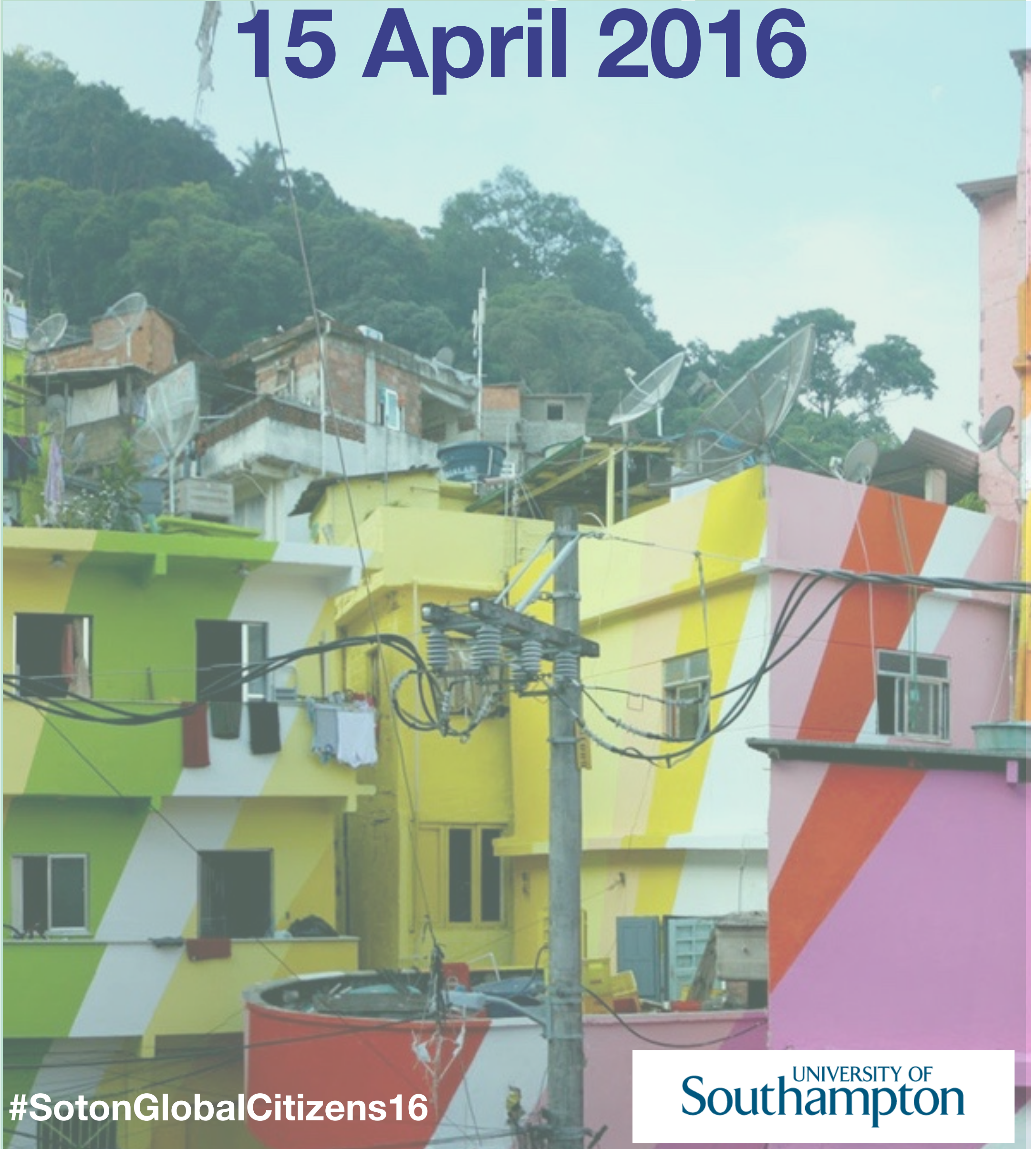


# Educating Global Citizens Research Symposium 15 April 2016



#SotonGlobalCitizens16

UNIVERSITY OF  
**Southampton**

# Welcome

**Welcome to the inaugural International Student Sustainability Research Symposium!**

We are thrilled you are joining us for this unique event where every research presentation and poster will be delivered by, has been peer-reviewed by, and will be chaired by undergraduate and postgraduate students. We are delighted to welcome delegates from not only Southampton, but also from Sweden, Mexico, Germany and across the United Kingdom. Please do use the day to learn from each other, to explore unfamiliar subject areas, and to network with colleagues from different academic disciplines and universities.

As you will see from the programme we have a packed day where you will be able to explore the social, economic, cultural and environmental dimensions of sustainability. We are delighted to be able to present such a rich diversity of excellent student work to you, through our keynote speakers, parallel sessions, and posters. Once colleagues have finished presenting, please do not be shy about asking them questions as everyone loves to talk about their personal work!

I would like to extend my sincere thanks to everyone who has made this symposium possible - our keynote speakers Jakob and Lydia, all our speakers and poster presenters, the Judging Committee, the Chairs, the Social Media Team, the Conference Illustrators, Shruti Verma (SUSU VP Education) for being so supportive and generous with her time from the very start, and to the University Education Enhancement Fund for funding and supporting our event.

