



Aims

The aim of our topic this year is to draw connections between food security, biodiversity and bioenergy and to use the meetings to think about the research pathways that will help us to prepare for and address the challenges we will face in the future. Alison Smith, Bhaskar Vira, Howard Griffiths and Will Simonson helped to lead and shape this discussion and through it, we are exploring different issues such as food security, food versus fuel, water use, and natural versus managed environments, all against a background of a changing climate.

Modus operandi

The core activity of the Forum centres on monthly discussions, and members meet on the third Tuesday of each month (except July - September) from 5pm until 7pm, followed by an informal, working dinner.

One of the Forum's aims is to bring people together who would not usually meet each other but who are working in areas which overlap enough to stimulate an interesting discussion. Three expert 'witnesses' from across and outside Cambridge are therefore invited each month to talk about what they perceive as being the gaps in our knowledge and what they would include in the next generation of research questions. Their 'testimonies' are then used as a springboard for an open discussion.

Each year, all material discussed over the course of the year is used as the basis of an output which aims to elucidate research issues related to how we live, where we live and how we respond to change. The multi-disciplinary discussions within the Forum feed into and shape this, providing fresh ideas and catalysing discussion around emerging research pathways.

This year, a new Parallel Forum was also set up to bring together a cross-disciplinary group of post-docs, Masters and PhD students who are working on sustainability and the environment to explore gaps in what we know and future research questions and opportunities. This group ran in parallel with the original Forum and met four times, using the background papers from the three expert witnesses and their ideas about future research as a starting point for their discussion.

Themes of the meetings between October 2014 and May 2015

The series began in **October** by taking a global view of land use change. In **November**, the discussion focussed on some of the economic and social drivers behind those changes including economics, politics and health.

In **December**, the theme was 'What can we tell from the sky?' and what recent advances in satellite technology can tell us about how land is changing.

In **January**, we took a step back and asked 'Does the way we think need to change?' and explored new ways of thinking about the impact of land use change on both the supply of natural resources and the people who rely on them.

In **February**, three multi-national companies brought a business perspective into this debate. Cotton was used as a case study to look at how companies respond to the demands being placed on their supply chains and the greatest challenges they can see on the horizon.

In **March** our theme was 'From global to local' and we explored questions that focus on the impacts of changes in land use, climate change and the demand for resources at a range of scales.

In **April** we focused on a specific resource - wood - and used it to make links between innovation and design, and the future supply and demand for natural materials.

In **May** we looked 'through an East African lens' and picked up themes from previous meetings to explore questions related to the food security and future of agriculture, livelihoods and conservation in the region.

Questions

Each month, the witnesses were all asked to prepare 10 minutes introduction centred on two core questions:

- 1) What do you perceive as being the main gaps in our knowledge?
- 2) What would you include in the 'next generation' of research questions?

After they had each spoken, their answers were used as a springboard for a round table discussion during the rest of the meeting and over dinner.

They were also given the opportunity to circulate a background paper to help set the scene for the ideas they outlined and the areas they were interested in

This summary

This summary brings together the material from each meeting, including:

- The topic we discussed, the biographies of the witnesses and the background reading they provided
- Notes taken by members of the Parallel Forum
- Key ideas and messages people took away from the Original Forum meeting

The Parallel Forum also met 4 times this year and their notes and take home messages are also included.

The themes of their meetings were:

- 1) Drivers of demand (25th November in Trinity Hall College)
- 2) Changing our thinking (29th January in Jesus College)
- 3) Cotton – from source to shop (24th February in Jesus College)
- 4) From local to global (17th March in Jesus College)

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Meeting themes and the sections of the output

What does the future hold?

Changing our thinking (20th January)

- New ways of thinking about the impact of land use change on the supply of natural resources and drivers behind the demand for them

Looking into the future - wood (21st April)

- Focusing on wood and the future uses of wood
- Links translational research, design and innovation to the topic
- Co-hosted with the Centre for Natural Material Innovation?

How we live: The supply of natural resources and the demand for them

The world is changing: Taking global view (21st October)

- Global view of pressures and drivers of land use change

What can we tell from above (2nd December)

- The kinds of data sets we can use to look at land use and land use change
- Links between these and policy implementation

Drivers of change (18th November)

- The pressures on land and impacts of the future demand for food, water and energy, including economic drivers, consumer choices and health

Commodity case study: Cotton - from source to shop (17th February)

- Using cotton to think about risk, supply and sustainability
- Corporate witnesses, co-hosted with CISL

Where we live

From local to global (10th March)

- The impact of demand on rural populations
- Connecting together land use, development, economics and climate change

EXTRA FORUM: Zooming in on East Anglia (over the summer)

- An extra meeting over the summer where we 'retreat' to Wimpole Hall
- Invite witnesses to bring a local perspective to the topic (e.g. National Trust, farmers, landowners)
- Potentially link to the International National Trust's September meeting theme - 'land and landscapes'

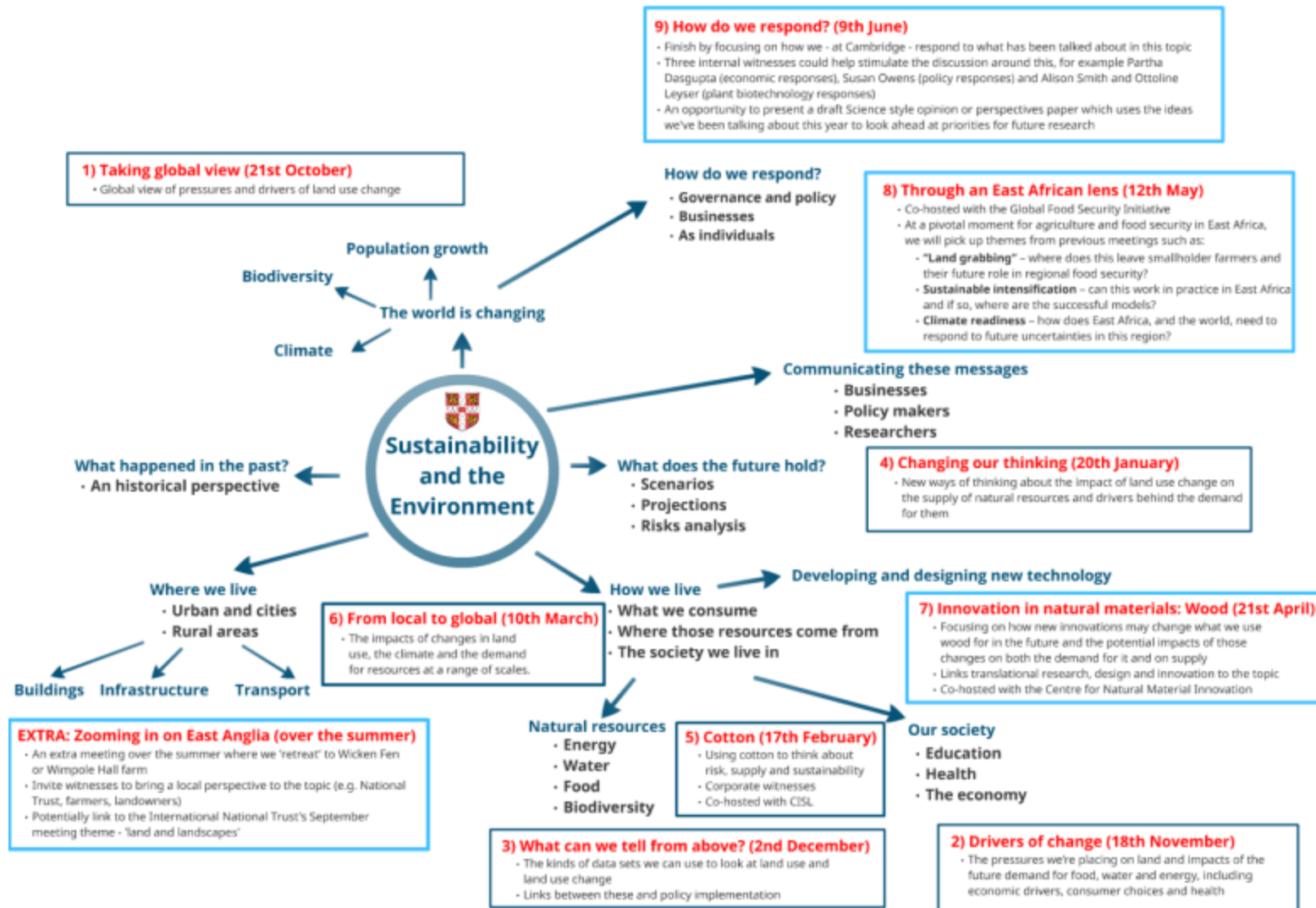
How do we respond?

