporated into the project's capacity-development activities.

Read more about the project at: [www.sentinel-gcrf.org](http://www.sentinel-gcrf.org)

Photo: Intensive irrigated maize and residues of the previous season's rain-fed maize crop: what are the impacts of these different systems?



## SUSTAINABLE TRADE AND RESPONSIBLE BUSINESS >

Processes of economic globalisation are leading to changing patterns of international trade, with an expansion in global value chains and production networks, growing south-south trade, and expanding regional and domestic markets. NRI's Sustainable Trade & Responsible Business programme aims to generate knowledge on the development potential, limitations and implications of a growing range of sustainable production and trade initiatives. These include sustainability standards, corporate sustainability supply chain strategies, responsible business initiatives, sector and landscape transformation approaches, pro-poor and sustainable value chains and inclusive economic development. The programme focuses principally upon agriculture and forestry, but also covers other sectors, such as apparel. There is a specific emphasis on smallholders and workers, and on issues of poverty reduction and inequality, human and labour rights and environmental impacts. The programme responds to several of the Sustainable Development Goals (SDGs).



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## Sustainable global supply chains, responsible business and forest-agriculture landscape initiatives

Valerie Nelson

**Significantly increasing the sustainability of global production, trade and consumption is critical for the achievement of the UN Sustainable Development Goals. Under the Sustainable Trade and Responsible Business programme, NRI explores diverse dimensions of sustainable production and trade, particularly in the agriculture, forestry and apparel sectors.**

Corporate behaviour change approaches and responsible business initiatives are expanding, moving beyond product sustainability certification and guidance on corporate reporting to include new legal forms for enterprises, public benchmarks rating corporate performance, impact-oriented corporate reporting standards, and new digital technologies for increasing worker voice. Cutting-edge NRI research unpacks how these responsible business initiatives work and if they are effective in influencing corporate sustainability performance and impact.

NRI is currently leading the Monitoring, Evaluation and Learning (MEL) of the DFID Responsible, Accountable and Transparent Enterprise (RATE) Programme. This includes evaluating the programme and strengthening the MEL capacity of the 12 partner organisations: Global Reporting Initiative, Ethical Trading Initiative, B Lab, UN Global Compact, ShareAction, Shift, Fairtrade, ISEAL, UK National Contact Point, British Academy Research Programme on Modern Slavery and Human Rights, and World Benchmarking Alliance.

Landscape-based and jurisdictional approaches balance competing stakeholder interests and the delivery of multiple social, economic and environmental goals, and are increasingly seen as important for achieving forest conservation and sustainable agriculture. The initiatives are relatively young and NRI evaluation activities are contributing to understanding of their potential and limitations.

DFID's 'Partnerships for Forests Programme' catalyses investment in forest partnerships for sustainable forests and land use. NRI led the evaluative learning design team and is currently delivering thematic studies on high-value, low-intensity forest products, restoration mechanisms, and 'Produce-Protect' which sources products from areas producing sustainably and protecting forests and livelihoods, and engaging in evaluative studies on individual Forest Partnerships. MEL for this programme is led by development consulting firm, LTS International.

Photo: Tea picking on a certified Nilgiris Tea Estate, Tamil Nadu, India – one of the studies from a multi-country sustainability standards impact assessment carried out by NRI.



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## Cattle value chains in Southern Africa

John Morton and Ben Bennett

For much of the population of Southern Africa, cattle have huge economic, social and cultural significance, being valued for a range of products and services, including milk, manure for vegetable gardens, draught power, sale for cash, their role as a form of savings, and their role in marriages and other ceremonies. At the same time, in some countries of the region, especially Botswana and Namibia, cattle are a major current source of export earnings, and in other countries could become so, especially if animal health regulations for access to European markets can be put in place, or if the lucrative South African market can be properly tapped.

As part of a long-running arrangement through the Agrinatura consortium to provide studies of key value chains in developing countries, NRI staff have recently looked at cattle marketing and its broader context in eSwatini (formerly Swaziland) and Zimbabwe. In eSwatini, Professor John Morton looked at social aspects of the cattle value chain. Around 40–50 percent of the rural population own cattle, benefitting from the multiple products and services they provide, and there is some evidence that cattle owners are better nourished and more food secure than other rural people. However, there are currently low levels of trust between farmers, cattle traders and abattoir owners. If both exports and the contribution of cattle to smallholders' well-being are to be increased, trust will need to be improved through better communication of information on markets and

prices, and the establishment of forums where all actors in the value chain can be represented.

In Zimbabwe, Professor Ben Bennett, an NRI marketing economist, working with a rural sociologist and an environmentalist, found that the beef economy has undergone massive changes in response to land reform. The change of focus from commercial export beef production to communal and small-scale method using local breeds and subsequent loss of global markets has dramatically changed the national beef production system. A model developed by the project team shows how important the new small-scale abattoirs are for sector development.

*This study was carried out as part of the 'Value Chain Analysis for Development' (VCA4D) project funded by the European Commission.*

Photo: Cattle being led through a dip-tank in Cota, in the eSwatini middleveld.



## GENDER AND SOCIAL DIFFERENCE >

Our innovative and high-quality research and practice in gender and social difference aims to make a demonstrable impact by reducing inequalities and achieving gender justice in sustainable development. The ultimate aim is to contribute to theory, policy and practice to benefit the lives of women, men, girls and boys, as a matter of human rights, gender justice and good development. This selection of our work includes projects identifying and integrating different user preferences for roots, tubers and bananas (RTB) products into breeding programmes, improving understanding of women's time and maternal and child dietary intake to guide actions to improve nutrition, and exploring farmers' decision making in cassava value chains.



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## Discovering different user preferences for breeding RTB crops

Lora Forsythe

**Root, Tuber and Banana (RTB) crops play vital roles in food security and income generation across sub-Saharan Africa. To date, breeding programmes have focused on improving the yield potential and pest and disease resistance of RTB crops. Despite considerable progress in the past decade, there is a gap in understanding of which varietal traits are preferred by which users, and for which specific food products. Such preferences can be used to inform breeding practices, which in turn, influence the adoption of new RTB varieties by farmers. There is also limited understanding of the socio-cultural differences and influences on RTB product preferences involved in RTB food chains in Africa.**

NRI and international partners are currently working on a project to address these issues. Led by CIRAD, the project entitled 'Breeding RTB Products for End User Preferences', aims to link local consumer preferences with breeders' selection criteria to ensure adoption along the value chains of cassava, yam, sweet potato and cooking banana products, in focus countries Benin, Cameroon, Ivory Coast, Nigeria, and Uganda.

Working with an interdisciplinary team of food technologists, economists and gender specialists, NRI's Dr Lora Forsythe is leading Work Package 1, to create a methodology and evidence base for RTB product preferences by factors of gender and social difference. One example from southwest Nigeria shows how male smallholder farmers tend to prefer to

sell their cassava to starch factories requiring varieties with high starch content. Female smallholder farmers are more likely to process the crop into a range of food products, which are then sold at market or consumed in their household. Therefore, women's preferences for varietal characteristics may be more reflective of their role in processing and household consumption, such as a high preference for peelability of the cassava root, or a specific taste, smell or texture of the final product.

Profiling the preferences of value chain actors with their gender-differentiated trait and product preferences is expected to support breeding programmes in improving the adoption of new varieties and to help ensure food security and income generation across sub-Saharan Africa.

Photo: Bananas being taken to market.



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## Using innovative tools to measure women's time use and mother and child nutrition

Kate Wellard

Rural women in sub-Saharan Africa carry a double burden of productive and reproductive work – farming and taking care of the household. Managing this workload often involves women making trade-offs which may affect their ability to feed and take care of themselves and their children. Better understanding of women's time and maternal and child dietary intake is important for agricultural programmes seeking to improve women's empowerment and nutrition outcomes. However, time use and dietary practices are difficult to measure – current methods are labour-intensive, such as direct observation and diaries, or prone to errors, such as recall.

NRI's Dr Kate Wellard, Jan Priebe and Dr Lora Forsythe, in collaboration with researchers from the London School of Hygiene and Tropical Medicine and the Africa Innovations Institute in Uganda, are testing two low-cost innovative tools with women in Eastern Uganda. Mobile phones send an automated interactive response call every four hours asking about each woman's activities and about the foods that she and her infant have eaten since the last call. Wearable cameras automatically take images every 30 seconds, capturing the woman's activities, the food she is eating and her interactions with her infant throughout the day. The images are reviewed by the participating women and project team the following day in an enjoyable interactive session to reconstruct their activities and dietary practices.

Preliminary findings show that study participants found use of both the wearable cameras and mobile phones acceptable; the project team is finding that the tools provide a richer picture of opportunities and constraints of the food environment. The two innovative methods are currently being validated against traditional methods of direct observation and 24-hour recall to assess their efficacy. Next steps would be to evaluate them in different country contexts. Ultimately, the data collected will be used to guide actions to ensure that agricultural activities are more nutrition and gender sensitive.

*This project is funded through the UK Department for International Development's IMMANA programme.*

Photo: Preparing a meal in Busoga, eastern Uganda. This shot was captured with a wearable camera, worn by one of the women participating in the project.



## Exploring farmers' decision making in cassava value chains: who produces, who consumes, who sells?

Ola Ogunyinka, Richard Lamboll and Lora Forsythe

**Nigeria is the world's largest cassava producer, with 55 million tonnes of roots and 21 percent of global supply. A marked expansion in total cassava production, particularly since 2011, has been accompanied by increasing, and often competing, demands for fresh roots. Diverse smallholder farmers – men and women – need to make informed decisions on what to do with the fresh cassava roots produced from their farms; how much to retain for home consumption versus what volume to sell and into which value chain to meet immediate family financial and other needs.**

The 'Cassava Adding Value for Africa Phase II' project (CAVA2) is working to strengthen cassava value chains, with the aim of increasing the incomes of smallholder farmers. An important objective is to ensure the reliable supply of fresh cassava roots produced by smallholder farmers, through understanding the socio-economic and market factors influencing supply and establishing farmer supply networks. A study of decision making among farmers in three Nigerian states (Kwara, Ogun and Oyo states) was undertaken in order to unravel the factors influencing decision-making processes within the family setting on production, utilisation and market sales.