Finally, enormous thanks to the Symposium Leadership Team Julia, Imogen and Beckie who are absolutely priceless and beyond compare, and to you all for attending and contributing to the symposium – there

Professor Simon Kemp,  
University Lead, Education for  
Sustainable Development



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# Programme

<u>Time</u>	<u>Activity</u>	<u>Location</u>
<b>09:30 - 10:00</b>	Registration, Refreshments & Posters	Level 2
<b>10:00 - 10:10</b>	Welcome	Lecture Theatre A
<b>10:10 - 10:40</b>	Keynote Speech- Jakob Grandin	Lecture Theatre A
<b>10:40 - 10:55</b>	Grab a Drink	Level 2
<b>11:00 - 11:45</b>	Parallel Sessions	Rooms 1-5
<b>12:00 - 12:10</b>	Vice Chancellor's Address	Lecture Theatre A
<b>12:20 - 13:20</b>	Lunch	Hartley Suite, Building 38
<b>13:30 - 14:00</b>	Parallel Sessions	Rooms 1-5
<b>14:00 - 14:15</b>	Break- Room Change	-
<b>14:15 - 15:00</b>	Parallel Sessions	Rooms 1-5
<b>15:00 - 15:30</b>	Refreshment Break & Posters	Rooms 1-5
<b>15:30 - 16:00</b>	Keynote Speech- Lydia Butler	Lecture Theatre A
<b>16:00 - 16:30</b>	Prize Giving and Symposium Close	Lecture Theatre A

The main event will be held on Levels 2 & 3 of Building 7 (Engineering & the Environment)

Lunch will be available from 12:20 in the Hartley Suite, Building 38  
If you need directions, please ask a member of the Symposium Team

#### **Wifi:**

Eduroam is available throughout the Highfield Campus  
If you are not on Eduroam you can log into 'The Cloud'

# Keynote Speakers



**Jakob Grandin**  
**@JakobGrandin**

**Educational Coordinator at the Centre for Environment and Development Studies (CEMUS)**

Jakob has worked with interdisciplinary, student-led university education for ten years. He co-initiated one of Sweden's first integrated university courses in Sustainable Development, and is currently creating a Massive Open Online Course (MOOC) on Climate Change Leadership. Jakob has also worked at the secretariat for the Baltic University Programme, where he developed student conferences on climate change, education and human rights. His key concern is to reframe sustainable development from a science of environmental problems to a creative process that enables pluralistic and socially just transformations to sustainable futures.



**Lydia Butler**  
**@LydnobutsButler**

**European Environment and Sustainability Graduate at Samsung Electronics**

Lydia Butler currently holds an environmental business support function for the European Environment Team at Samsung Electronics Ltd. Lydia is responsible for environmental communication, producing training materials, supporting trade shows, applying for environmental awards, competitor analysis and other policy or data support functions for the team or Korean headquarters. She frequently interacts with current sustainability topics related to circular economy, WEEE (waste electrical and electronic equipment), technological environmental innovation, environmental policy, energy efficiency, recycled materials, and supply chains. Lydia has a passion for business responsibility and technology-driven sustainability.

# Parallel Sessions

	Room 1	Room 2	Room 3	Room 4	Room 5
<b>Morning Session</b>	<b><i>Global Politics &amp; Economics</i></b>	<b><i>Global Citizenship</i></b>	<b><i>Managing Resources &amp; Conservation</i></b>	<b><i>Community Energy</i></b>	<b><i>Global Energy</i></b>
<b>11:00 - 11:15</b>	The End of Religious Tolerance? Research into 21st Century Terrorism and Its Social Effects	Women in Combat Roles	Factors Influencing Conservation of Local Wildlife	Bottom line of Community Energy	The Charge Project
<b>11:15 - 11:30</b>	Sustainable Finance	A Study of Environmental and Other Factors in Migration in Rwanda and China, 1982-2000	The relative Importance of Wild and Farmed Fish for Traders and Consumers in the Fish Value Chain in Southern Malawi	Energize Worcester Phase 2	Sustainability of Shallow Geothermal Energy Applications: Why and How to Improve Long-Term Models for Vertical Borehole Heat Exchangers
<b>11:30- 11:45</b>	To What Extent are Violent or Non-Violent Protests More Effective in Producing Democratic Stability in Thailand?	Young People and Governance in Ikorodu, Nigeria	Peak Oil	Energy Attitudes, Behaviour and Behavioural Change of Students Living in University Owned Accommodation	Covalent Immobilization of Enzymes as Catalysts for Biofuel Cell Applications
<b>Afternoon Session</b>					
<b>Afternoon Session</b>	<b><i>Food</i></b>	<b><i>Wellbeing</i></b>	<b><i>Design</i></b>	<b><i>Universities &amp; Society</i></b>	<b><i>Urban Regeneration</i></b>
<b>13:30 - 13:45</b>	Our Diet and Why We Need to Change It	Do Mental Illness and Relative Poverty Affect Household Portfolio Choice? An Empirical Analysis of the USA and the UK	A Pilot Study: Computational Analysis of a Cause and Treatment of Knee Pain in Young Adults and Adolescents	Integration of Sustainable Development in Higher Education: A Case Study in Southampton	Assessing England's Green Belt: Seeking Best Practice in Review Methodologies
<b>13:45 - 14:00</b>	Genetics and Food Security in the Developing World	Derivation and Use of Mouse Embryonic Stem Cell Lines as Model for Mechanistic Analysis of Periconceptional Developmental Programming	Effect of Manganese-Doped Cobalt Oxide Calcination Temperature on the Bifunctional Catalysis of the Oxygen Reduction and Evolution Reactions	Exploring Responsible Knowledge Exchange	Valuing the Benefits of Public Realm Design: A Case Study of Southampton
<b>BREAK (Delegates can change rooms)</b>					
<b>14:15 - 14:30</b>	Drought Tolerance in Bioenergy Crops	Effects of Attachment Styles on Attitudes Towards Prenuptial Agreements	What are the Limitations of Self-Calibration in Electrochemical Oxygen Gas Sensors?	Engineering Thinking: A Research into Theory, Practice and the Development of Critical Thinking Skills within Foundation Year Programme	Adaptive Re-Use: A Sustainable Solution for Southampton's Bargate Shopping Centre?
<b>14:30 - 14:45</b>	The Potential of Agent-Based Modelling as a Tool to Unravel the Complexity of Household Food Security: a Case Study of Rural Southern Malawi	Investigating the Effect of Environmental Features on Student Wellbeing in Halls of Residence	Increasing Sustainability through Optimisation	Repair Café II	Worcester Arts Business Plan
<b>14:45 - 15:00</b>	More crop per drop: Reducing water footprint of herbs		Diethyl Ether as Green Carbon Source in the Synthesis of Carbon Nanotubes by Chemical Vapor Deposition		