Through an East African lens (12th May)

- Co-hosted with the Global Food Security Initiative
- Potential themes include:
 - “**Land grabbing**” – where does this leave smallholder farmers and their future role in regional food security?
 - **Sustainable intensification** – can this work in practice in East Africa and if so, where are the successful models?
 - **Climate readiness** – how does East Africa, and the world, need to respond to future uncertainties in this region?

9) How do we respond? (9th June)

- Finish the series by focusing on how we - at Cambridge - respond to what has been talked about this year
- Three internal witnesses could help stimulate the discussion around this, for example Partha Dasgupta (economic responses), Susan Owens (policy responses) and Alison Smith and Ottoline Leyser (plant biotechnology responses)
- Potential opportunity to present a draft Science style opinion or perspectives paper which uses the ideas we've been talking about this year to look ahead at priorities for future research



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Connecting biodiversity, energy and food security: Summary of the discussion so far

Witnesses and meeting themes

The witnesses who joined us between October and May and the themes of each meeting are below.

21st October: Taking a global view



Dr Tina Barsby	Chief Executive, The National Institute of Agricultural Botany (NIAB) in Cambridge
Ariel Brunner	Head of EU Policy, BirdLife International, based in Brussels
Professor Paul Dupree	Professor of Biochemistry, Department of Biochemistry, University of Cambridge

18th November: Drivers of demand



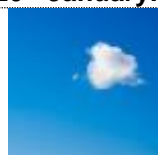
Bojana Bajželj	Doctoral Researcher, Low Carbon & Materials Processing group, Department of Engineering, University of Cambridge
Professor Ian Bateman	Professor of Environmental Sciences, School of Environmental Sciences, University of East Anglia
Professor Theresa Marteau	Director of the Behaviour and Health Research Unit, Institute of Public Health, University of Cambridge

2nd December: What can we tell from above?



Dr Alan Belward	Head of the Land Resource Management Unit at the Institute for Environment and Sustainability, European Commission's Joint Research Center (JRC) in Ispra, Italy
Dr Jon Hutton	Director of the United Nations Environment Programme World Conservation Monitoring Centre in Cambridge
Dr Lucas Joppa	Head the Conservation Science Research Unit at Microsoft Research, based at the Microsoft Redmond Campus, USA

20th January: Changing our thinking



Professor Charles Godfray	Hope Professor and Director of the Oxford Martin Programme on the Future of Food at Oxford University
Professor Georgina Mace	Professor of Biodiversity and Ecosystems and Director of the Centre for Biodiversity and Environment Research (CBER) at University College London (UCL)
Dr David Nally	Senior Lecturer in Human Geography in the Department of Geography at the University of Cambridge

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17th February: Cotton – from source to shop



Chris Brown Head of Ethical and Sustainable Sourcing at ASDA

Dr Helen Crowley Head of Sustainable Sourcing Innovation at Kering

10th March: From local to global



Dame Barbara Stocking President of Murray Edwards College

Dr Toby Gardner A Research Fellow at the Stockholm Environment Institute

Professor Tim Wheeler Deputy Chief Scientific Adviser at the UK Department for International Development (DFID) and Professor of Crop Science at the University of Reading

28th April: Looking into the future of wood



Professor Peter Freer-Smith Chief Scientist, Forest Research and Forestry Commission

Jon Kirkpatrick Head of Sustainability, Europe, Lend Lease

Michael Ramage Senior University Lecturer, Department of Architecture, University of Cambridge

12th May: Through an East African lens



Liz Watson Senior Lecturer and Pybus Fellow of Newnham College, Department of Geography, University of Cambridge

Tinashe Chiurugwi Research Associate in the Business Strategy team at the National Institute for Agricultural Botany (NIAB)

Alison Mollon Senior Programme Manager, West & Central Africa, Acting Regional Manager, Africa at Fauna and Flora International (FFI)

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Word Clouds: Created by using Word It Out - www.worditout.com – based on the transcript of each meeting (edited to exclude non subject-specific words).