The study found that there were different scales of farmer participation in cassava markets, with farm sizes ranging from less than one, to well over 40 acres. There are high and increasing levels of commercialisation amongst all farmers in terms of high levels of land rental, external input use

(particularly herbicides), and hired labour (almost all farmers). Contrary to current perceptions, farmers of all scales were not primarily growing cassava for household consumption, but growing for the market. Most farmers, even the larger farmers, were mainly selling to local food markets, with limited sales into industries, such as ethanol, although new opportunities are growing in some areas.

Important factors informing farmers' decisions on cassava sales include: availability and/or awareness of market options, prompt payment in cash, price and trust in the buyer. Decision making differs between men and women, and depends on land access and management norms and opportunities for the sale of locally processed cassava products which are a speciality of women. The study confirms the importance of a targeted and well-integrated approach to value chain-based interventions and sustainability.

Photo: Farmers arrive to take part in a group discussion on farmer decision making in relation to cassava market participation in south-west Nigeria.



## LAND, RURAL INSTITUTIONS, GOVERNANCE AND FINANCE >

NRI's work in this field aims to assist policy and institutional innovation for sustainable, socially inclusive economic development in rural areas, particularly in Africa, with a focus on improved governance of land and natural resources, extending market participation by small farmers, strengthening rural advisory services and the social impact of agricultural and other investments. Examples of NRI's current work in this area includes the development of a market-based, innovative risk financing solution called Risk-Contingent Credit (RCC), and progress on making agri-investment more inclusive and responsible, while protecting rural communities' land rights through DFID's LEGEND programme.



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## Promoting resilience and climate risk financing in sub-Saharan Africa

Apurba Shee

Uninsured drought-related agricultural risks and limited access to credit are serious impediments to agricultural productivity, and they are considered major sources of poverty among smallholder farmers in sub-Saharan Africa. Against this backdrop, Dr Apurba Shee, a Business Development Economist at NRI, and Calum Turvey, Professor of Agricultural Finance at Cornell University, have developed a market-based, innovative risk financing solution called Risk-Contingent Credit (RCC). It appears to be the first to develop scientific bundling of rainfall-based index insurance and an agricultural term loan through actuarially fair pricing. Dr Shee has been co-leading a project that is implementing RCC with smallholder farmers in Kenya funded by the Global Resilience Partnership (jointly supported by the Rockefeller Foundation, USAID, and Sida) and a multi-year impact evaluation supported by 3ie. The objective of this project is to promote resilience and investment opportunities that impact the livelihoods and food security of vulnerable communities.

RCC is a linked or 'bundled' credit product that embeds within its structure an insurance protection which, when triggered, offsets loan payments due to the lender providing a risk-efficient balance between business and financial risks. RCC has many innovative features. By reducing credit default risk, it provides trust in the lender-borrower relationship. It eliminates the drawbacks of standalone index insurance products by not requiring the farmers to pay a premium upfront and out of pocket. By removing liquidity constraints, combined with transfer of climate risk, RCC can achieve better targeting of poorer farmers, increase economic efficiency, provide climate resilience, and eliminate climate-based poverty traps.

The project is currently being implemented in Kenya in collaboration with the International Food Policy Research Institute (IFPRI), with Equity Bank fronting the credit product, and with insurance underwritten by APA Insurance. The team has

set up a multi-arm randomised controlled trial to assess unbiased impact of RCC on agricultural investment, productivity, resilience, and farmer welfare. 1150 sample households were randomly assigned to one of three research groups, each of 350 households: treatment 1 (farmers offered traditional credit), treatment 2 (farmers offered RCC) or control (farmers not offered credit; 350 households). By September 2017, the project had distributed approximately \$35,000 in loans to over 266 farmers who mostly had no previous access to credit. The team has found that the uptake rate of RCC loans in treatment 2 is about 40 percent, whereas the uptake rate of traditional credit in treatment 1 is about 35 percent. These uptake figures are significant and much higher than in any previous studies. The team has conducted a baseline and a follow-up household survey and is in the process of evaluating the impact of RCC and comparing it with the effect of traditional credit.

Photo: Playing a risk-contingent credit game as part of financial education in Kenya.



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## Protecting land rights whilst promoting sustainable agri-investment: LEGEND

Julian Quan

**As private sector investment in agribusiness expands and market participation of smallholder farmers increases, uncertain and insecure land rights continue to prevent vulnerable rural people from taking opportunities and overcoming poverty, particularly in Africa.**

NRI provides the technical leadership for LEGEND, DFID's programme on Land: Enhancing Governance for Economic Development. Led by Julian Quan, Professor of Land and Development Practice at NRI, the team has been making progress this year on how to make agri-investment more inclusive and responsible, while protecting rural communities' land rights.

Assisted by LEGEND, high-profile companies in East and southern Africa, including Illovo Sugar, Africa's major sugar producer, and forestry investor Portucel, are now developing sustainable business plans and strengthening community engagement practices. In West Africa, investors are also scaling back on overambitious plans to transform whole districts into oil palm plantations, and developing smaller estates by leasing land from local communities on equitable terms, while creating new opportunities for small-scale farmers as outgrowers. LEGEND is also assisting emerging social investors to build community enterprises in projects that utilise untapped potential of degraded savannah woodlands as sources of high-value natural products through marketing

products such as baobab fruit in Mozambique and providing tourism services in northern Tanzania, while strengthening women's participation.

Initiatives like these cannot be pursued at scale unless rural people's land rights are documented and secured, and the governance of land investments improved. Through LEGEND, NRI has worked with consortium partners ODI and IIED to assess how governments, donors, civil society and private sector partners can work together and to empower communities legally, ensure investors and rural people understand the risks of land investment, eliminate corrupt practice, reduce land conflicts, and map and secure land rights. The team is currently undertaking a major study to inform donor policy and practice on how to document and deliver land rights at scale, learning lessons from DFID's major programmes in Ethiopia and Rwanda and building long-term sustainable land and property registers to support development needs in Africa for decades to come.

For more information, see: [landportal.info/partners/legend](http://landportal.info/partners/legend)

Photo: Sugar cane in east Africa. Assisted by LEGEND, high-profile companies, including sugar producers in east and southern Africa, are developing sustainable business plans and strengthening community engagement practices.



## CLIMATE CHANGE, AGRICULTURE AND NATURAL RESOURCES >

Responding to climate change is one of the most urgent challenges facing humankind. The most severe impacts are likely to be suffered by the poorest and most vulnerable in society who live in more fragile environments and have the least resources to adapt and recover. The majority of the world's poor continue to live in rural areas and their livelihoods are heavily dependent upon agriculture and natural resources, which will be severely affected by climate change. Therefore, there are serious implications for their food security, health and well-being. NRI's work in this field aims to understand these challenges better, to build adaptive capacities, and to develop appropriate strategies for sustainable and equitable rural adaptation. Highlights of our work include contributing to the IPCC's Special Report on Climate Change and Land, and training the next generation of scientists through one of our dedicated postgraduate programmes.



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## The IPCC Special Report on Climate Change and Land

John Morton

**Set up in 1988 by the World Meteorological Organization and the United Nations Environment Programme, the Intergovernmental Panel on Climate Change (IPCC) is the international body for assessing the science related to climate change. The Panel provides policymakers with regular assessments of the scientific basis of climate change, its impacts and future risks, and options for adaptation and mitigation.**

NRI's Professor John Morton is currently working on the IPCC's Special Report on Climate Change and Land. Professor Morton previously wrote sections on smallholder and subsistence agriculture for the Nobel Prize-winning Fourth Assessment Report (2007) and jointly led the chapter on rural areas for the Fifth Assessment Report (2014). The current report covers the interactions between climate change, land degradation and food security. Land degradation processes like desertification are both exacerbated by climate change while also exacerbating it. Similarly, climate change adds to the threat of food insecurity for huge numbers of the world's population, but the ways in which food is produced and distributed in the world contribute to climate change through emissions of greenhouse gases.

There are potential policies that can address combinations of these problems while

contributing to sustainable development, but discussion is needed on the decision-making and governance under which such policies can be identified and implemented. Professor Morton is working on the final chapter of the report, 'Chapter 7: Risk Management and Decision Making in Relation to Sustainable Development', together with colleagues from India, Canada, Ecuador, France, Latvia, New Zealand, South Korea, Sudan, Sweden, UK, and USA. The chapter synthesises findings from earlier chapters of the report on key risks from the interactions of climate change, responses to climate change, land degradation, and food insecurity, and identifies policy responses to those risks. It then discusses both formal and informal decision-making processes in the face of climate-related risks, and modes of governance which are needed to strengthen climate action.

Photo: Maize field under the effects of drought in Ghana.



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## Act now: discover Global Environmental Change MSc at NRI

Conor Walsh

The timeframe for action in maintaining global average temperatures within 1.5°C of pre-industrial levels is rapidly diminishing, as emphasised in a recent report from the International Panel on Climate Change (IPCC). The report highlights that this action must be far-reaching, requiring unprecedented changes in all aspects of society. "We are already seeing the consequences of 1°C of global warming through more extreme weather, rising sea levels and diminishing Arctic sea ice, among other changes," said Panmao Zhai, Co-Chair of IPCC Working Group I. It is becoming apparent that adapting to climate change will become increasingly important in the future.

Building on the Institute's established reputation in climate change research, NRI is launching an MSc programme entitled 'Global Environmental Change', which focuses on exploring the dual challenges of reducing emissions as well as preparing for varied impacts of climate change. How can we make sense of change? This programme looks at what changes to our environment could mean for us, on a global level, both in the past and in the future.