# Room 1 (3019)

## Morning: Global Politics & Economics

*Chair: Linda Baines*

**11:00 - 11:15** - The End of Religious Tolerance? Research into 21st Century Terrorism and Its Social Effects  
*Rebekah Rackett (University of Southampton)*

**11:15 - 11:30** - Sustainable Finance  
*Sophia Sun (University of Southampton)*

**11:30 - 11:45** - To What Extent are Violent or Non-Violent Protests More Effective in Producing Democratic Stability in Thailand?  
*Alicia Vaughan-Dick (University of Southampton)*

## Afternoon: Food

*Chair: Christopher Lawson-Johns*

**13:30 - 13:45** - Our Diet and Why We Need to Change It  
*Jasleen Amber Kaur Mahal (University of Southampton)*

**13:45 - 14:00** - Genetics and Food Security in the Developing World  
*Sonal Chagan (University of Leicester)*

**BREAK** (*Delegates can change rooms*)

**14:15 - 14:30** - Drought Tolerance in Bioenergy Crops  
*Joseph Mattocks, Jack Bailey-Bale and Isobel Tickner (University of Southampton)*

**14:30 - 14:45** - The Potential of Agent-Based Modelling as a Tool to Unravel the Complexity of Household Food Security: a Case Study of Rural Southern Malawi  
*Samantha Dobbie (University of Southampton)*

**14:45 - 15:00** - More Crop per Drop - Reducing the Water Footprint of Fresh Herbs  
*Libby Rowland (University of Southampton)*

# Room 1 - Abstracts

## Global Politics & Economics

**The End of Religious Tolerance? Research into 21st Century Terrorism and Its Social Effects:** - Terrorism in the 21st century is unique. No longer a foreign concept to simply be observed, it has become entangled in our everyday lives. This research analyses the extent to which global terrorism has intercepted space – changing everyday thought, attitudes and actions. With modern-day terrorism increasingly justified through religion, the research focuses specifically on changing attitudes towards religion and religious communities.

**Sustainable Finance:** - Studying the sustainability of finance worldwide, this research considers the volatility and fluctuation of stock market and green investment in finance. More than the green investment, the strategy is more than important to know and study in implementation in many financial institutes.

**To What Extent are Violent or Non-Violent Protests More Effective in Producing Democratic Stability in Thailand?:** - This research considers the effect of violent and non-violent protests on democratic stability. Thailand has fluctuated from a stable democracy to a military junta rule for several decades against the backdrop of ethnic tensions and class conflict. This research intends to identify if democracy is sustainable in difficult circumstances, developing a transferable framework to understand the factors necessary for complex authoritarian regimes to transition to a democracy, and what aspects of protests are universally effective.

## Food

**Our Diet and Why We Need to Change It:** - Consumers are increasingly aware of the major contributors to global climate change, notably the vast environmental damage of increased cattle farming for meat and dairy consumption. This research explores alternative to meat-based diets, such as the Western rise of vegetarianism and vegan-ism or eating insects as a main source of protein in parts of East Asia.

**Genetics and Food Security in the Developing World:** - Food security is the attainment of sufficient, nutritious and safe food for everyone. The project will examine the strengths and limitations of genetics in meeting Goal 2: 'Zero Hunger' of the 2015 Sustainable Development Goals. This research includes modelling approaches to analyse hunger around the world, consider social, political and economic factors, and preparing for future food security challenges through the use of seed banks and genomics.

**Drought Tolerance in Bioenergy Crops:** - Drought is the abiotic factor that most constrains crop yield around the world. It is set to increase in frequency and severity with the onset of climate change. This, coupled with population rise and the increased use of bioenergy, creates a need for crops that maintain biomass accumulation under drought. The model tree *Populus nigra* is used to help understand the traits determining drought adaptations in deciduous trees.