October



November



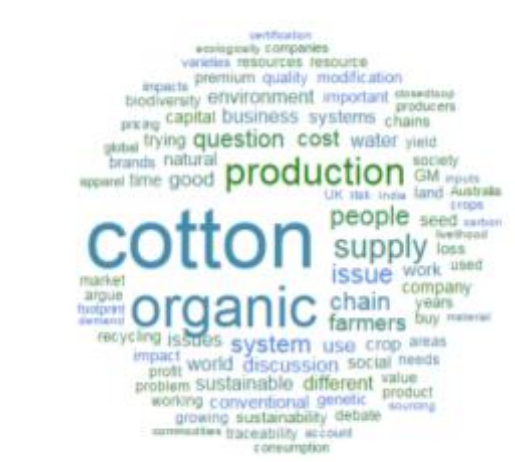
December



January



February



March



Key points from the discussion and that people took away from the meetings

<p>October</p>	<ul style="list-style-type: none"> - Some see genetics as the solution to problems of food security and environmental degradation (i.e., we can just use genetic tools to breed better crops that use fewer chemical inputs); whereas others see GM as one of the major threats to both of these (i.e., the success in creating high-yielding crops has narrowed our diet to a few crops which are inbred and require uniform environmental conditions and high inputs). - Technological fixes are never so straightforward as is initially imagined but how can we reconcile these very different views about the role of technological solutions in the future of agriculture? - Tech transfer: How do we get the sorts of technology developed for commercial gain into non-commercial areas? - From genes to companies & farmers: Under what political, legal, social conditions would genetic engineering of crops gain broader support, especially in the EU? - What really matters/what are really the problems around land use? - Food security today is a local, not a global issue – how can we bring scale into this discussion and develop holistic sustainable farming scenarios for specific locales? - Compromise compromise compromise: in reaching agreements, providing policies and imposing regulations- and recognise/respecting the views of others. - Recognition of global convergence on the lowest common denominator - in that internationalised markets are driving down commodity prices and human nature demands higher living standards for less; but balancing populations demands for energy and food security will increasingly demand local solutions for local people - Look for the opportunities for renewables such as waste materials - what are the effects of developing these technologies on land use and on soil? - How do we find research questions that are narrow enough to allow real research and not just big philosophy, but that address the bigger problems out there, which clearly cannot be addressed just through the sum of small improvements?
<p>November</p>	<ul style="list-style-type: none"> - How will the land use scenarios change under the uncertainty of climate change? With increased groundwater depletion? With improved technology? - Developing truly integrated models which combine natural sciences, economics and policy and include both temporal and spatial dimensions of changes in natural capital - Economics has a strong role to play, both in how we build ‘value’ into models (as opposed to the amount of money we pay) and how we use them to make decisions - The role of agricultural production: Can sustainable intensification close the yield gap? Which practices are most effective? - What are the impacts of alternative land use strategies & land be used in a more intelligent way? - How do we mainstream Payments for Ecosystem services so that market forces are more aligned with what would be the ‘optimal use of land’ for society? - While accepting that research is needed into the supply side – the role of land management, GM, agritech and precision agriculture – more research is needed into the demand side and the role that spatial and temporal variation in economic drivers and their impacts will play - The impacts of the choices we make on the environment: Much research concentrates on adaptation but not enough on the dynamics of adaptation and the secondary effects those will have - Changing the behaviour of consumers: How will people’s affluence change their behaviour? In turn, how will that change diets and land use? - How can we reduce agricultural waste? And what strategies are appropriate for various parts of the world where the waste might occur at different stages of the production-consumption chain?

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<p>December</p>	<ul style="list-style-type: none"> - There is huge capability to obtain high resolution data, yet our ability to understand change on a global scale is limited - How can we make sure that that the data is turned into something that can be measured or modelled, and turn it into knowledge? - How can we enable 'Cross-mapping' between different mapping projects? E.g. between biodiversity mapping and land use? - How do we manage the large data flows and how do we deal with the fact that globally, existing datasets are not uniform? - What missing data would be of the most use in the future and how could we lay the foundations now for the collection of it? - There are challenges related to data ownership, including what should and could be publically available - Difficulties in linking the physical data to human/ social/ institutional data in order to begin to understand more about the processes at work. - We are collecting haystacks of data that we do not need, struggle to interpret, without asking constructive scientific questions – how can we collect data more consistently and can we identify common ground between the observation standards for the three Rio Conventions (related to biodiversity, desertification and climate change)
<p>January</p>	<ul style="list-style-type: none"> - Ideally, humanity should take a balanced approach towards the relationship between nature and people, but there remains tendency towards focusing on what nature can provide for people, rather than what we can do for nature. - Questions of scale – what do we mean by 'multi-functional landscapes'? - Economies of scale - have there been empirical studies on the conservation outcomes of small holdings vs. large scale food production and how do these studies fit with the general assumption that economies of scale bring about efficiencies? - Food supplies and markets - how can we optimise land to ensure that it delivers what it does best, at the right time in the right place? - The demand side of the food security equation – what we want versus what we need and behaviour change not just in terms of healthy diet, but also how much we procure, consume and waste. - Translating academic ideas into policy implementation - Charles Godfray argued that “now is the endgame on land allocation” and the next steps are about sustainable intensification - what does this mean and is it actually doable? - How do the local or the micro-level needs and issues of 'sustainable intensification' link with the concerns at the global, macro level? - Incorporating ecosystem services values into agriculture and economics - Myths surrounding food security overlook the underlying structural dynamic that causes hunger and starvation in the first place, indicating that the efforts are in the best case only treating the symptom of the problem – the amount of food available - and in the worst case making matters worse by assuming technology can fix the problem. - Food equality: Although we discussed the assumption 'more people = more requirement for food', we agreed that this was a simplification. In fact it may even be used to make people fearful and justify inappropriate use of land. It's possible the case that the volumes and type of food grown now may be sufficient in the future but there may be inequalities in where food is available and transported. This results in food waste in some areas and shortage elsewhere. How can this be balanced? - Agriculture research and development agenda for increasing 'tools in the tool box' of farmers, for practicing sustainable agriculture. - Documentation and sharing of best practices and up-scaling existing solutions - Creating new or supporting existing institutions for support and governance

<p>February</p>	<p><i>“Cotton is not the fore-front issue at the moment. However, we are interested in investing time and resources in it because we believe that it may well become significant in the future.”</i> Chris Brown: Sustainable Business Director at Asda</p> <p><i>“We are far from being 100% organic in Kering, but it is something we are looking at moving towards.”</i> Helen Crowley, the Head of Sustainable Sourcing Innovation at Kering</p> <ul style="list-style-type: none"> – Choices about whether to choose organic or GM cultivation will become increasingly urgent as competition for land increases and land quality decreases. – Despite the importance and prevalence of cotton, costumer’s awareness on the importance of sustainability issues with cotton is low compared to food commodities and currently, the demand for debate is limited to specific groups and interests – Supply chain traceability is one of the greatest challenges to the cotton industry as the supply chains are very opaque and the supply largely comes from smallholder farmers. How can we unpick cotton supply chains and create new business functions that allow traceability throughout the cotton supply chain from source to shop? – There is a lack of clarity and evidence about the feasibility and the impacts of different production systems (organic vs. ‘better’ vs. conventional and certification) – Can we develop indicators to help us to determine the impacts of cotton production on the environment or will these in danger of being too simplistic? – Economic costs and incentives - who absorbs the risk in the production chain and who has profit elasticity according to the cotton prices set in the stock market? – There are cost issues associated with organic cotton as it is more expensive than conventional cotton. What incentives do farmers need in order to grow it and how do these vary from one region to another? – The lack of availability of financing systems to smallholder cotton farmers to improve the agronomy practices, and overcome gaps between farmer costs and their income. – The demand side: Sustainable consumption versus reducing consumption – Could we open questions of sustainability out to think about whether a commodity like cotton is sustainable more generally, rather than just concentrating on production?
<p>March</p>	<p><i>“In an increasingly interconnected world we need to move towards an uncomfortable middle ground of both research and policy endeavour that seeks to untangle and address some of the concerns that link the local and the global, and are so critical to devising lasting solutions, without being lost in their complexity. In this, I believe, we still have a very long way to go.”</i> Toby Gardner</p> <ul style="list-style-type: none"> – Despite the ever increasing influence of global dynamics, local dynamics matter and can have a profound influence on large-scale processes, yet they are often ignored – Bear in mind the adage “think global act local”- the fact that we live in an increasingly interconnected world means that acting locally can influence global conditions whether or not we are “thinking globally” – Toby’s introduction focused on challenges for sustainable resource use in a changing world, and he drew on Chapin et al’s three approaches to sustainability - managing risks, building resilience to change, and achieving transformation – Ricocheting effects across scales are overturning common assumptions – such as fast local dynamics shaped by slowly changing global drivers – that need to be increasingly recognised and accounted for in our work. – A clear emerging theme is that solving the problem is not really about needing to produce more food, but to make better use of the food we already produce. – The concept of degrowth and the complexity of the debate about growth in terms of simultaneously accepting the need for conventional growth in less developed countries while challenging the conventional concept of growth in developed countries and recognising that growth as measured by GDP has increased in recent years