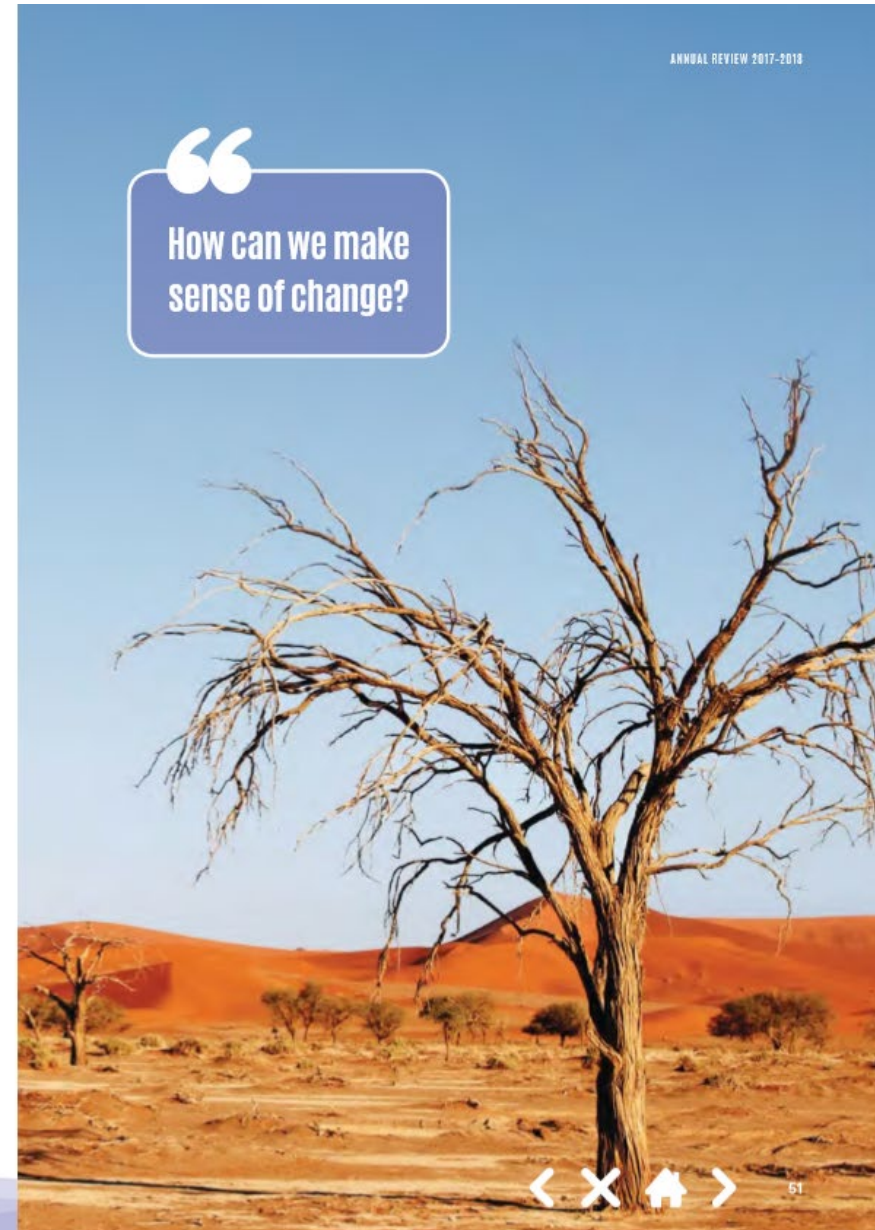
Designed around the concept of the 'land-water-energy' nexus, this programme seeks to provide the necessary skills and knowledge base to join global efforts to manage impacts and find solutions at different scales. Built around core modules which focus on climate change, ecological and carbon footprinting and climate adaptation, this programme

gives students the opportunity to choose from modules ranging from 'Conservation Ecology' to 'Environmental Law and Policy'. Fundamentally, this programme offers both a strong theoretical foundation along with modules such as 'Geographic Information Systems' and 'Environmental Footprinting' which focus on transferring practical skills to enhance employability.

Class interaction, peer support and review are fundamental aspects of teaching and learning at NRI, whilst the independent research project affords students an opportunity to showcase their ideas to their peers, demonstrating the breadth of subjects, methods and expertise that can be brought to bear within this challenging field. [www.gre.ac.uk/postgraduate-courses/engsci/glob-envi-change](http://www.gre.ac.uk/postgraduate-courses/engsci/glob-envi-change)

“

How can we make sense of change?





## RESEARCH-LED TEACHING >

NRI's research responds to global challenges. Our researchers also teach on our undergraduate and postgraduate programmes, with new elements from their research and enterprise work being rapidly introduced into individual courses and lectures. This section highlights how students' own research is championed throughout their courses, culminating in award-winning research at all levels of study.



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## Issues-inspired, research-led teaching at NRI

Claire Coote

**"I find it really exciting being taught by someone who has just come back from a farming community in Malawi or presenting at an international conference and is giving us the latest knowledge on how our subject is being applied in the world," says Katie James, a third-year student on NRI's BSc in Environmental Science. "My degree has been really hands-on from the start, with regular field trips, laboratory work and data analysis," she adds.**

Along with Environmental Science, NRI also offers BScs in Geography, and, jointly with the University of Greenwich's School of Science, Biology. "This degree allows me to see how I can personally make a difference to environmental problems affecting the world through research-based solutions," continues Katie. "Food security is a sector I find particularly interesting and by developing a career in this field, I can undertake research which creates a positive physical change."

With a range of MScs including Agriculture for Sustainable Development, Global Environmental Change, Food Innovation, Applied Food Safety and Quality Management, and Food Safety and Quality Management by e-learning, NRI students can work towards a world-changing career and help devise solutions to global challenges.

Inspired by one of her lecturers, Katie would love to continue studying at NRI and work towards a PhD in food security and pollination services. Postgraduate research students become

part of NRI's thriving research community, benefitting from specialist supervision, support and membership of a dedicated Research Group, whilst undertaking structured training in research methods, methodology and core skills. NRI's MPhil/PhD programmes cover Agriculture, Health and Environment, Development Studies, and Food Science and Marketing Economics.

NRI's postgraduate research students have created their own 'NRI Postgraduate Society' (NRIPS) which organises an Annual Postgraduate Symposium. This initiative highlights the students' research, providing them a professional platform to discuss their work, sharpen their communication skills and network with the NRI community. Other NRIPS activities include monthly presentations by PhD students, academic sessions and workshops, social gatherings to celebrate academic and personal milestones, and seasonal gatherings for the whole Institute.

**Study with us and build a world-changing career.**

Photo: Katie James, a third-year student on NRI's BSc in Environmental Science, at work in the laboratory.



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## The student journey: from learners to award-winning researchers

Claire Coote

**At NRI, our students find a stimulating and supportive environment for their learning experience. As undergraduates near the end of their three-year programme, they develop from learners into young professionals.**

Students undertake a research project which allows them to develop their own ideas and to improve their skills in generating and using real data, and to consider interdisciplinary working. After data collection in the field, lab or library, students hone their skills in critical data analysis and graphical presentation, academic writing and effective presentations, allowing them to appreciate, in a practical way, the different tools used to research real-life problems. The best research projects are considered for the NRI Awards for Best Dissertation.

Being able to communicate results is an important part of the journey towards graduate employment or further study. Final-year undergraduates present the findings of their research to NRI researchers during 'Poster Day' at NRI.

This year, several of the undergraduate students' dissertation topics focused on environmental issues in Medway and Kent, while others examined issues further afield. Two prizes were awarded for the best Geography dissertation.

These went to Jessica Sanders and Katie Sanders, who undertook research into different aspects of the Medway environment and their implications for human health. Jessica studied the effects of weather systems on particulate matter (PM10) and nitrous oxide concentrations along a linear transect from Maidstone to Rochester, whilst Katie investigated whether the Medway Towns are an urban heat island. Both students were supervised by NRI Biometeorologist, Dr Peter Burt, who leads the BSc programmes in Environmental Science and Geography.

Every year, a group of students from Hunan Agricultural University, China, join the BSc Environmental Science programme in Year 3. This year, the NRI prize for best BSc Environmental Science dissertation went to Zitong Sun for her work on diatoms – a photosynthetic single-celled organism and common form of phytoplankton, used as an environmental indicator – and water nutrient levels at 12 sites on the River Medway between Tonbridge and Maidstone, supervised by Dr Andrew Haggart.

Photo: Students and staff contemplate Lake Windermere and the Solway Firth in the distance, from the top of the mountain called Red Screes. The team was studying mountain weather and environments during the First Year Geography/Environmental Science field trip to the Lake District in May 2018.



“  
A stimulating and supportive  
environment for your  
learning experience





## Award-winning student research

Claire Coote and John Orchard

At Master's level, this year's prize-winners were:

- Jamila Abou Saleh: Best MSc dissertation – joint winner, MSc Food Innovation
- Paul Britten: Best MSc dissertation, MSc Sustainable Environmental Management
- Ayben Kara: Best MSc dissertation, MSc Food Safety and Quality Management
- Daniele Pond: Best MSc dissertation – joint winner, MSc Food Innovation
- Daria Popkova: Merit Award for Outstanding Achievement, MSc Food Safety and Quality Management
- Zachary Thomas: Best MSc dissertation, MSc Agriculture for Sustainable Development
- Diana Tixi Verdugo: 2016/17 Prize – Tessa Blackstone Achievement Award (for self-funded international NRI Master's student making the most progress), MSc Agriculture for Sustainable Development

At PhD level, Kate Denton was the winner of the 2018 Three Minute Thesis Competition (3MT®), run by the University of Greenwich's Faculty of Science and Engineering.

At the NRIPS Annual Postgraduate Symposium, prize-winners for best presentation and poster were:

- Early-stage researcher: Christina Faulder, studying synthetic compounds to create a control strategy on the fruit fly *Drosophila Suzuki*, a pest species causing £20–30 million of damage to fruit crops every year.
- Intermediate-stage researcher: Steven Sewe, whose work is examining Next Generation Sequencing characterisation of plant viral diversity and host interactions in West African yam.
- Late-stage researchers: Jackie Atim and Kate Denton
  - Jackie is researching *Bemisia tabaci* (whitefly) resistance in Latin America cassava genotypes, as part of the African Cassava Whitefly Project.
  - Kate's research focuses on the potential of UK bats as insect pest controllers in the agricultural industry by gathering information on the composition of bats' diets, using DNA sequencing to find out the species of insects that bats eat.

Photo: Students and staff discuss their research during a break at the 2018 Annual Postgraduate Symposium. (L–R: Anthony Abbott, Soňa Vyskočilová, Tim Chancellor, Juan Paolo A. Sicat, Steven Harte and Jill Joiner).

# PROFESSIONAL SERVICES

NRI's Professional Services team is made up of technicians and specialists in project management, administration, finance, IT, communication, and other fields, working together with natural and social scientists to deliver our mission.



## Delivering quality: Professional Services and Administration

Mark Parnell

NRI and our global network of partners contribute to delivery of the United Nations Sustainable Development Goals (SDGs) on a daily basis. Our contribution to the SDGs through delivery of world-class research, teaching and development work is supported by the bedrock of our human capital, our dedicated team of professional services and administrative staff.

As a team, we ensure NRI's portfolio of business is appropriately budgeted for, effectively managed and fully supported both technically, through a team of dedicated laboratory support staff, and administratively, through an award-winning team of professional administrators. We ensure NRI's project contracts, grants and agreements are fit for purpose and continually strive to guarantee that our archived material and research facilities meet all regulatory concerns. All of this work is undertaken against a backdrop of genuine concern for safeguarding NRI's employees, and fulfilling NRI's mission.