**The Potential of Agent-Based Modelling as a Tool to Unravel the Complexity of Household Food Security: a Case Study of Rural Southern Malawi:** - Complex social, ecological and political factors undermine the realisation of food security within developing country contexts. Malawi's vast rural population involved in subsistence farming needs an approach to direct interventions that address the multi-scalar and dynamic nature of food security. Agent-based modelling (ABM) is one possible technique. The project aims to develop a simple ABM to explore potential pathways towards sustainable food systems, taking into account the availability, access, utilisation and stability dimensions of food security.

**More Crop per Drop - Reducing the Water Footprint of Fresh Herbs:** - Irrigation in agriculture uses 70% of all freshwater abstracted worldwide. Reducing water use without detriment to the crop has become crucial; one way is deficit irrigation - applying less than the optimum amount of water required. This imposes a slight stress, which extends shelf life and enhances product quality and flavour. Working with a UK commercial grower, this project uses thermal imaging techniques to reduce water use in fresh herb production.

# Room 2 (3021)

## Morning: Global Citizenship

*Chair: Christopher Lawson-Johns*

**11:00 - 11:15** - Women in Combat Roles

*Ria Lakhani (University of Southampton)*

**11:15 - 11:30** - A Study of Environmental and Other Factors in Migration in Rwanda and China, 1982-2000

*Joel Foreman (University of Southampton)*

**11:30 - 11:45** - Young People and Governance in Ikorodu, Nigeria

*Jonathan Ham (University of Southampton)*

## Afternoon: Wellbeing

*Chair: Jaffar Ridha*

**13:30-13:45** - Do Mental Illness and Relative Poverty Affect Household Portfolio Choice? An Empirical Analysis of the USA and the UK

*Di Wang (University of Southampton)*

**13:45 - 14:00** - Derivation and Use of Mouse Embryonic Stem Cell Lines as Model for Mechanistic Analysis of Periconceptional Developmental Programming

*Pooja Khurana (University of Southampton)*

**BREAK** (*Delegates can change rooms*)

**14:15 - 14:30** - Effects of Attachment Styles on Attitudes Towards Prenuptial Agreements

*Ritika Kochhar (University of Southampton)*

**14:30 - 14:45** - Investigating the Effect of Environmental Features on Student Wellbeing in Halls of Residence

*Rebecca Thomas (University of Southampton)*



# Room 2 - Abstracts

## Global Citizenship

**Woman in Combat Roles:** - The UK is currently the only major NATO power which does not permit women to join forces in combat roles. Since the US lifted the ban on women joining US forces in 2013, there has been an increasing amount of pressure exerted onto the UK to follow suit. The question of female accession has often stimulated conflict among policy-leaders and women; the argument that women are physically weaker has often been raised as a prominent rationale for the proscription of females into combatant forces.

**A Study of Environmental and Other Factors in Migration in Rwanda and China, 1982-2000:** - The massive population movements in China and Rwanda have regularly and incorrectly been attributed simply to economic issues. These examples show how environmental un-sustainability can affect the poorest and richest countries across the planet. This research brings together the often divorced fields of history and sustainability, showing that sustainability and environmental preservation have a historical grounding; establishing this can build more effective policy moving forward.

**Young People and Governance in Ikorodu, Nigeria:** - Young people in Nigeria have become damaged and disempowered by a vicious cycle of corruption and elder based politics. This research aims to analyse young people's role in society and the ability of grassroots projects to enhance their participation and accountability in society and decision-making structures.

## Wellbeing

**Do Mental Illness and Relative Poverty Affect Household Portfolio Choice? An Empirical Analysis of the USA and the UK:** - This paper focuses on the effect of mental illness and relative poverty on USA and UK households' portfolio choices. Longitudinal data is used to understand how mental illness and relative poverty affects ownership probability and the proportion of stock owned. Differences in the results between the two countries are attributed to differences in coverage for mental health and in financial literacy, with policy suggestions offered.

**Derivation and Use of Mouse Embryonic Stem Cell Lines as Model for Mechanistic Analysis of Periconceptional Developmental Programming:** - Environment before birth predisposes people to non-communicable disease during adulthood, according to the Developmental Origins of Health and Disease (DOHaD) concept. Despite the success of IVF technology achieving pregnancy, there is some evidence from IVF children of DOHaD-related disease risk. Using mouse embryos this research is investigating three critical conditions relevant to DOHaD: maternal diet, older maternal age and IVF plus relevant controls.

**Effects of Attachment Styles on Attitudes Towards Prenuptial Agreements:** - in the 'Western' world, binding marriage with anything other than love is discouraged. The practicality of prenuptial agreements (written contracts between two people about to marry, determining financial and social decisions if the marriage ends) is often ignored. This research addresses a current gap: understanding attitudes to and the psychological implications of prenuptial agreements.

**Investigating the Effect of Environmental Features on Student Wellbeing in Halls of Residence:** - Quality of life is a measure of mental health and wellbeing, and is affected by our relationships to prominent features of our environment. This research draws upon NUS statistics showing that up to one in five students experience a problem with their mental health in a given year, and aims to give an insight into the effects of interior design and the environment on students' quality of life.