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	<ul style="list-style-type: none"> - Understanding systems, for example, there may be deforestation in Brazil, this may be offset by what is happening in neighbouring areas. - The accelerated speed with which physical and economic (and social?) shocks are transmitted and their widened spatial extent. - While the national scale is often the default decision-making level, decision-making on a local level is often innovative and agile.
April	<p><i>"I'd say that within the UK we have moved from a past focus on woodland creation and to some extent biodiversity which has been a major focus in recent years to an agenda driven by climate change adaptation and protection from pests and pathogens, (both crouched in terms of resilience)." Peter Freer-Smith</i></p> <ul style="list-style-type: none"> - The future of plantations and sustainably managed forests- is there a significant role for mono-culture 'crop' forests to play in the future supply of timber? - Currently planted forests make up 7% of the total global forest area but provide 45% of industrial roundwood consumption – in the future, is it feasible for planted forests will supply the bulk of our wood requirements and protect remaining natural forests? - What tree species are needed to supply the timber for future buildings and where in the world will it come from? Does reduced use of timber for paper really increase the supply of suitable grade wood for construction? Can we increase the use of such timber by material innovations? - Exploring the social and ecosystem services value of forests and forest landscapes - Developing new ways of processing and using wood in buildings - A paradigm shift is needed in the way we design buildings rather than simply applying concrete-based design expertise - The future impacts of climate change on forestry – risks and opportunities - Quantifying and modelling the value of competing land uses, including forests - the competing uses/functions of forests (timber, paper, biofuel, biodiversity, recreation) paralleling similar pressures on agricultural land. Has the land sparing/land sharing debate been extended to forests? - Costs and benefits of using timber in construction, including the impacts of material processing (such as glue), methane and carbon emissions during shipping
May	<p><i>We often hold conflicting ideas about the situations we are trying to intervene in that we do not think about the bigger picture. In the end, sustainable intensification becomes a roof under which different disjointed (and sometimes contradictory) projects/activities are housed and go on without much conversation between them. Tinashe Chiurugwi</i></p> <ul style="list-style-type: none"> - The importance of respecting 'indigenous' views, customs and practices in agricultural development projects - In the rush for new solutions to sustainability problems, the values, capabilities and adaptability of indigenous people are often overlooked. As a result, technological 'fixes' are often mal-adapted to the socioeconomic and cultural context, and the theory on paper looks very different to what takes place on the ground. - There is a critical gap in understanding how to communicate solutions (e.g. improved seeds) using existing institutions and communication systems. - One of the main priorities for future research is to investigate the potential for landscape planning approaches to resolve tensions between food and energy production and biodiversity conservation. What are the most appropriate scales at which such planning should be undertaken? One key area within this is the food versus fuel issue, and in particular how to reduce the demand for charcoal – doing so would take an enormous pressure off biodiversity. Another is to develop greater understanding of how the changing physical interface and proximity between protected parks and inhabited areas affects the spread of zoonotic diseases and threats to human health. - The power of narratives, success stories and storylines – these can be as powerful as evidence and important in disenfranchising communities from local resources.

- Focussing on genuine success stories in discussion and evaluation of progress
- Bridging disconnections between discourses and narratives - why are the disconnects between discourses around competing demands for land and potential solutions so persistent, and what is the best way to build bridges?
- Being wary of unintended consequences when searching for solutions
- The movement towards cities and creating alternative rural livelihoods to farming
- Education and raising people's awareness of the value of their natural resources

Crafting future research questions

The Parallel Forum explored ideas to bear in mind when thinking about the next generation of research questions:

- Who are we trying to influence and what are the 'levers' that will change behaviour or move towards more sustainable choices?
- Be interdisciplinary and connect disciplines together, both within one field and also very different areas, such as natural, physical and social sciences
- Find ways to represent and quantify cross-disciplinary roles and how to integrate different disciplines together
- Recognise the need to be more multidisciplinary/cross-disciplinary at answering questions and for breadth as well as depth in research (where currently depth seems much more valued in academia). Although interestingly, someone made the point that the job market in academia is so competitive that people can find their career moves through different disciplines as they take the jobs where they are offered (they themselves had experienced that).
- Think about how to achieve inter-disciplinarity, going beyond ticking the boxes to do actual research
- The need to strike a balance between breadth and depth
- Link together policy making and human behaviour
- Think about scaling, from a global scale to a local level
- Explore cross-cultural differences, particularly in relation to people's behaviour, and highlight differences between countries as well as giving a global perspective
- Demand is crucial to the solution (e.g. of meat consumption and climate change). However, this is not necessarily a problem for business. Needs to be reframed as an opportunity to do other things. How do we help businesses/individuals to find their role in the solution (rather than just confrontation).
- Is change driven at the bottom or the top of a supply chain? Enhanced sustainability could be pushed up from the bottom or pulled up from the top. Most examples appear to be the latter. Linked to bottlenecks/power. Tend to be fewer retailers/commodity traders. Cooperatives may help if producers want to push change from the bottom, but much harder to mainstream.
- How do we respond? The common theme of our meetings - it is clear that the situation is dire but what can/should we do to tackle it?
- Should we be putting existing information to more use or should we be embarking on a continual search for new and better information?

October: Taking a global view



Aims

This was the first meeting in the series, and the aim of it was to help lay the foundation for the rest of the year by taking a global view of the connections between food security, biodiversity and bioenergy. The three witnesses will also use their research and interests to think about some of the research pathways that will help us to prepare for and address these future challenges.

Witnesses

Dr Tina Barsby	Chief Executive The National Institute of Agricultural Botany (NIAB), Cambridge
Ariel Brunner	Head of EU Policy, BirdLife International, based in Brussels
Professor Paul Dupree	Professor of Biochemistry, Department of Biochemistry, University of Cambridge

Setting the scene

Ariel Brunner, the Head of EU Policy at BirdLife International travelled over from Brussels to help us to start to think about how biodiversity connects to the other elements of this topic. He joined Tina Barsby, the CEO of the National Institute of Agricultural Botany (NIAB) in Cambridge who focused on food security and agriculture and Paul Dupree, Professor of Biochemistry in the Department of Biochemistry who discussed his research into the development of sustainable biofuels that do not adversely affect the food chain.