In 2017-18, we delivered on contracts worth over £12 million and worked in every continent on the planet except Antarctica. Our professional services and administration team ensured people, physical resources and formalities were all in place to enable us to work in the far-reaching corners of the globe and meet our contractual obligations. This does not happen by accident; we maintain order within the competing priorities and demands of

over 100 active projects by continually striving to evolve management systems, improve service provision and generally make things happen that need to happen, when they need to happen.

We maintain a bespoke in-house Quality Management System accredited to ISO9001 which keeps the entire workforce of NRI on the straight and narrow, delivering outputs to the quality and standard required of an internationally recognised, award-winning institution.

We ensure our messages, core values and achievements reach our audiences through digital and print media channels. Without our dedicated team of marketing, communications, IT, accounting, executive and budgeting specialists, this publication would not exist in its current form – just one example of how professional services complement and strengthen the achievements of NRI.

## Annual Review story contributors

### Food security, agriculture and nutrition

- Dr Julia de Bruyn, Lecturer/Researcher in Nutrition
- Dr Aurélie Bechoff, Research Fellow: Food Technologist

### Root and tuber crops in development

- Professor Ben Bennett, Professor of International Trade and Marketing Economics
- Dr Debbie Rees, Principal Scientist, Reader in Plant Physiology
- Professor Andrew Westby, Professor of Food Technology
- Gillian Summers, Communications Specialist
- Professor Maruthi Gowda, Professor in Molecular Plant Pathology

### Insects, pests, and human and plant health

- Professor David Hall, Professor of Chemical Ecology
- Dr Daniel Bray, Senior Research Fellow in Chemical Ecology
- Dr Steven Harte, Post-doctoral organic chemist/chemical ecologist
- Dudley Farman, Analytical Chemist
- Dr Mandala Fernandez-Grandon, Research Fellow: Behavioural Entomologist
- Professor Steve Belmain, Professor of Ecology
- Professor John Colvin, Professor of Entomology and Plant-Virus Epidemiology
- Professor Richard Hopkins, Professor of Behavioural Entomology

### Sustainable Agricultural Intensification

- Professor Phil Stevenson, Professor of Plant Chemistry
- Dr Sarah Arnold, Research Fellow – Insect Behaviour and Ecology
- Professor Steve Belmain, Professor of Ecology
- Dr Tim Chancellor, Director of Capacity Strengthening and Partnerships

### Food loss, waste reduction and value addition

- Dr Tanya Stathers, Principal Scientist: Postharvest Systems, Food Security and Adaptation
- Professor Ben Bennett, Professor of International Trade and Marketing Economics
- Professor Keith Tomlins, Professor of Food Science
- Dr Lori Fisher, Enterprise Development Fellow

### Capacity strengthening

- Linda Nicolaidis, Food Safety & Quality Management, Microbiologist
- Professor Adrienne Martin, Professor of Development Studies, Social and Institutional Development and Evaluation Specialist

### Sustainable trade and responsible business

- Professor Valerie Nelson, Professor of Sustainable Development, Social Development, Learning and Evaluation Specialist
- Professor John Morton, Professor of Development Anthropology
- Professor Ben Bennett, Professor of International Trade and Marketing Economics

### Gender and social difference

- Dr Lora Forsythe, Senior Research Fellow, Gender and Livelihoods
- Dr Kate Wellard, Principal Research Fellow – Natural Resource Management and Innovations
- Dr Ola Ogunyinka, Monitoring, Evaluation and Impact Specialist
- Richard Lamboll, Principal Scientist: Socio-Economist

### Land, rural institutions, governance and finance

- Dr Apurba Shee, Business Development Economist
- Professor Julian Quan, Professor of Land and Development Practice

### Climate change, agriculture and natural resources

- Professor John Morton, Professor of Development Anthropology
- Dr Conor Walsh, Environmental Scientist

### Research-led teaching

- Claire Coote, Principal Economist, Teaching & Learning Leader
- Dr John Orchard, Director of Postgraduate Research Studies

### Professional Services

- Mark Parnell, Commercial Manager

## The NRI Team

NRI's team is made up of over 100 members of staff including natural and social scientists, technicians, and specialists in project management and administration, communication, finance, IT and other fields. We are based at the University of Greenwich Medway campus in Chatham, UK, with many of our staff undertaking overseas assignments all over the world, working with international partners to achieve our mission.

To see the full list of staff and their contact details, visit [www.nri.org/about/organisation-and-staff/all-staff](http://www.nri.org/about/organisation-and-staff/all-staff)

### Senior Management Team

**Professor Andrew Westby**, Director of NRI

**Professor Ben Bennett**, Deputy Director of NRI, Deputy Faculty Director, Research & Enterprise

**Professor Adrienne Martin**, Director of Programme Development

**John Linton**, Commercial Director

**Dr John Orchard**, Director of Postgraduate Research Studies

**Dr Tim Chancellor**, Director of Capacity Strengthening and Partnerships

**Claire Coote**, NRI Teaching and Learning Leader

**Professor Vegard Iverson**, Head of Livelihoods and Institutions Department

**Dr Andy Frost**, Head of Food and Markets Department




**Professor Richard Hopkins**, Head of Agriculture, Health and Environment Department

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<b>Page 52:</b>	A still from a video all about NRI's Environmental Science BSc degree <a href="https://www.youtube.com/watch?v=OVT3XFxd95U">https://www.youtube.com/watch?v=OVT3XFxd95U</a>
<b>Page 55:</b>	Peter Purt
<b>Page 56:</b>	Gillian Summers

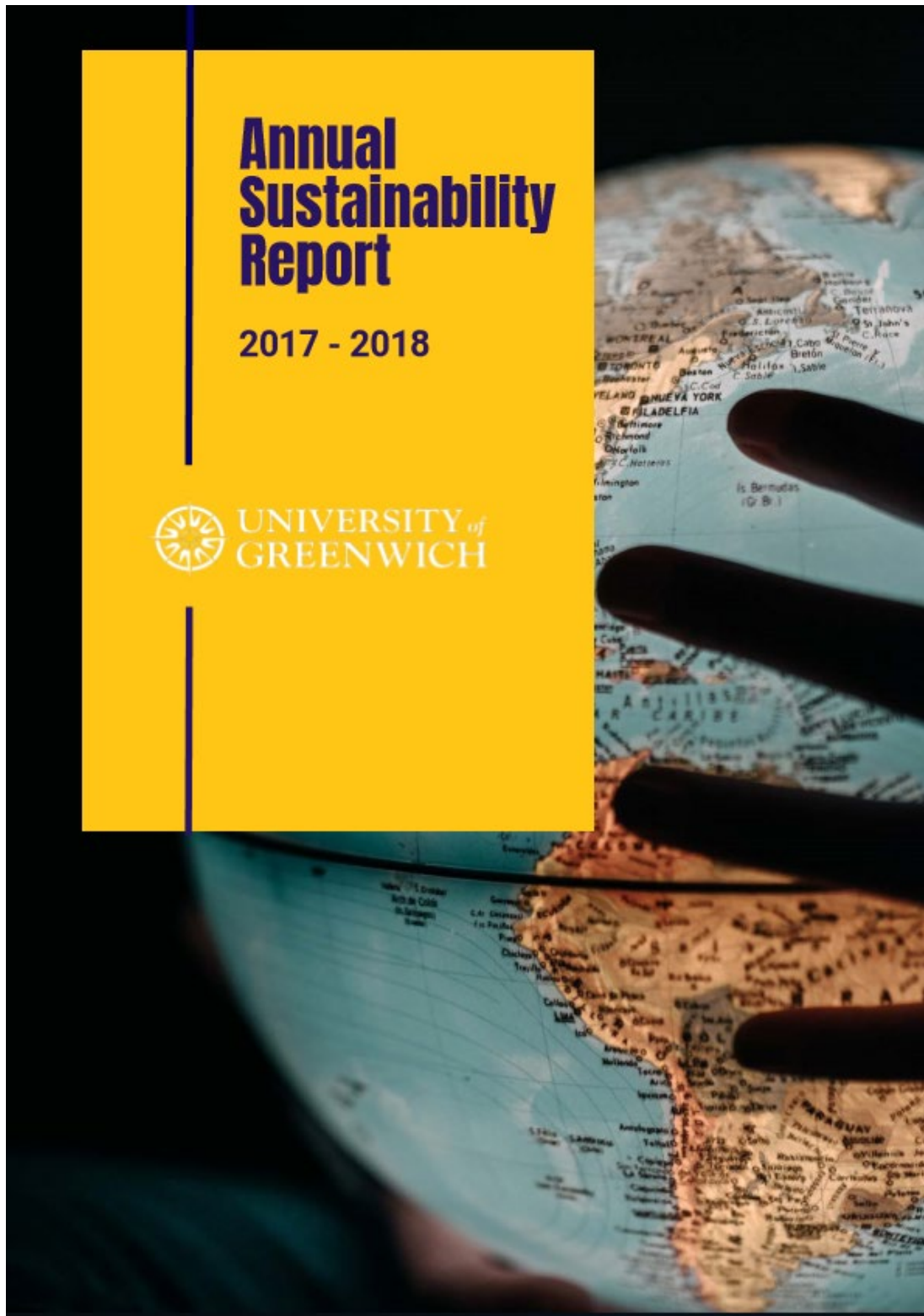
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The latest University of Greenwich Sustainability Report is included here highlighting our commitment to sustainability and our progress in supporting the SDGs.





## FOREWORD

This is our Third Annual Sustainability Report and illustrates the great progress we're making at the University of Greenwich.

We understand that many of the challenges the world faces, such as the climate crisis or access to clean water, will be solved through the application of sustainability thinking. Through our staff, students, graduates and research we help change the world for the better, aligning with the University's core values.

In 2017/18 for the 6th consecutive year we're proud to have achieved a First Class award in the People and Planet University (Green) League amongst the top 20 of universities and colleges in the UK. The work we undertake to provide sustainable food continues to be recognised nationally through our retention of Food for Life Gold and our Fairtrade University accreditation. An innovative project developed by our graduates encouraging the use of reusable drinks containers in cafés was a finalist in the EAUC's Green Gown Awards. The carbon footprint of our energy use has continued to fall and we are now 48.9% below our 2005/06 HEFCE baseline, against a target of a 40% reduction.