# Room 3 (3023)

## Morning: Managing Resources and Conservation

*Chair: Jasleen Amber Kaur Maha*

**11:00 - 11:15** - Factors Influencing Conservation of Local Wildlife

*Xavier McNally (University of Southampton)*

**11:15 - 11:30** - The relative Importance of Wild and Farmed Fish for Traders and Consumers in the Fish Value Chain in Southern Malawi

*Heather Brown and Sophie Hocart (University of Southampton)*

**11:30 - 11:45** – Peak Oil

*Samantha Pritchard (Manchester Metropolitan University)*

## Afternoon: Design

*Chair: Anna Tassie*

**13:30 -13:45** - A Pilot Study: Computational Analysis of a Cause and Treatment of Knee Pain in Young Adults and Adolescents

*Shruti Verma (University of Southampton)*

**13:45 - 14:00** - Effect of Manganese-Doped Cobalt Oxide Calcination Temperature on the Bifunctional Catalysis of the Oxygen Reduction and Evolution Reactions

*Alexander Pateman (University of Southampton)*

**BREAK** (*Delegates can change rooms*)

**14:15 - 14:30** - What are the Limitations of Self-Calibration in Electrochemical Oxygen Gas Sensors?

*Venushan Varatharajan (University of Southampton)*

**14:30 - 14:45** - Increasing Sustainability through Optimisation

*Timothy Deehan and June Lovitt (University of Southampton)*

**14:45 - 15:00** - Diethyl Ether as Green Carbon Source in the Synthesis of Carbon Nanotubes by Chemical Vapor Deposition

*Alejandro Duran Navarro (Universidad Michoacana de San Nicolás de Hidalgo)*

# Room 3 - Abstracts

## Managing Resources and Conservation

**Factors Influencing Conservation of Local Wildlife:** - With global biodiversity is decreasing rapidly, the need for behaviour change is ever apparent. This research investigates the factors affecting people's valuation of the importance of different local animal species, in particular, whether information about the conservation status of species affects financial donations given to these species. This study focuses on the local wildlife in the New Forest, but offers practical applications for conservationists worldwide.

**The relative Importance of Wild and Farmed Fish for Traders and Consumers in the Fish Value Chain in Southern Malawi:** - Southern Malawi is a low-income food-deficit country with a high dependence on fish as an important source of protein. This has caused increasing pressure on wild fish stocks. To support sustainable management and better food nutrition, these two closely related undergraduate dissertations explore consumer preferences, and constraints on those involved in the fish trade.

**Peak Oil:** - The global economy is heavily dependent on oil. Peak oil refers to the point in time when demand for petroleum starts to exceed supply. This research uses recent data to investigate the Hubbert Peak theory and model the future of oil. It indicates the price of oil will increase dramatically if projected supply follows peak theory, highlighting the urgent need for sustainable alternatives.

## Design

**A Pilot Study: Computational Analysis of a Cause and Treatment of Knee Pain in Young Adults and Adolescents:** - Patellofemoral Pain Syndrome (PFPS) affects 20% of young adults and adolescents, causing chronic knee pain. Taping of the kneecap (the patella) is common, but there is limited research on the effectiveness of this treatment and its success is heavily debated. This study predicts the effects of weight, severity of patella misalignment and patella taping on PFPS using computational models; the first step towards understanding the benefits and establishing more evidence-based treatment guidelines.

**Effect of Manganese-Doped Cobalt Oxide Calcination Temperature on the Bifunctional Catalysis of the Oxygen Reduction and Evolution Reactions:** - The oxygen reduction (ORR) and oxygen evolution (OER) reactions are important in the operation of renewable energy sources. Precious metals and their alloys are effective materials in catalysing the ORR and OER, but their scarcity results in a high price, limiting the amount of material that can be used. This research focuses on a potential low-cost, high-abundance replacement for platinum: manganese-doped cobalt oxide.

**What are the Limitations of Self-Calibration in Electrochemical Oxygen Gas Sensors?:** - The accuracy of electrochemical oxygen gas sensors is affected by the humidity of the external environment. To improve the accuracy and the lifetime of these sensors in different environmental conditions, this research talks of designing the sensors to self-calibrate. This means the sensors' operational lifetime is increased, reducing the frequency of replacement. The environmental benefits include reduce the demand for precious platinum metals, plastic and sulphuric acid electrolyte.

**Increasing Sustainability through Optimisation:** - Chemistry at Southampton has begun a program to address sustainability within research, education and management. Standard precursors for reactions are rarely optimised, creating unnecessary consumption of resources. Through the application of statistical Design of Experiments (DoE) to optimise chemical reactions, chemical and power use has been decreased, the solvents were more environmentally friendly and the percentage yield increased up to 10%.

**Diethyl Ether as Green Carbon Source in the Synthesis of Carbon Nanotubes by Chemical Vapor Deposition:** - Carbon Nanotubes (CNTs) have acquired great importance due to their outstanding electrical, magnetic and mechanical properties. There are different techniques for CNTs synthesis. Chemical Vapour Deposition provides better yield rates and offers more control but often requires high contaminating components, making it necessary to develop new synthesis methods with less or null contaminating side-effects. This research proposes a sustainable process of CNTs synthesis by applying the principles of green chemistry.