Background papers

Tina sent us a book chapter that reviews the role that plant breeding and new agricultural technologies will play in feeding 9 billion people equitably, healthily and sustainably, particularly in Africa. She and Wayne Powell argue that in Sub-Saharan Africa, meeting this challenge will require both a deeper understanding of plant breeding methods and principles together with exposure and understanding of the needs of small holder farmers who dominate agricultural productivity. They also provide a critical appraisal of crop genomics and life sciences advances together with an analysis of the particular issues and opportunities related to plant breeding in this region.

Paul's paper focuses on xylan, one of the most abundant polysaccharides on Earth that will provide more than a third of the sugars when using plant dry matter such as grass or hardwood feedstocks to produce biofuels (a method known as lignocellulosic biofuel production). Their results can be used in crop breeding programs to make non-edible plant material that requires less processing, less energy and fewer chemicals in order to convert it to biofuels or other renewable products.

There is also an article about Paul's paper on the university news website: [Biofuel from inedible plant material easier to produce](#)

Full references

Powell, W. & Barsby, T. (2013) Germplasm diversity and genetics to drive plant breeding for Africa. In: Successful Agricultural Innovation in Emerging Economies: New Genetic Technologies for Global Food Production (Ed. by D. J. Bennett & R. C. Jennings), pp. 82-94. Cambridge, UK: Cambridge University Press.

Mortimer, J. C., Miles, G. P., Brown, D. M., Zhang, Z., Segura, M. P., Weimar, T., Yu, X., Seffen, K. A., Stephens, E., Turner, S. R. & Dupree, P. (2010) Absence of branches from xylan in Arabidopsis gux mutants reveals potential for simplification of lignocellulosic biomass. Proceedings of the National Academy of Sciences, 107, 17409-17414.

Witnesses

Dr Tina Barsby

Chief Executive

The National Institute of Agricultural Botany (NIAB), Cambridge

Dr Barsby was appointed Chief Executive and Director of NIAB in September 2008, becoming the first female Chief Executive in the Institute's 90-year history. A plant geneticist, Dr Barsby has extensive experience in plant biotechnology and applied plant science, spanning both academic and commercial research in the agricultural crop sector, including 18 years with Groupe Limagrain.



She has extensive scientific experience in biotechnology and seed development, especially in wheat and oilseed rape, and has been involved in various cross-sector activities bringing together scientists and breeders.

Tina has a first degree in Agricultural Botany from the University of Wales at Bangor, and a PhD from the University of Nottingham. She spent a postdoctoral period at Kansas State University, and worked at Allelix Inc., Ontario, Canada for several years before returning to the UK in 1989.

e-mail: tina.barsby@niab.com

Ariel Brunner

Head of EU Policy,

BirdLife International, based in Brussels

Based in Brussels, Ariel Brunner is Head of EU Policy at the environmental NGO BirdLife International. In recent years, he has led BirdLife's work on reform of the European Union common agriculture policy, better implementation of the EU rural development policy and advocating the sustainability of biofuels and bio-energy policies. Before moving to Brussels he followed the implementation of EU nature conservation legislation in Italy and was instrumental in the designation of the country's special protection areas network (sites protected under the EU Wild Birds Directive).



Born in Israel, he holds an MSc in Environmental Sciences from Milan University and he speaks Italian, English, Spanish, French, as well as Hebrew.

e-mail: ariel.brunner@birdlife.org

Professor Paul Dupree

Professor of Biochemistry,

Department of Biochemistry, University of Cambridge

Professor Paul Dupree's research is focused on understanding the biosynthesis and function of polysaccharide components of the plant cell wall. He has made significant advances in the area of understanding and improving plant lignocellulosic biomass quality and quantity, research which underpins development of renewable materials, such as fuels from plants.



The Dupree Lab is one of the six research hubs in The BBSRC Sustainable Bioenergy Centre. This virtual centre is composed of academic and industrial partners, based at each of the Universities of Cambridge, Dundee, Nottingham and York and Rothamsted Research. Their contribution is the BSBEC Cell Wall Sugars Programme - developing strategies to improve plants and enzymes for increased sugar release from biomass. The programme aims to better understand how sugars are locked into plant cell walls. By doing this they can select the right plants and the right enzymes to release the maximum amount of sugars for conversion to biofuels.

His research group collaborate with industrial partners to test their ideas and are also actively involved in increasing both energy awareness and public understanding of the opportunities and challenges biotechnology and bioenergy provide. They are also part of the Leverhulme Centre for Natural Material Innovation, a collaboration between the departments of Architecture, Biochemistry, Chemistry and DAMTP that aims to understand and improve wood properties for building construction.

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Word Cloud

Created by using Word It Out - www.worditout.com – based on the transcript of the meeting (edited to exclude non subject-specific words).



Introductions by the witnesses

Tina Barsby talked about how research is driven by the market, and particularly how/what crops get on to the market. She argued that there is a tension and a gap between the commercial value of supply and the public demand for crop varieties – mentioning so called ‘orphan crops’ such as sugar beet which reproduce vegetatively and where relatively little research has been directed towards. Targeted genetics is the only way to go.

Ariel Brunner argued that there are real tensions between agriculture and biodiversity, between various scales, between lobby and necessary shifts (disinformation campaigns), between the old and transformed world etc.

Paul Dupree argued that there is huge potential for creating biofuels from the sugars in plant cell walls. For example, it is now feasible to convert these sugars into ethanol and it is becoming more economically viable.

Key points people took away from the witnesses in the Original Forum

From genes to companies and farmers

- How do you involve farmers into the breeding process/participation?
- Under what political, legal, social, etc conditions would genetic engineering of crops gain broader support, especially in the EU?
- Participative plant breeding
- Corporate roles in developing and influencing agricultural technology

Technological solutions

- How do we get the sorts of technology developed for commercial gain into non-commercial areas? (vegetative + African market = double negative)

- I was struck overall by the difference in the speakers' expressions of faith in technological solutions. For example, it was clear from Tina Barsby's comments that she sees genetics as the solution to problems of both food security and environmental degradation (i.e., we can just use genetic tools to breed better crops that use fewer chemical inputs); but by comparison, Ariel Brunner seemed to categorize the achievements of genetics to date as one of the major threats to food security and a source of environmental degradation (i.e., the success in creating high-yielding crops has narrowed our diet to a few crops which are mostly inbred and which require uniform environmental conditions and high levels of chemical inputs).
- My own research on the histories of agricultural technologies and conservation biology leads me to sympathize more with Brunner than Barsby. In fact, I felt like his views of both technological realities and human nature were as sensible as any heard from those of us engaged in more academic pursuits. He was very clear and convincing in his explanation that technological fixes are never so straightforward as is initially imagined, with unanticipated ramifications all over the place, and also in his point that we cannot simply expect people to eat food that is more sustainable to produce and deliver (as is also evidenced every meeting in meals we eat...)

What really matters/what are really the problems around land use?

- Sustainable farming...what is it? ; relationship between sustainable farming and biodiversity and conservation? ; what are the elements of risk built into innovations such as high yielding crops
- Priorities for biodiversity conservation (in context of climate change) and potential accommodation with farming

Questions of scale

- Food security today is a local, not a global issue – how can we bring scale into this discussion and develop holistic sustainable farming scenarios for specific locales?