Further progress has been made in our strategic delivery. We have improved our data capture and reporting systems, enabling us to focus and prioritise action more effectively. Programmes incorporating sustainable building design and operation within our estates have helped improve the performance of the Dreadnought building and this work continues with the Avery Hill, Southwood Site redevelopment. We continue to work with academics to integrate sustainability into curricula and research, and with directorates ensuring sustainability can deliver the needs and expectations of our students in an ever-changing world.

Many students have worked with us on campaigns and activities, including the energy saving initiative 'Student Switch Off' and our 'Hall's End of Term' reuse campaign. In 2017/18 student residents collected over six tonnes of clothing and other items with a value of over £10,000, which was donated to the British Heart Foundation.

I hope this report illustrates the progress made so far, which has been achieved thanks to all our staff, students and stakeholders, and provides a benchmark from which to make further progress. There is still a lot more to do, but with your help we can achieve great things for our University, and the planet.

Professor David Maguire,  
Vice Chancellor, University of Greenwich.

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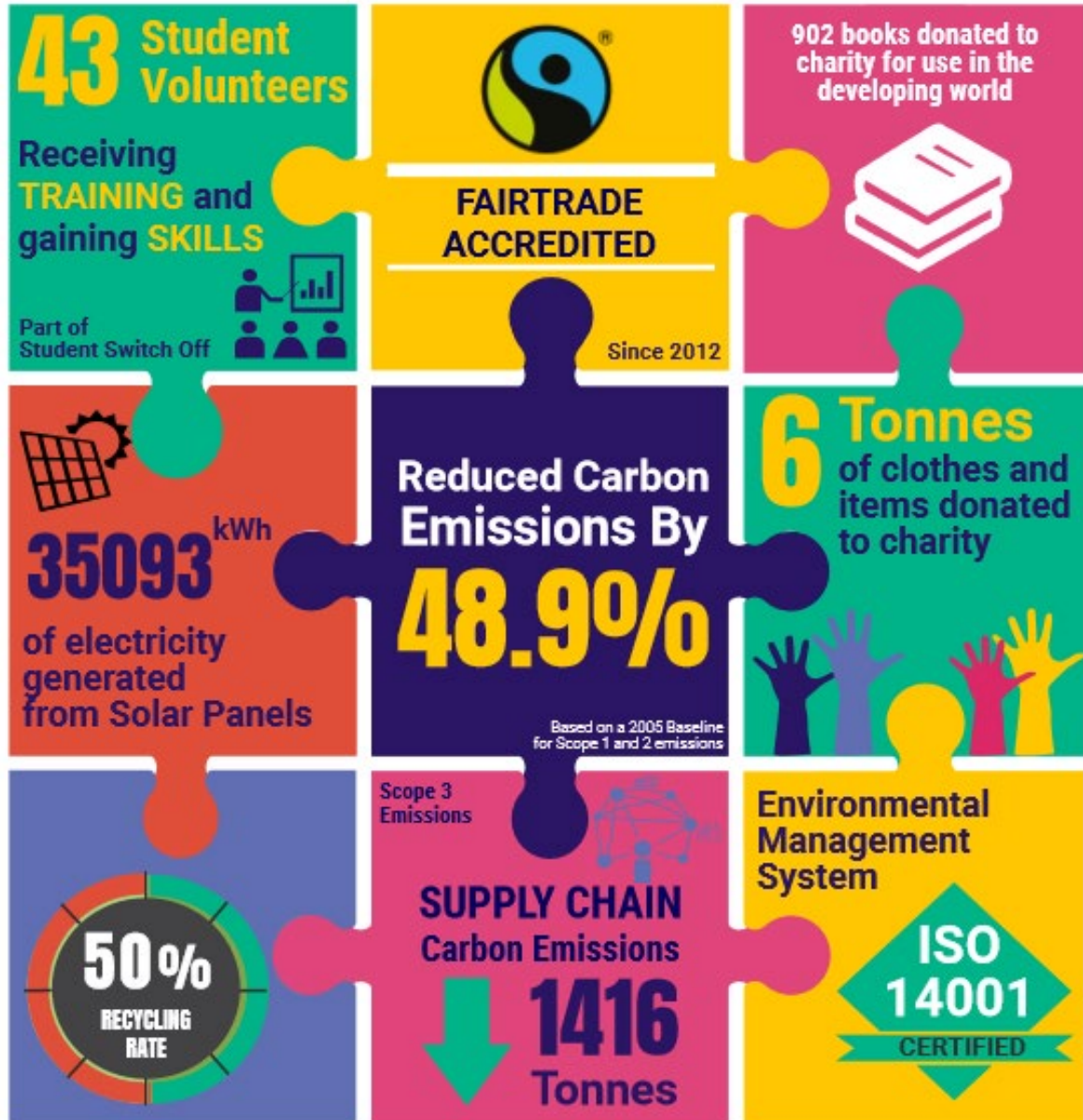
## A WORD OF THANKS

Improving sustainability performance is down to both individual and collective effort. The University sees all our staff, students, service partners and suppliers as part of our sustainability team, where everyone has a role to play in reducing our impacts and developing opportunities and solutions that can help improve the University and the world beyond it.

A thank you goes to everyone who goes the extra (sustainably travelled) mile to make a positive improvement in their work or studies.

Particularly we would like to thank our Sustainability Management Board Chair, Per Reiff-Musgrove who has been a great supporter in helping drive forward change. We would also like to thank Kimberley Lewis who has been critical in helping us improve our environment management, data analysis, reporting and communications (including designing our Annual Report). Both are leaving Greenwich in the summer of 2019 and the sustainability team wishes them well for their futures.

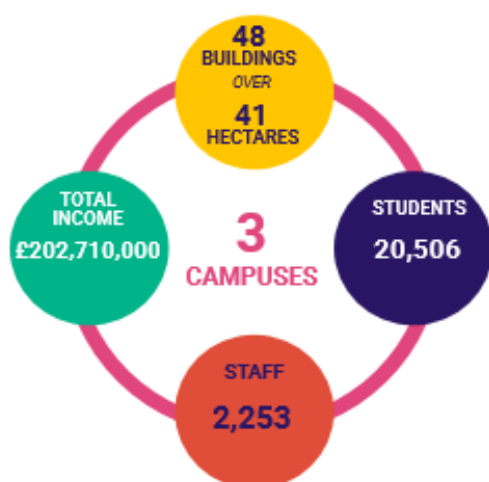
# 2017/18 HIGHLIGHTS



# INTRODUCTION

At the University of Greenwich our mission is to transform lives through inspired teaching and research. We seek to improve society and the lives of all those who study with us through the embodiment of our values of excellence, determination, inclusivity, creativity and ambition.

Based at three historically rich campuses, we combine rich heritage with significant high-tech learning and research facilities, providing an environment which stimulates enquiry, celebrates scientific endeavour, and promotes well-being.



## OUR APPROACH TO SUSTAINABILITY

The nature of our organisation is complex, and the social, economic and environmental impact of our activities and the extent of our academic influence are as far reaching as they are long lasting. However, so too are the influences on the University.

This is why we take a risk management approach. We seek to anticipate regulatory changes, student needs, resource demands and internal requirements, as well as the longer term global mega-trends that will ultimately affect all our futures. Understanding and recognising these influences in the context of the University allows us to plan for the future, helps us achieve our goals and create a resilient institution.

We are motivated by our ability to empower change, the difference we as individuals can make and the significance of our global contribution when we act together; from the smallest action to life-changing research.

Our Sustainability Policy is ambitious and wide-ranging, providing high level aims and objectives that help drive efficiencies and raise awareness amongst the next generation of leaders. How we are progressing on our policy is set out within this report.

## GOVERNANCE

The Sustainability Management Board (SMB) exists to help provide direction and accountability for the delivery of sustainability at Greenwich.

The Board comprises professional services staff with responsibilities for key sustainability related impacts including Estates and Facilities, Finance, Procurement, and Information and Library Services.

Importantly it also includes key representatives from our Faculties and the Students' Union to ensure the group can connect our students, academics (including teaching and research staff) to the potential that exist in the application of sustainability at Greenwich. It also helps us take advantage of the many opportunities that we can utilise coming from within and outside of the University relating to sustainability.

To view a copy of the SMB structure visit: <https://blogs.gre.ac.uk/greengreenwich/sustainability-management-board/>

## ABOUT THIS REPORT

The University is fully committed to functioning as a socially responsible and sustainable institution, aiming to minimise our impact on the environment and to achieve significant cultural, economic, environmental and social contributions at local, national and international levels.

This report has been prepared by the Sustainable Development Unit to illustrate the University's performance against our most significant sustainability impacts for the academic year 2017/18 and includes examples of our achievements as well as tips that our students, staff and wider community can take to continue supporting our goals.

The data for this report represents our owned activities only and is sourced from the Estates Management Record 2017/18 that is publicly available from the Higher Education Statistics Agency (HESA).

It is important to us that we create materials that our students, staff and other interested parties want to engage with, therefore your feedback is welcomed and encouraged. If you have suggestions for future content or any questions regarding the data within this report and the work the University is doing then please contact us:

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- ☎ 0208 331 8794
- 🐦 @sust\_Greenwich
- 📘 @UoGSustainability
- 🌐 www.greewich.ac.uk/sustain

# SUSTAINABLE DEVELOPMENT GOALS

In 2015 the United Nations launched the Sustainable Development Goals (SDGs). These 17 goals with associated targets are to be achieved by 2030 through individual and collective action on a local to global basis. Institutions such as the University of Greenwich have a key role in highlighting the goals and applying and helping achieve them in our teaching, research and operations. The SDGs are relevant as almost every subject we teach will relate to at least one of them, opening up explorations into sustainability teaching and research.



We can support this goal through the teaching and research we do illustrating that poverty can often be avoided through the decisions and actions made systemically and through effective interventions.

Work for example undertaken by the Natural Resources Institute (NRI) has a powerful role in reducing hunger, particularly through protecting crops and produce and improving the livelihoods of workers in the developing world.



The University and the Students' Union (SU) work hard to help our stakeholders access and utilise services to improve health and well-being. In addition to this we provide excellent teaching, training up paramedics, nurses and midwives.

We are proud to deliver high quality teaching and especially reach out to individuals in our local communities who may not consider tertiary education as relevant to them.



We act strategically to ensure that we can achieve gender equality objectives. We have in place policies that are carried out to give equal opportunities regardless of gender.