# Room 4 (3027)

## Morning: Community Energy

*Chair: Aliko Moysiadi*

**11:00 - 11:15** - Bottom line of Community Energy  
*Mehrnaz Tajmir (University of Bath)*

**11:15 - 11:30** - Energize Worcester Phase 2  
*Daniel Braconnier, Keaton Goddard, Stephanie Puckett and Danny Ruiz-Cadalso (Worcester Polytechnic Institute)*

**11:30 - 11:45** - Energy Attitudes, Behaviour and Behavioural Change of Students Living in University Owned Accommodation  
*Paul Blackburn (University of Hull)*

## Afternoon: Universities & Society

*Chair: Aliko Moysiadi*

**13:30-13:45** - Integration of Sustainable Development in Higher Education: A Case Study in Southampton  
*Emma Wong (University of Southampton)*

**13:45 - 14:00** - Exploring Responsible Knowledge Exchange  
*Linda Baines (University of Southampton)*

**BREAK** (*Delegates can change rooms*)

**14:15 - 14:30** - Engineering Thinking: A Research into Theory, Practice and the Development of Critical Thinking Skills within Foundation Year Programme  
*Sevendy Patchamuthu (University of Southampton)*

**14:30 - 14:45** - Repair Café II  
*Emma Turton, Jack Viens, Matthew Micciolo and Tiffany Leung (Worcester Polytechnic Institute)*

# Room 4 - Abstracts

## Community Energy

**Bottom line of Community Energy:** - Energy is increasingly in the spotlight. Global population growth means people are in need of inexpensive accessible energy. Community Energy (CE) is revolutionising energy generation and consumption in England, giving people greater control. Solar power has been a viable choice but recent Feed-In Tariff (FIT) cuts make its future a concern. Analysis of the Moorhouse Solar Farm in Bristol, UK, was undertaken to highlight the importance of CE projects and predict the effects of FIT cuts.

**Energize Worcester Phase 2:** - In this research, a bold approach has been taken by students of the University of Worcester to determine the most efficient technological or habitual solutions for promoting energy conservation. This is based on consumer behaviour and habits in homes of multiple occupancy (HMOs) around the University of Worcester campus.

**Energy Attitudes, Behaviour and Behavioural Change of Students Living in University Owned Accommodation:** - Comparing accommodation employee's understanding and perception of students' energy use with students' own energy attitudes and behaviours hasn't been done before. This research compares employee and students' perceptions to comprehend what students' actual behavioural attitudes to energy consumption are, and what they need, if anything, to reduce their energy use.

## Universities & Society

**Integration of Sustainable Development in Higher Education: A Case Study in Southampton:** - Education for Sustainable Development (ESD) is an essential in delivering knowledge and skills of Sustainable Development (SD), with Higher Education Institutions playing an important role. Yet first, students' attitudes and behaviour towards SD must be understood. Using the University of Southampton as a study, this research investigates students' attitudes towards the role of the University in ESD and the extent to which ESD has been integrated into University.

**Exploring Responsible Knowledge Exchange:** - Universities and public sector research establishments ("knowledge exchange organisations" – KEOs) share their knowledge and research with the public as a way of contributing to economic growth and benefitting society. KEOs face growing pressure to be socially responsible, but CSR studies focus on business, not KEOs. Universities seek to ensure research ethics are managed effectively but ethical issues in knowledge exchange have been generally overlooked. This research addresses the gaps, exploring the interaction between knowledge exchange, CSR, and ethics.

**Engineering Thinking: A Research into Theory, Practice and the Development of Critical Thinking Skills within Foundation Year Programme:** - Promoting and developing criticality among students is a key objective for an effective educational curriculum. However, recent research on critical thinking development has claimed that little empirical research on the current situation exists. This study looks into Engineering Foundation Year programme in two UK universities, considering how existing theory and current practice address students' expectations and learning needs in preparation for their undergraduate engineering programme.

**Repair Cafe II:** - This project is evaluating the feasibility and desirability of hosting a repair cafe on University of Worcester and University of Gloucester campuses. To do this involves: identifying the lessons learned from the implementation of repair cafés in various other locations; soliciting the opinions of staff, students, and other stakeholders; and developing a plan for implementing repair cafes on the campuses.

# Room 5 (3031)

## Morning: Global Energy

*Chair: Anna Tassie*

**11:00 - 11:15** - The Charge Project

*Matthew Norman and Jack Covey (University of Southampton)*

**11:15 - 11:30** - Sustainability of Shallow Geothermal Energy Applications: Why and How to Improve Long-Term Models for Vertical Borehole Heat Exchangers

*Oleskandra Pedchenko (University of Southampton)*

**11:30 - 11:45** - Covalent Immobilisation of Enzymes as Catalysts for Biofuel Cell Applications

*Marta Meneghello (University of Southampton)*

## Afternoon: Urban Regeneration

*Chair: Amy Paraskeva*

**13:30 - 13:45** - Assessing England's Green Belt: Seeking Best Practice in Review Methodologies

*Rebecca Keens (University of Southampton)*

**13:45 - 14:00** - Valuing the Benefits of Public Realm Design: A Case Study of Southampton

*Jade Cohen (University of Southampton)*

### BREAK

**14:15 - 14:30** - Adaptive Re-Use: A Sustainable Solution for Southampton's Bargate Shopping Centre?

*Dominika Slotwinski (University of Southampton)*

**14:30 - 14:45** - Worcester Arts Business Plan

*Anya Prevallet-Kinstle, Jorge Santana, Kelley Slabinski and Cassandra Tomerlin (Worcester Polytechnic Institute)*

# Room 5 - Abstracts

## Global Energy

**The Charge Project:** - This research focuses on bringing certain elements of electrification to Northern Bangladesh through investigating the possibility of creating a solar boat network that will supply electricity to the ultra-poor communities living on Chars. This is made possible through partnering with a professor from the University of Tokyo, who has been investigating the applicability of solar power in Bangladesh for over 10 years.