Policy

- Subsidies for specific crops may distort the market for crops, but they also have other aims, such as preserving specific rural lifestyles. How do we balance the food aims of policies against these broader cultural aims?
- Compromise compromise compromise - in reaching agreements, providing policies and imposing regulations- and recognise/respect the views of others. However, whether an ardent conservationist, GM proponent or climate change denier, present the evidence for risk and reward calmly and encourage a positive outcome. Stop moaning and have a positive attitude.
- Policy (Ariel Brunner) is subject to pressure groups even in the face of overwhelming evidence – the differing strengths of pressure groups (eg farmers) distort the direction of policy making

Markets and prices

- Recognition of global convergence on the lowest common denominator - in that internationalised markets are driving down commodity prices and human nature demands higher living standards for less; but balancing populations demands for energy and food security will increasingly demand local solutions for local people (my "Royston Vasey" scenario- League of Gentlemen)- be it local solar/energy generation including solar, wind and perennial biofuel crops or intensifying agricultural production and marketing
- (Tina Barsby) there are distortions in levels of research for different crops based on commercial returns for companies; seeds get precedence over vegetative crops – this is a Cinderella issue where knowledge that should benefit society is not gained because there is not a profit driver.

Next generation fuels and waste

- If we were to turn crop processing into a biochemical production process that could turn out many different products from the same raw crop stock (food, fuel, fibre for clothing, etc), what would/should the mix of products be and how would this be governed (if at all)?
- Look for the opportunities for renewables – for example, waste materials.
 - What are the effects of developing these technologies on land use (e.g. is less land used because fuel production is more efficient or is more used to grow biofuels because it's more profitable?) and on soil (e.g. the straw is being removed)?
 - What are the effects on greenhouse gasses?
 - Can it be economic without government incentive?
 - Could it be used as animal feed?

- Concentrating our efforts? Research (Paul Dupree) is focussed and narrow (for well understood reasons) leading to knowledge gain being the dominant rationale rather than increased understanding of a recognised problem. Paul said he would continue his research into lignocellulosic sugars even if it were shown to be leading up a blind alley. The consequence of this is that the scientists (academic researchers) are not the ones who decide what to research or what the implications are. So who is? There is an implication that the Research Councils have this role; are we satisfied they have a sufficiently broad remit? I am not sure I am.
- How to tackle such an apparent contradiction - education in both developed and developing world, and transparency in delivery and use of aid packages to encourage local resilience, but need for Cambridge to harness the power of those global drivers and use our collective expertise to make a difference
- I found interesting the comments on "this is all way too big and too complex so I better focus on my little research topic". It is very real, but also the real challenge. How do we find research questions that are narrow enough to allow real research and not just big philosophy, but that address the bigger problems out there, which clearly cannot be addressed just through the sum of small improvements? I found brilliant the example about the efficiency of lorries (technological improvements can scrap maybe another 1% but this is dwarfed by the logistical improvements on a system that runs lorries 85% empty half the time and 100% empty the other half of the time).

November: Drivers of demand



Aims

This month, the three witnesses will help us to think about some of the pressures on natural resources from the demand side, including economics, politics and health.

Witnesses

Bojana Bajželj	Doctoral Researcher, Low Carbon & Materials Processing group, Department of Engineering, University of Cambridge
Professor Ian Bateman	Professor of Environmental Sciences, School of Environmental Sciences, University of East Anglia
Professor Theresa Marteau	Director of the Behaviour and Health Research Unit, Institute of Public Health, University of Cambridge

Setting the scene

Ian Bateman, Professor of Environmental Sciences at the University of East Anglia came to help us to think about how to bring the environment into everyday decision making, both at the highest level, by informing government policy, and at the supermarket checkout by ensuring that prices reflect the true resource costs of production. His background paper was published in *Science* last year as part of the work underlying the UK National Ecosystem Assessment - also known as the UK NEA - and it shows the significance of land-use change not only for agricultural production but also for emissions and sequestration of greenhouse gases, open-access recreational visits, urban green space, and wild-species diversity.

He joined **Bojana Bajželj**, who leads the land use components of the BP FORSEER modelling project in the Department of Engineering. For her PhD, she has been exploring linkages between our diet, food security and climate change. Her paper was published in September this year in *Nature Climate Change* and using the BP FORSEER model, she and her co-authors suggest that healthier diets and reducing food waste are part of a combination of solutions needed to ensure food security and avoid dangerous climate change.

Theresa Marteau, the Director of the Behaviour and Health Research Unit (the Department of Health funded policy research unit in behaviour and health), who is particularly interested in our diets, the choices consumers make and their health. She recommended we read a paper she published as part of a special issue in *Science* on disease prevention, and it focuses on how interventions that target automatic processes underlying behaviours such as overeating, smoking, excessive alcohol consumption, and physical inactivity could enhance global efforts to prevent disease.

Background papers

Bojana Bajželj, Keith S. Richards, Julian M. Allwood, Pete Smith, John S. Dennis, Elizabeth Curmi & Christopher A. Gilligan (2014) Importance of food-demand management for climate mitigation *Nature Climate Change* 4, 924–929

Ian J. Bateman, Amii R. Harwood, Georgina M. Mace, Robert T. Watson, David J. Abson, Barnaby Andrews, Amy Binner, Andrew Crowe, Brett H. Day, Steve Dugdale, Carlo Fezzi, Jo Foden, David Hadley, Roy Haines-Young, Mark Hulme, Andreas Kontoleon, Andrew A. Lovett, Paul Munday, Unai Pascual, James Paterson, Antara Sen, Gavin Siriwardena, Daan van Soest and Mette Termansen (2013) Bringing ecosystem services into economic decision making: Land use in the UK, *Science*, 341: 45-50

Theresa M. Marteau, Gareth J. Hollands and Paul C. Fletcher (2012) Changing Human Behavior to Prevent Disease: The Importance of Targeting Automatic Processes (2012) *Science* 337, 1492

Witnesses

Bojana Bajželj

Doctoral Researcher, Low Carbon and Materials Processing group,
Department of Engineering, University of Cambridge

Bojana is interested in the global food security, climate change and land use. Her research points to the importance of addressing food waste and sustainable diets from climate mitigation perspective. She is also contributing to the resource-nexus model called Foreseer, integrating a range of land-related topics: urbanisation, agricultural production, biodiversity and the role of land in global carbon and water cycle.

Before joining University of Cambridge, Bojana worked as environmental consultant. She holds an MSc in Environmental Technology from Imperial College London and a degree in Landscape Planning from University of Ljubljana.

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Professor Ian Bateman

Professor of Environmental Sciences,
School of Environmental Sciences, University of East Anglia

While it is human economic activity which has resulted in the major global environmental problems facing present and (to a greater extent) future generations, it is clear that reform of that economic activity provides the only viable solution to such problems. Ian Bateman's interests lie in attempting to achieve this reform by bringing the environment into everyday decision making whether at the highest level, by informing government policy, or at the supermarket checkout by ensuring that prices reflect the true resource costs of production. Much of his research therefore seeks to value the true cost of pollution and the true worth of environmental improvements.