Access to clean water is a fundamental right. At Greenwich we enable academic and student research to improve the access and availability of clean water and sanitation. We ensure free water is available to staff and students.



Academics in Medway continue to conduct research looking at how novel new approaches can be used to create cleaner fuels. Work by Professor Pat Harvey exploring the use of algae to create biofuels is just one example.

Greenwich academics, including the research group the Greenwich Political Economy Research Centre, have been working to support this goal for a number of years producing invaluable findings and research papers.



A large amount of our teaching and research is devoted to improving the capabilities of business through innovation and the improvement of systems upon which societies depend.

The University is proud of its inclusive nature and the progress it has made in improving the equality of the needs and expectations of our diverse communities.



Research and work by Systems Management and Strategy and Tourism and Events departments illustrates how Greenwich is helping enable cities and towns to thrive and do so sustainably.

Creating more with less makes good economic and environmental sense. As a university our work output has been growing although we produce less carbon dioxide and generate less waste.



We have many academics working on climate change including one who has been recognised as contributing to the award of the 2007 Nobel Peace Prize to the Intergovernmental Panel on Climate Change.

Plastic waste in our oceans is one of many impacts that are becoming more obvious. Work by our Greenwich Maritime Centre is undertaking important work helping protect these precious spaces.



We improve the natural habitats of our estates through the work our Ecosystems Services Steering Group does. Our research and teaching, especially at Medway, is of real importance and impact in helping meet this global goal.

The University's teaching and research staff are involved in helping achieve this in particular through the work done by the NRI and the Business School.



Achieving the SDGs will not be done by individuals and organisation working in isolation. Greenwich prides itself in the partnerships and collaborations it has fostered, many of which are contributing in the attainment of the SDGs.

## To reduce energy use and to further explore the possibilities of less carbon intensive energy sources

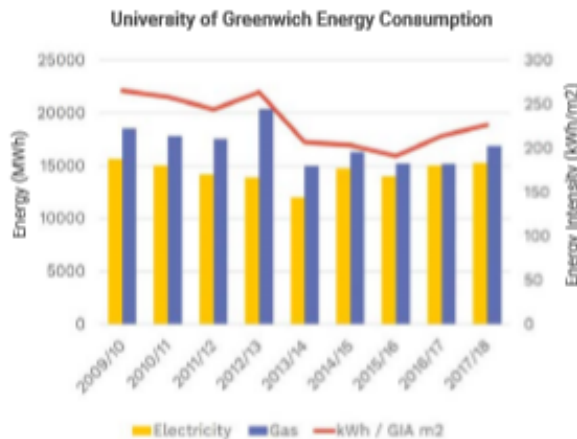


### ENERGY

Our energy consumption has a significant impact on the environment as well as our utilities spend. Costing approximately £3 million a year, it is important that as a University we strive to meet our energy needs as efficiently as possible, ensuring we optimise resource use, deliver value for money and minimise our reliance on the burning of fossil fuels.

In 2017/18, we used **32.2 million kWh** of energy, equivalent to meeting the annual energy needs of 2,000 homes. The vast majority of this energy, **94%**, was used in our non-residential buildings.

A breakdown of our electricity and gas consumption is shown below together with an indication of our energy consumption per meter square of estate (Gross Internal Area (GIA)).

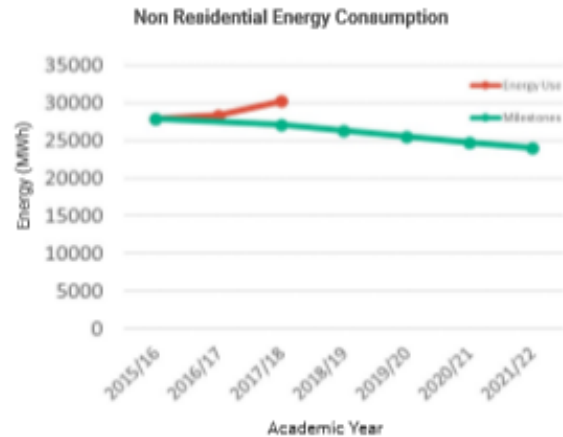


Our current energy use is 12% lower than in 2009/10, though there has been a gradual increase in consumption since 2014 due in part to additional buildings such as Stockwell Street. However, there is still work to do.

The University has set a strategic KPI to reduce our energy consumption by 14% by 2022 across all non-residential areas. This has been set against a 2015/16 baseline as it best represented our operations at the time.

The graph opposite shows current performance against key milestones.

**Target** To reduce Non Residential Energy Consumption by 14% by 2022 from a 2015/16 baseline



Since the baseline position in 2015/16 our estates have seen the addition of Devonport Halls, the Medway Student Hub and the Dreadnought building, all of which have inevitably contributed to increases in energy consumption across our estates. Over the next twelve months the team will be preparing a plan of works to optimise energy use in our highest consuming areas. Key works includes improved monitoring, boiler upgrades in Greenwich and Medway, an environmental reset of Stockwell Street and the introduction of efficiency improvements within refurbishment works at Avery Hill.

For the past four years the University has been working with Student Switch Off to influence the energy using behaviour of our students in our halls of residence.

This project trains our students to become energy saving ambassadors who influence residents to save energy through simple but impactful measures. These can include turning down heating and putting on an extra layer, putting lids on pans, having shorter, cooler showers, switching off electrical items etc. Residents are incentivised through the awarding of prizes (tubs of Ben & Jerrys ice cream).

Five tonnes of carbon and 13,000kWh of electricity were saved, equating to 408,844 cups of tea. Over 2,300 students living in our halls were reached.

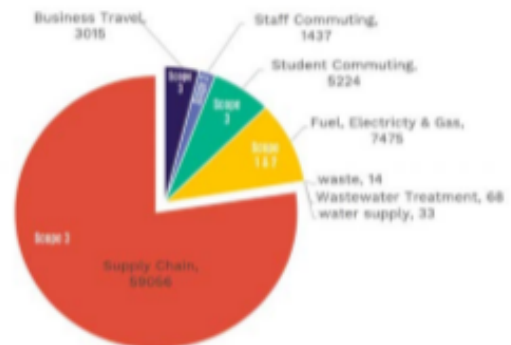
**To reduce energy use and to further explore the possibilities of less carbon intensive energy sources**



**To achieve a 40% reduction in Scope 1 & 2 emissions by 2020 against a 2009/10 baseline (Carbon Management Plan target)**

Our Scope 1 and 2 carbon emissions, that's the carbon produced directly from sources owned by the University (i.e. gas used for our boilers and fuel in our vehicles) and purchased electricity, have been reduced by **48.9%** as compared with our 2005 Higher Education Funding Council for England (HEFCE) target of a 40% reduction to be achieved by 2020.

A separate Carbon Management Plan (CMP) target that includes a wider scope of carbon contributions from our estate has continued to improve, with a 27.2% carbon reduction against our 2009/10 CMP baseline. The 40% reduction target to be achieved in 2019/20 will require a number of significant improvements to the efficiency of our estate and operations. The Dreadnought building will be operational from 2018/19 and will add to our absolute emissions, meaning further efficiencies and initiatives similar to the Medway Combined Heat and Power system will be essential to help meet this carbon target.



This pie chart breaks down our carbon footprint into a range of categories. Procurement (categorised as Scope 3 emissions) has a significant impact on our carbon emissions suggesting we need to buy less or buy items or services with a lower carbon footprint. Travel is also significant particularly private transport (cars) for commuting and the use of flights (a short-haul return flight from London to Edinburgh contributes more CO<sub>2</sub> to the atmosphere than the average annual emissions of a person in Uganda or Somalia).

## BE THE CHANGE:

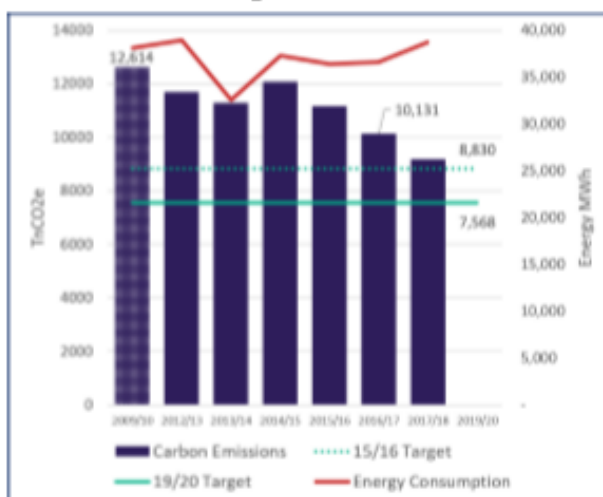
### On Campus

- Switch off lights and non-essential equipment including chargers when not in use
- Ensure doors and windows are closed when it's cold outside and in air conditioned buildings when its hot outside
- Use the University bus services rather than your car when travelling between campuses - or teleconference
- If you have an idea to save carbon then act on it or share it with the sustainability team.

### At Home & in Halls

- Put on another layer and turn down the heating
- Eat less red meat and dairy
- Switch off electrical items when not in use
- When making a cuppa, boil only the water you need
- Take shorter, cooler showers (aim for less than four minutes)
- Put lids on pans when cooking
- Cook communally/batch cook and store safely
- Consider the carbon footprint beyond the energy you use e.g. the carbon embedded in products and services you buy, the travel you take, etc.

**Carbon Management Plan Performance**



**To minimise harmful emissions arising from business travel, commuting & deliveries**



## TRAVEL & TRANSPORT

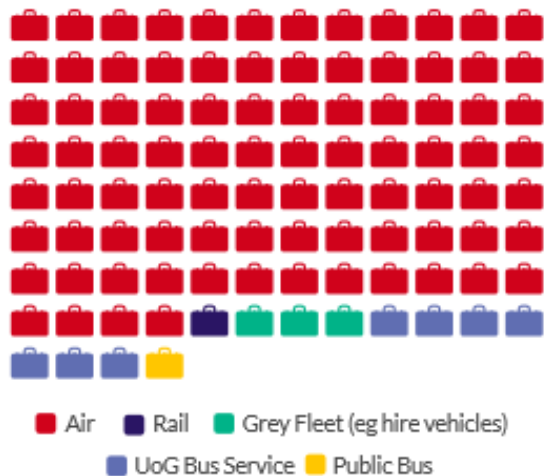
- To achieve a 40% reduction in Scope 1 university vehicle fleet emissions by 2020 (2009/10 baseline) **10% reduction achieved by 2017/18**
- To achieve a 20% reduction in Scope 3 work related travel emissions by 2020 (2012/13 baseline) **45% reduction achieved by 2017/18**
- To achieve a 20% reduction in Scope 3 commuting emissions by 2020 (2007 baseline) **2% reduction achieved by 2017/18**

Our transport needs have substantial environmental impacts but through changing behaviours or modes this can be reduced. Impacts include traffic congestion, carbon emissions, air, water, noise and light pollution, road casualties, stress and the fracturing of communities.