**Sustainability of Shallow Geothermal Energy Applications: Why and How to Improve Long-Term Models for Vertical Borehole Heat Exchangers:** - As part of the movement towards low-carbon technologies, vertical borehole heat exchangers (VBHE) are increasingly used for space heating/cooling. Sustainable design and management of such subsurface energy resources requires understanding the thermal storage capacity and the effects of the local hydrogeological conditions. Current models for determining the thermal capacity often assume ideal homogeneous ground conditions but geology is usually heterogeneous and fractured. This research reviews current developments and needs in modelling VBHE systems.

**Covalent Immobilisation of Enzymes as Catalysts for Biofuel Cell Applications:** - Biofuel cells (BFCs) are systems that transform chemical energy into electrical energy by using enzymes as catalysts and natural compounds, such as sugars, as fuels. The benefits of BFCs over conventional fuel cells are their low cost and renewable components; they do not need fossil fuels and expensive rare metal catalysts. A challenge however is the short lifetime of enzymes and their poor stability. This research is developing new strategies for a stable immobilization of enzymes.

## Urban Regeneration

**Assessing England's Green Belt: Seeking Best Practice in Review Methodologies:** - The National Planning Policy Framework (2012) sets out England's vision for the planning system; to contribute to the achievement of sustainable development. For local planning authorities, this includes understanding how the Green Belt is performing against its national Purposes. However, no formal national guidance exists leading to a variety of approaches. This research explores local planning authorities' Green Belt reviews against whether they should be heading in order to contribute to sustainable development.

**Valuing the Benefits of Public Realm Design: A Case Study of Southampton:** - Urban design influences a range of environmental factors and the liveability of urban centres; important considerations for planners and decision-makers seeking to ensure sustainable development. This research models how changes to environmental variables within an area of Southampton impact city liveability, public health and comfort. This provides the basis for further model development and introducing a viable system for estimating the monetary value of environmental benefits.

**Adaptive Re-Use: A Sustainable Solution for Southampton's Bargate Shopping Centre?:** - Southampton's Bargate shopping centre struggled to maintain its popularity with the general public in the face of competition. This project discusses whether the method of 'adaptive re-use' for obsolescent buildings is a sustainable solution for Southampton's Bargate Shopping Centre. By exploring the concept of 'adaptive re-use', a suggested multifaceted 'indoor market' would be the most sustainable suitable adaptation for Bargate.

**Worcester Arts Business Plan:** - this project aims to assist the Worcester Arts Workshop in creating a sustainable holistic plan to enhance revenues, reduce operating costs, and aid fundraising in the future. Plan sections include stakeholder engagement, looking at the spatial and temporal scales, highlighting options for environmental sustainability and finally providing recommendations for further amendments.

# Poster Submissions

**Our Diet and Why We Need to Change It:** As society becomes more integrated, our knowledge broadens and so too does our awareness. Most notably our awareness develops rapidly through media platforms often targeting diets and food production. Through this research the concept of diets and food production will be discussed in relation to global climate change. *Jasleen Amber Kaur Mahal (University of Southampton)*

**Genetics and Food Security in the developing world:** Food security is the attainment of sufficient, nutritious and safe food for everyone. In examining the strengths and limitations of genetics in meeting Goal 2: 'Zero Hunger' of the 2015 Sustainable Development Goals (SDGs), this research looks towards genetics of plants in terms of preparing future food security. *Sonal Chagan (University of Southampton)*

**The Potential of Agent-Based Modelling as a Tool to Unravel the Complexity of Household Food Security: a Case Study of Rural Southern Malawi:** The aim of this project was to develop a simple agent-based model that takes into account the availability, access, utilisation and stability dimensions of food security; which could be used to explore potential pathways towards sustainable food systems and the alleviation of food insecurity with rural Southern Malawi. *Samantha Dobbie (University of Southampton)*

**High Throughput Synthesis and Electrochemical Screening of Palladium-Tin Thin Films for the Reduction of Nitrate:** Nearly 50% of drinking water comes from contaminated groundwater. Therefore, the protection of groundwater has become a priority for many governments. The aim of this poster (project) was to identify a cathode material that is suitable for removing nitrate from groundwater. *Mabkhoot Alsaari (University of Southampton)*

**A pilot study: Computational Analysis of a Cause and Treatment of Knee Pain in Young Adults and Adolescents:** Patellofemoral Pain Syndrome (PFPS) affects 20% of young adults and adolescents, causing chronic knee pain. There is limited research into the effects of patella alignment in PFPS; hence, the evidence base for treatments is limited though patella taping is common. Its success is heavily debated, particularly with patients applying their own taping. *Shruti Verma (University of Southampton)*