He is the Director of the Centre for Social and Economic Research on the Global Environment (CSERGE). Based at the University of East Anglia, CSERGE is a leading interdisciplinary research centre in the field of sustainable development and decision making. Recently completed research projects include: ChREAM (land use); AQUAMONEY (water quality); VERHI (impacts on child health).

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Professor Theresa Marteau

Director of the Behaviour and Health Research Unit,
Institute of Public Health, University of Cambridge
Professor Theresa Marteau is director of the Behaviour and Health Research Unit, the Department of Health funded policy research unit in behaviour and health.

She is also Professor of Health Psychology at King's College London and Director of the Centre for the Study of Incentives in Health (with the London School of Economics and Queen Mary, University of London) . She studied psychology at the London School of Economics and Political Science and the University of Oxford.

Her current research focus is upon developing ways of changing behaviour at population levels, drawing on neuroscience, behavioural economics as well as psychology.

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- 4) **How will the land use scenarios change under the uncertainty of climate change?** With increased groundwater depletion? With improved technology?

Ian Bateman highlighted three areas where he feels there are gaps in research:

1) The demand and supply of food

- We have estimates about how some parameters might change and we know, for example, that population increase will have a huge impact.
- One complication which often isn't taken into account is how people's affluence will change their behaviour and in turn, how that will change diets and land use
- While accepting that research is needed into the supply side – the role of land management, GM, agritech and precision agriculture – more research is needed into the demand side and the role that spatial and temporal variation in economic drivers and their impacts will play

2) The impacts of the choices we make on the environment

- There are many fundamental natural science questions about impacts still to be answered
- Many of these impacts are interrelated and non-linear – climate change, ecology
- A lot of research concentrates on adaptation but not enough on the dynamics of adaptation and the secondary effects those will have. For example, how people will respond to the changes in climate and how those will change land use and water availability

3) Trying to make better decisions based on what we know about demand, supply & impacts

- a) Develop truly integrated models which combine natural sciences, economics and policy and include both temporal and spatial dimensions of changes in natural capita
- b) Model multiple impacts of change and how we use land
- c) None of these models will ever be perfect but at the moment, different facets of this area are still very much in silos
- d) Economics has an important part to play, both in how we build 'value' into models (as opposed to price - the amount of money we pay) and how we use them to make decisions
- e) What are the impacts of alternative land use strategies & land be used in a more intelligent way?

Theresa Marteau: There are, broadly, two options for changing behaviour:

Providing information to change peoples' minds (e.g. poster campaigns):

- This has driven public health policy for last 60 years.
- Generally not that effective (although some evidence that providing information can change attitudes, which can then make people more susceptible to other influences).

Changing the environment to make something less easy or more immediately rewarding

Reducing food waste (could find no academic review of interventions):

- Change environment and associations, for example decrease portion size, change packaging and alternative pricing (sell less for less money)
- Provide information, such as labelling (e.g. Love Food Hate Waste)

Reducing meat consumption (note parallels with alcohol and tobacco):

- Change environment and associations
 - Decrease availability (e.g. why do we subsidise its farming)
 - Modify associations (e.g. McDonalds in hospitals has been shown to influence perceptions of how unhealthy it is)
 - Increase price
- Provide information
 - E.g. health or environmental campaigns on damage caused by beef industry

BUT. Although interventions have potential to modify behaviour, these options are constrained by the political and economic space that is available (e.g. how to ask companies to sell less).

Key points emerging from the discussion in the Original Forum and the Parallel Forum

The key themes emerging from both discussions included:

- 1) Integrating ecosystem services
- 2) Reducing waste
- 3) The role of agricultural production
- 4) Modelling and scenarios
- 5) Changing the behaviour of consumers
- 6) The impacts of the choices we make
- 7) Quantifying and communicating risk and uncertainty
- 8) Questions of scale
- 9) Making connections between research, businesses and policy makers
- 10) The next generation of research questions

Integrating ecosystem services

- At the moment, we are not rewarding other uses of land in the same way as land used for agriculture, how should we address this?
- The definition of "ecosystem services" is often framed from a biological perspective but could be expanded to include geological and hydrological services as well
- How do we mainstream-ise Payment for Ecosystem services, so that all beneficial land-uses are rewarded relative to the services they provide: not only food production, but also recreation, continuous carbon storage, carbon sequestration and biodiversity protection; so that market forces are more aligned with what would be the 'optimal use of land' to the society?
- Ecosystem services, both the definition and integrating together biodiversity, water and physical attributes such as soil

Reducing waste

- How can we reduce agricultural waste? And what strategies are appropriate for various parts of the world where the waste might occur at different stages of the production-consumption chain?
- Exploring interventions to reduce food waste (Theresa could find no academic review of this):
- Change environment and associations
- Decrease portion size, change packaging and alternative pricing (sell less for less money)
- Provide information
- Labelling (e.g. Love Food Hate Waste)
- Waste in developing countries, such as lack of storage facilities, and the need for more efficient storage

The role of agricultural production

- Can sustainable intensification close the yield gap? Which practices are most effective?
- What are the impacts of alternative land use strategies and how can we use land in a more intelligent way?
- Linking together the energy costs of farming and biodiversity
- The process of making fertilisers – trade-offs, inefficient farming, matrix of sustainability
- Farming and landscapes
- Improve the output of production – connected to the benefits
- Crop management
- Exploring the potential for cities to produce food

Modelling and scenarios

- How will the land use scenarios change under the uncertainty of climate change? With increased groundwater depletion? With improved technology?
- Develop truly integrated models which combine natural sciences, economics and policy and include both temporal and spatial dimensions of changes in natural capital
- Model multiple impacts of change and how we do and will need to use land in the future
- None of these models will ever be perfect but at the moment, different facets of this area are still very much in silos so overcoming these silos will be increasingly important
- A model that has a bigger vision is worth doing, even if it isn't perfect
- There is merit in a baseline set of principles/parameters for each type of model so they can be compared
- There are absolutes, not everything in a model is dependent of the perspective of the modeller or a particular political agenda

- The publicity surrounding Bojana's paper picked up on the idea that they were advocating reducing population size (when they weren't of course) indicates that it is the context/value of the reader not the modellers that causes variability in the models
- The issue of how to model multiple outputs from land areas (both private and public goods)
- Whether a capacity to model at smaller spatial scales has implications for the level of which we can make (social) decisions.
- Models and research (not just around sustainability) are based on many assumptions and simplifications. How can we properly account for variability or at the very least work to a common set of 'sustainability assumptions'?
- One thing that really stuck with me from last week was the discussion around the usefulness of modelling and how people use the information that is produced by models to support a certain narrative. As with Bojana's experience - the results can be used to support unexpected narratives/views.
- Cautious about believing the results of models too much and the way in which both them and the evidence by interest groups can be politicised
- How to translate abstract modelling into policy
- Economics has an important part to play, both in how we build 'value' into models (as opposed to price - the amount of money we pay) and how we use them to make decisions