The University has made progress in the improvement of services to encourage a shift away from private car use and has invested significantly in zero emission electric, hybrid and cleaner diesel vehicles.

Research suggest that by 2036 London will have ten million residents, over a million more than now. To cope the city will not be able to build more roads and improve mass public transit systems in time. To avoid gridlock we will need to change our travel behaviours, reduce our use of private vehicles and walk, or cycle more.

Proportion of Carbon Emissions by Business Travel Type (TnCO2e)



Proportion of Carbon Emissions from Student & Staff Commuting by Travel Type (TnCO2e)



- Car
- Bus
- Train
- Underground
- Other - Motorcycle, Coach, Taxi & Ferry

### BE THE CHANGE:

#### On Campus

- Use the University bus system rather than your car when travelling between campuses
- If you don't physically need to be somewhere call, tele/video conference or Skype
- If you drive then car share using this platform: <https://liftshare.com/uk/community/unishare>
- Need an incentive to walk, cycle run or carshare (Medway) to work? Then use the Better Points App to gain tickets to win prizes
- Reduce the number of flights you or your department takes.

#### At Home and in Halls

- If you are able to; walk, run, cycle, or use public transport rather than drive
- Otherwise consider an electric vehicle
- Get rid of your car and join a car club
- Avoid or reduce flying if you can as this has a huge carbon footprint.

**To prevent pollution and to promote 'zero waste', encouraging Reduce, Reuse, Recycle to minimise our impact**

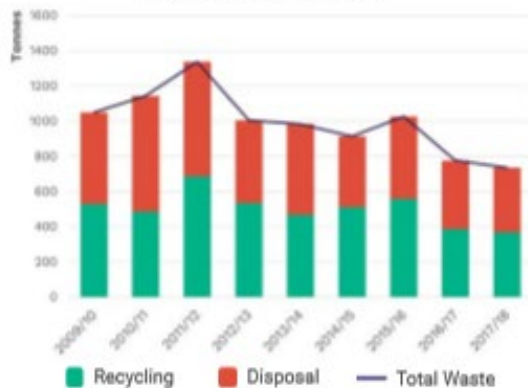


## WASTE & RECYCLING



- To achieve a 70 % recycling rate (by weight) of non-construction wastes
- Reduce total weight of non-construction wastes by 5% annually

Waste Recycling & Disposal

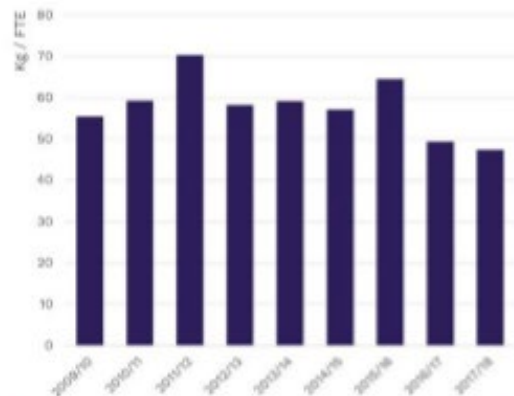


The above graph shows we are continuing to generate and dispose of less waste than ever, with a 30% reduction since 2009/10. Although we have missed the reduction target the improvement is impressive and we continue to expect further reductions through initiatives, such as the surplus reuse platform Warpit, that are in the planning stages. Possible reasons for this improvement includes reductions in procurement and the use of paper as increasingly we are moving towards more electronic processes.

The graph also illustrates that our recycling rate has remained steady at 50%. Although this is a very slight improvement it is below what we could expect. Evidence from bin audits indicates that there continue to be high levels of recyclable materials that are put in our general waste bins. There is also, in some places, high contamination of non-recyclable waste in our recycling bins, meaning that sometimes the whole recycling load is deemed contaminated and must be incinerated.

The University recycling target of 70% is achievable but means that all waste generated by staff and students must be separated effectively and put into the correct waste bin to avoid contamination.

Waste Produced per Staff, Researchers & Students (FTE)



## BE THE CHANGE:

Follow the Waste Hierarchy:

- Avoid potential waste being generated in the first place through wise purchasing decisions
- Reuse or share what you can
- Recycle all that is possible
- Dispose carefully so as not to contaminate recycling streams.

### On Campus

- Follow the guidance on the waste and recycling bins
- Ask for china or use your own reusable coffee cups at our catering outlets
- Refill your water bottles for free at our cafe water points, at our water fountains and selected kitchenettes
- Use the surplus reuse platform Warpit ([www.warp-it.co.uk/greenwich](http://www.warp-it.co.uk/greenwich))
- if you generate a lot of waste through your work set up a plan to tackle this as it is a cost and often indicates inefficiencies that can be fixed.

### At Home and in Halls

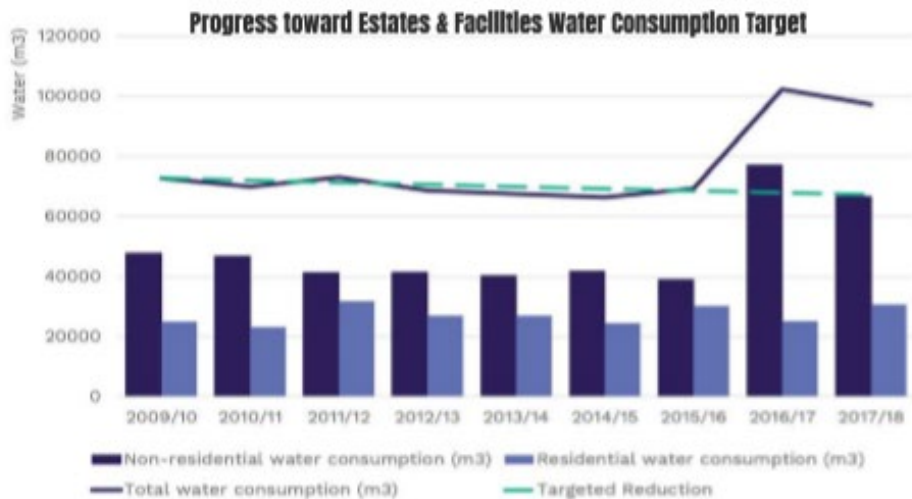
- Buy less stuff. There is often a large environmental impact through what we buy and use
- Items you don't need should be given to charity (or use our British Heart Foundation bank at the Southwood site).



**To reduce water use and establish a utilities monitoring and targeting system**



**WATER**



**To reduce water consumption by 1% per annum**

Water is a commodity that is often overlooked yet is essential to our survival. It is also scarcer than we think and it is likely both through the increasing demands for water in London and with the impacts of climate change, that water shortages could soon become common in London and the South East.

In 2017/18 we again missed our water consumption reduction target, in large part due to an irrigation system on the Stockwell Street landscaped roofs being left on. Often leaks are hidden yet can have a significant negative impact on our performance. There is also a cost as water is not free. Lower flow taps, toilet cisterns and waterless urinals have been integrated within the Dreadnought building

Our residential (halls) water use increased too so we ask our student residents to be careful with how they use water and follow some of the tips in the side panel.

**BE THE CHANGE:**

**On Campus**

- Turn off taps or don't leave them running for longer than you need to
- Report dripping taps and leaks to your campus FM Helpdesk
- If you do research work, check that you are using only the water you need to effectively undertake your work.

**At Home and in Halls**

- Take shorter showers - aim for 4 minutes as a maximum
- When using a dishwasher or washing machine only run when you have a full load
- Turn off the tap when brushing your teeth (use a cup of water instead)
- Use a washing up bowl rather than rinse under a running tap.

“ To work with catering contractors to ensure our food policy is met and our Fairtrade accreditation maintained ”



## SUSTAINABLE FOOD



- Fairtrade Foundation University status maintained
- Food for Life Gold maintained
- Marine Stewardship Council Award for sustainable fish maintained

The University is proud of the work it has done in improving the sustainability of the food it provides.

We have attained Food for Life Gold at all our outlets and for all our menus, as well as being a Fairtrade Foundation University since 2012.

Working in partnership with our caterers Baxter Storey (who provide food at all campuses apart from Southwood Site), Sodexo (who provide catering at the Dome) and the Students' Union we have collaborated to develop initiatives and partnerships that are recognised externally.

In 2017/18 the University employed two graduates who developed the 'Reuse Race,' an incentive scheme encouraging hot drink consumers to use china or reusable takeaway drinks containers. The concept is that the higher the percentage of reusables used then the higher the discount that will be given to these users. The project ran from February to March 2018 and proved very successful. It was shortlisted as a Finalist at the Environmental Association of Universities and Colleges Green Gown Awards Scheme in 2018, and the initiative has been run again at the University.

Full results can be found using this link: <https://bit.ly/2Z47lwp>

## BE THE CHANGE:

### On Campus

- Choose more sustainable menu options, reduce your consumption of meat (particularly red meat) and dairy, and select local, organic and Fairtrade food items
- Use/ask for a china cup/mug when in the cafes or bring your own re-usable cup for takeaway hot drinks. At University catering outlets you will receive a 10p discount for every hot drink you buy
- Free water is available at outlets, at drinking water fountains across our campuses and in selected kitchenettes
- Remember to put any unwanted food, and packaging in the proper waste container
- Try to avoid wasting food - request a box to take away your left-over lunch to eat later
- Become a staff or student representative on the Sustainable Food Steering Group.

### At Home and in Halls

- Avoid food waste and buy only what you know will be consumed
- Avoid over-packaged food items
- Buy fruit and veg that is seasonal and locally grown
- Try cutting out meat even if it's just for a couple of meals a week
- Avoid foods that you think may have been air freighted (e.g. asparagus from Peru)
- Compost all of your waste food and peelings.