**Derivation and use of Mouse Embryonic Stem Cell Lines as Model for Mechanistic Analysis of Developmental Programming:** Early environment before birth may predispose people to non-communicable disease in later life. Previous work using animal models demonstrated that poor maternal nutrition during periconception affected the formation and characteristics of early embryo cell lineages leading to adult offspring cardiometabolic disease. Despite the success of IVF technology in achieving pregnancy, this research considers egg/embryo treatments that may also induce disease risk. *Pooja Khurana (University of Southampton)*

**Factors Associated with Condom Use at First Heterosexual Intercourse in British Adolescents:** With the United Kingdom having high teenage pregnancy and sexual transmitted infection (STI) rates, this research investigates the relationship between first heterosexual intercourse (FHI), risk of pregnancy and STIs, condom and or contraceptive use, and later sexual risk taking. *Katie L Heap (University of Southampton)*



# Poster Submissions

**Factors Influencing Conservation of Local Wildlife:** With global biodiversity decreasing at a rapid rate, the need for behaviour change is ever apparent. This research investigates a taxonomic bias present in charity giving in the New Forest, predicting that more is given to mammal species compared to invertebrates, and that participants will give more money to conservation priority species when given information about their conservation status. *Xavier McNally (University of Southampton)*

**Adaptive Re-Use: A Sustainable Solution for Southampton's Bargate Shopping Centre?:** Since the opening of the WestQuay Shopping Centre in 2000 and the ongoing competition with the Marlands Shopping Centre (opened in 1991), Bargate has struggled to maintain its popularity with the general public. Research into 'adaptive re-use' for obsolescent buildings suggests that in terms of sustainability, a multifaceted 'indoor market' would be the most suitable adaptation for the building: socially, economically and environmentally. *Dominika Slotwinski (University of Southampton)*

**Teachers' Perceptions of Virtual Laboratory use in Secondary School Chemistry Education:** Technology can be used to enhance the effectiveness of practical work in chemistry education. This research provides evidence that virtual laboratory use is not prevalent as it is supposed to be. Despite acknowledging the advantages that virtual laboratories possess, teachers perceive virtual laboratories not to be a realistic and quality substitute to traditional laboratories to a great extent. *Ramrajiv Rajendram (University of Southampton)*

**Changing Research Attitudes through Improved Sustainability:** Methods within chemical procedures are generally taught in a rigorous fashion containing generations of knowledge which hold influence over attitudes. On discovering the limited sustainability of certain methods, a new stance has been taken to improve this. *June Lovitt & Timothy Deehan (University of Southampton)*

**Effect of Manganese-doped Cobalt Oxide Calcination Temperature on the Bifunctional Catalysis of the Oxygen Reduction and Evolution Reactions:** Oxygen reduction (ORR) and oxygen evolution (OER) reactions are important in the operation of renewable energy sources, yet precious metals are usually used within the reactions. This research look into a material resource change as to realistically allow the reactions to occur. *Alexander Pateman (University of Southampton)*

**The Bottom Line of Community Energy:** By focusing upon the recent Feed-in Tariff cuts, this research will begin to explore the question of; "Will community energy programs, in particular Solar, survive these sudden cuts?" through the use of an active community energy example; Moorhouse Farm in Bristol. *Mehrnaz Tajmir (University of Bath)*

**Instant Paper Recycling Machine:** This research reveals an invention to aid our 21<sup>st</sup> century qualms; giving us the ability to recycle within our home or workplace. The research so far is well underway, presenting an array of hope that enables recycling to be performed in an instant. *William Roberts (University of Southampton)*

**Posters will be on display on Level 2 of B7 all day**

# Sustainability at Southampton



At Southampton, students and staff collaborate on ambitious sustainability projects to change the world for the better.

Sustainability is embedded into our education. Through faculties and modules we are beginning to broaden student knowledge on sustainability.

The University is committed to sustainability in all aspects of our work. We achieved ISO 14001 Certification in July 2014, and our **Sustainability Action** programme is dedicated to embedding sustainability across the core of the University: Curriculum, Operations, Research and Experience.

You can follow us on Twitter (@**Sustainable\_UoS**) for latest news and competitions.

# Campus Map



The Symposium will take place in **B7**  
(Lanchester: Engineering & the Environment Building)

Follow the directions shown in orange to the **Hartley Suite in B38**  
for a free lunch buffet from 12:15

Southampton has great transport links, find out more: [southampton.ac.uk/transport](http://southampton.ac.uk/transport)

# Special Thanks

## Judging Committee

Joe Massey, Hannah Lesbirel, Frances Dunn, Claire Murray, Alice Moysiadi, Sarah Mayson, Ronan Brennan, and Mengyu Huang

## Session Chairs

Anna Tassie, Linda Baines, Christopher Lawson-Johns, Aliko Moysiadi, Jasleen Amber Kaur Mahal, Jaffar Ridha, and Amy Paraskeva

## Social Media Team

Jade Playle, Jasleen Amber Kaur Mahal, Samantha Dobbie, and Phoebe O'Brien

## Conference Illustrators

Hugo Loynes, Jenn Hammond, Nichola Garrett, and Sam Elston

## University of Southampton

Institute for Learning Innovation and Development  
University of Southampton Education Enhancement Fund  
Excel Southampton Internship Programme

## Symposium Team

Simon Kemp, Julia Kendal, Imogen Dinham-Price, and Beckie Thomas