## Our Intern Highlights



Ethical & Fairtrade Fortnight AND Green Week

25

Events organised across 3 Campuses



203%

Increase in Twitter Engagements



31.5%

Hot Drinks Purchased in Reuseable Cups at Pilkington Cafe

A New Sustainability Facebook Page



Dr Bike

Workshops at Greenwich & Avery Hill

email: [sustainability@gre.ac.uk](mailto:sustainability@gre.ac.uk)

10

@Sust\_Greenwich

**To protect and conserve the heritage buildings we occupy and to actively protect and enhance wildlife on campuses**



## ECOSYSTEM SERVICES

 **To develop and implement a biodiversity policy that seeks to protect and enhance wildlife on campus. Achieved**

We are fortunate to have three beautiful and varied campuses. Each of these offer opportunities to encourage nature to thrive.

Ecosystems services is a term used to describe the many and varied benefits that humanity freely gains from properly functioning ecosystems. These provide us with agricultural produce, timber, and aquatic organisms such as fish. They also provide us with clean drinking water, the decomposition of waste, and the natural pollination of crops and other plants, essential to our own success as a species.

Our landscape roofs at Stockwell Street provide us with research, teaching and leisure space, meet users wellbeing needs, provide food crops, support pollinators and other important insects and reduce the impact of flooding by storing rain water in the soil.

Our Southwood Campus at Avery Hill has many different habitats, including established woodland, laid hedges, wildflower meadows and ponds. There is also an organic food garden and a forest garden, both run by volunteers. The diversity of habitats brings an abundance of insect, bird and animal species. This then brings opportunities to use the spaces for teaching, research and leisure and wellbeing, illustrating that the protection and improvement of our natural spaces is an investment vital to all our futures.

The beautiful Medway campus has woodland areas, green spaces, beehives, and is the home for a significant amount of critically important research and teaching on Ecosystem Services, farming and land use practices.

## BE THE CHANGE:

### On Campus

- Get out into our natural spaces, your local park, or the countryside if you can. Appreciating nature is important to human wellbeing, helping us to connect with nature and encouraging us to protect it when it is threatened
- Consider how you can use our natural spaces for your teaching, learning and research. This guide explains how you could do this at Greenwich: <https://bit.ly/2M1x8YC>
- Volunteer to undertake species surveys, help improve our natural spaces or volunteer at the Community Edible Garden at Southwood Site.
- Look out for University of Greenwich honey in our Students' Union shops - produced by our own bees
- This is your campus, don't litter - it's unsightly and harms nature on land and in water
- Take part in events including harvesting in the summer.

### At Home and in Halls

- If you can, set aside space for nature, let weeds grow and allow your lawn grow longer if you have got one. Build log piles or a pond to encourage wildlife
- Even having a pot plant or two can help you connect with nature
- Volunteer with a local nature volunteering group such as a Wildlife Trust or RSPB
- Consider your day-to-day actions and how they can impact on nature. Make decisions that can protect nature rather than damage it. Eat less meat, eat organic and Fairtrade, buy less stuff
- Use less energy (including flying less) as climate change will have one of the biggest impacts on nature.

## To incorporate the principles of sustainable development into all new build & refurbishment projects



## CONSTRUCTION & REFURBISHMENT



To meet BREEAM Excellent/Very Good standard according to the value and type of project

The University has a rich and varied estate, ranging from the historic 17th Century architectural masterpiece of Greenwich Maritime and the Edwardian redbrick splendour of Medway Campus to the parkland mosaic of buildings at Avery Hill and the futuristic and sympathetic BREEAM - Excellent rated Stockwell Street Building.

Each of our buildings has unique challenges, particularly in making them meet the dynamic nature of our teaching, student and staff needs. Our Estates Team works throughout the year consulting, designing, planning, building and reviewing our buildings.

The Dreadnought project, a £30m redevelopment of a Grade 2 listed building at our Greenwich Maritime campus has been the main estates project for the University. The aim was to build a student hub, a space containing all the elements that support our students to thrive at Greenwich. From Autumn 2018 this will be the home of the SU, including its offices and work spaces, bar, entertainment spaces and gym, Student and Academic Services, ILS, plus part of the Faculty for Education and Health. The space will also be the main catering outlet for the campus and it will provide exhibition and events space using the huge atrium that encapsulates the original building's courtyard.

There was extensive consultation with users of the building to ensure that it would meet the current and future needs of the varying users. During construction guided tours were given to ensure staff and students understood how the building could work and to answer any questions that arose. These tours were particularly valuable to some of our teaching programmes, giving our students direct experience of how complex building projects are undertaken.

The building has a number of sustainability features. A key one is that by retaining the building the 'embedded' carbon of the structure is not wasted when compared to a new build. In addition the steel and wood structure of the atrium has a lower impact than concrete and the use of tempered air handling means the building can operate effectively without energy intensive air conditioning.

The 2018 summer heatwave focused our minds on the potential impact of climate change and particularly increased summer temperatures on our estates. Research conducted by one of our volunteers was presented to our Estates team so that we are now better aware of how to design and plan for the expected changes in our climate.

The University also delivered some further refurbishment projects including:

- The University of Greenwich International College (UGIC) which required a redevelopment of the ground floor of part of Devonport House to create office and teaching space, and,
- The Medway Greenwich Research and Enterprise students and staff research areas in Pembroke which were upgraded, integrating sustainability principles in the design and fit out including the use of carpet tiles that are made from discarded fishing nets (a significant risk to sea life).

## BE THE CHANGE:

### On Campus

- Participate in consultations on future plans for our campuses and estates
- Consider how your academic research could help us make further improvements in construction and refurbishment projects, following the 'Living Lab' concept.

### At Home

When making changes to your home seek to reduce the impacts of the work:

- Select low VOC paints and adhesives
- Try and reuse materials that may otherwise be thrown away
- Ensure that projects maximise energy efficiency, including insulation
- Avoid cement and concrete if you can as this has a high carbon footprint
- Safely dispose of potentially hazardous chemical and other materials.

**To actively encourage and support the teaching of and research into sustainable development in the University**



**EDUCATION & RESEARCH**

The university sector has a major role in helping deliver sustainability and contributing to the Sustainable Development Goals (SDGs).

The ability to influence and engage our student body on sustainability is a real opportunity. Research conducted by the Higher Education Academy and the National Union of Students clearly also shows that students demand sustainability is taught to them. Rising awareness of global challenges and the need for action means students are wanting to be part of the solution and we can therefore illustrate the relevance of sustainability and integrate it into our courses. Having sustainability literate graduates is increasingly important to employers who are looking for the skill sets that sustainability learning and application can bring.

Many of the solutions we need will come from research and innovation from the university sector. The Natural Resources Institute is seen as a global leader in areas of agronomy, crop and pest science, climate change and food storage. Academics are capitalising on research, creating spin out businesses able, for example, to make construction materials out of waste and creating net carbon negative products (Carbon8).

**STAFF PROFILE**

**Dr. Andres Coca-Stefaniak**, Associate Professor of Tourism and Events at the Faculty of Business, launched the first edition of a new undergraduate taught module in Sustainable Tourism in January 2018, along with another new undergraduate course in Sustainable Events planned to start in September 2018. In March 2018, building on his 16 years of research on the management and competitiveness of town centres and high streets, he submitted written expert evidence to a UK Parliament inquiry on "High Streets and Town Centres in 2030", which was launched to investigate the decline of the UK's high streets in terms of their social sustainability and economic viability.

**BE THE CHANGE:**

**In Teaching**

- Consider how sustainability relates to your subject. As a teacher, explore how you could apply sustainability or the SDG's to your courses
- As sustainability is rarely out of the news always consider connecting live stories and issues to the student's learning
- If you teach sustainability elements in your subject then include reference to this in your course descriptions as many students are keen to choose courses relating to sustainability
- Collaborate with staff or join an Education for Sustainable Development community of practice to share ideas around how to teach and engage your students in sustainability
- Explore the research findings around student interest in sustainability teaching: <https://sustainability.nus.org.uk/articles/student-expectations-for-action-on-sustainability-as-strong-as-ever>

**In Research**

- Consider how you can use the 'lens' of sustainability to create novel research perspectives, or alternatively consider how your research could tackle some of the many local and global sustainability challenges
- Sustainability offers great opportunities for interdisciplinary research. Reach out to researchers across the University to see how you can collaborate to solve or inform some of the key sustainability challenges we face
- Use our estates data for your research - contact us to find out more.

## Part III. Measurement of Outcomes cont.

Annual Statement on Research Integrity - <https://docs.gre.ac.uk/rep/gre/annual-statement-on-research-integrity-2017-18>

University of Greenwich PRME Report 2018 - <https://www.unprme.org/reports/PRMEreportUoG2018.pdf>.

University of Greenwich Annual Sustainability Report 2017-2018 - <https://docs.gre.ac.uk/rep/ef/annual-sustainability-report-2017-18>

University of Greenwich Strategic Plan - <https://docs.gre.ac.uk/rep/vco/strategic-plan>

NRI Annual Review 2017-2018 - <https://www.nri.org/publications/annual-review/38-annual-review-2017-2018/file>

Mandatory training for staff which includes courses in Bribery Prevention; Data Protection; Equality and Diversity Essentials; Managing Diversity and Safeguarding against Extremism <https://www.gre.ac.uk/staff-development/compliance>

Anti-Slavery and Human trafficking statement - [https://docs.gre.ac.uk/\\_data/assets/pdf\\_file/0010/1643860/Modern-Slavery-Act-Annual-Statement-of-Compliance-2018-19.pdf](https://docs.gre.ac.uk/_data/assets/pdf_file/0010/1643860/Modern-Slavery-Act-Annual-Statement-of-Compliance-2018-19.pdf)

Anti-Bribery policy - : <https://docs.gre.ac.uk/rep/human-resources/anti-bribery-policy>

Sustainability Policy - <https://docs.gre.ac.uk/rep/ef/sustainability-policy2>

Our [Sustainability Management Board](#) has responsibilities to help develop and implement our strategy and to help achieve our goals.

Our sustainability work is extensive and we would like to share this with you. [Visit our sustainability information and support hub](#) to explore what we are doing, and to find information about how you can learn and help us all move towards our sustainable vision.

Sustainability Facebook page: <https://en-gb.facebook.com/UoGSustainability/>

Gender Pay Gap report - <https://docs.gre.ac.uk/rep/human-resources/gender-pay-gap-report>

Work of the BHRE - <http://www.bhre.org/> and <https://www.gre.ac.uk/ach/research/centres/bhre>

Work of the NRI – [www.nri.org](http://www.nri.org) and <https://www.nri.org/publications/annual-review/38-annual-review-2017-2018/file>