Changing the behaviour of consumers

- Behaviour is driven largely by immediate gratification and our environment (true both of individuals and of policy makers). Your environmental impact (a direct consequence of your behaviour) is driven less by your values than by your personal affluence.
- How will people's affluence will change their behaviour? In turn, how that will change diets and land use?
- Although interventions have potential to modify behaviour, these options are constrained by the political and economic space that is available (e.g. how to ask companies to sell less)
- Changing eating habits from the predicted increase in meat to a more plant- based diet will be very important for reducing impact on land and the environment
- Although we can see the impact of red meat, it isn't yet clear that there is a viable alternative to it
- Knowing the limits on our understanding of how we make consumption decisions and how they are influenced

The impacts of the choices we make

- While accepting that research is needed into the supply side – the role of land management, GM, agritech and precision agriculture – more research is needed into the demand side and the role that spatial and temporal variation in economic drivers and their impacts will play
- Many of these impacts are interrelated and non-linear – climate change, ecology
- A lot of research concentrates on adaptation but not enough on the dynamics of adaptation and the secondary effects those will have. For example, how will people respond to the changes in climate and how will those responses change land use and water availability?
- As the link between healthy diets, sustainable diets and meat moderation becomes clearer and robust, how do we bring about institutional changes (in schools, universities, hospitals, via public spending ...), that will make the healthy, sustainable food choice the most convenient and 'automatic', given that most choices we make in life are not influenced by knowledge and values, but the behavioural environment and instant gratification?
- How do we identify potential 'losers' of the transition to healthy, sustainable diets (livestock farmers, retail, food industry) and identify potential compensations to them (e.g. jobs in land-stewardship), so that they do not feel threatened and oppose the transition?
- Who are the winners and losers in particular interventions, for example the effects of displacing agricultural production in one country to protect biodiversity?

Quantifying and communicating risk and uncertainty

- How can the issue of uncertainty in science be addressed to help policymakers act on important issues such as climate change?
- Quantifying and communicating uncertainty

Questions of scale

- At what spatial and temporal scale is sustainability investigated?
- Given that sustainability implies long-term, is this defined and does everyone design/plan/research using the same scales in time and space? I feel there's a lot of variability in its application -

site/local/national/international, now/next year/50 years/70 years. If you take the example of designing buildings, the sustainability of them is probably considered over the life cycle of the building (~ 50 years), but what about beyond?

- As a starting point, view connections between global and local, for example in food security

Making connections between research, businesses and policy makers

- Policy implementation – how to make research work within the constraints of time, finances etc
- I thought the recognition that researchers could work on developing solutions for businesses was a novel one. We often assume that businesses are going to innovate and that it is businesses that are progressive and cutting edge, perhaps with regards to sustainability businesses are actually conservative and not inclined to try out new things if the old things seems to be working for them. What role then do academics have in innovating for business? And gathering evidence for business to show that there are alternatives to the way in which they are currently operating?
- Who are we trying to influence and what are the 'levers' which will change behaviour or move towards more sustainable choices?

The next generation of research questions

- Be interdisciplinary and connect disciplines together, both within one field and also very different areas, such as natural, physical and social sciences
- Find ways to represent and quantify cross-disciplinary roles and how to integrate different disciplines together
- Recognise the need to be more multidisciplinary/cross-disciplinary at answering questions and for breadth as well as depth in research (where currently depth seems much more valued in academia). Although interestingly, someone made the point that the job market in academia is so competitive that people can find their career moves through different disciplines as they take the jobs where they are offered (they themselves had experienced that).
- Think about how to achieve inter-disciplinarity, going beyond ticking the boxes to do actual research
- Strike a balance between breadth and depth
- Link together policy making and human behaviour
- Think about scaling, from a global scale to a local level
- Explore cross-cultural differences, particularly in relation to people's behaviour, and highlight differences between countries as well as giving a global perspective

December: What can we tell from above?



Aims

This is the third meeting in the series and this month, the three witnesses helped us to think about the kinds of data sets we can use to look at land use and land use change and links between these and policy implementation.

Witnesses

Dr Alan Belward	Head of the Land Resource Management Unit at the Institute for Environment and Sustainability, European Commission's Joint Research Center (JRC) in Ispra, Italy
Dr Jon Hutton	Director of the United Nations Environment Programme World Conservation Monitoring Centre in Cambridge
Dr Lucas Joppa	Head the Conservation Science Research Unit and a scientist in the eScience Group at Microsoft Research, based at the Microsoft Redmond Campus, USA

Setting the scene

Alan Belward, the Head of the Land Resource Management Unit at the EC Joint Research Council, is one of the other witnesses and he was particularly interested in land use change and remote sensing in Africa. He sent us two papers. Paper 1 is an article from *The Biologist* about how satellites can help monitor the latest threat to life on Earth: a lack of space. Paper 2 was published online this year in an open source journal that outlines the satellites under civilian and/or commercial control with the potential to gather global land-cover observations.

Lucas Joppa from Microsoft Research, now based in Redmond, was keen to talk about who owns what land and for what purpose, particularly looking forward, the agricultural 'land grab' or land rush that's being driven by foreign investors buying up farmland in developing countries. He sent us Paper 3 about 'the global land rush' that focuses on how foreign investors are buying up farmland in developing countries. He also recommended we look at the Land Matrix, an open web-tool for collecting and visualising information about large-scale land acquisitions and contains some fascinating infographics and maps.

They were joined by **Jon Hutton**, the Director of the United Nations Environment Programme World Conservation Monitoring Centre who is interested in both the data sets themselves and in how to link them to policy at a national and inter-governmental level.

Background papers

Belward, A.S. & Skøien, J. O. (2014). Who launched what, when and why; trends in global land-cover observation capacity from civilian earth observation satellites. *LSPRS Journal of Photogrammetry and Remote Sensing*, published online: <http://www.sciencedirect.com/science/article/pii/S0924271614000720>

Belward, A.S. (2014). Running out of land. *The Biologist*, 61,3, 28-32

Arezki, R., Deininger, K. & Harris, S. (2012) *The Global Land Rush*. *Finance and Development*, 49, 46-49.

The land matrix website: <http://www.landmatrix.org/en/>

Extra paper: from Lucas

Lucas mentioned a paper about satellite accumulation around the world, and how we are missing conservation priorities with high res images. Seeing this figured updated would be amazing!

Loarie, S. R., **Joppa, L.N.** & Pimm, S. L. 2008. Satellites miss environmental priorities. *Trends in Ecology & Evolution*, 23, 183-184.

Witnesses

Dr Alan Belward

Head of the Land Resource Management Unit at the Institute for Environment and Sustainability, European Commission's Joint Research Center (JRC) in Ispra, Italy

Alan Belward leads one of eight Units within JRC, which provides information for European and International policies aiming to balance competing land-use demands whilst securing access to natural resources and maintaining ecosystem services.

He received the BSc degree in Plant Biology from the University of Newcastle upon Tyne in 1981, and MPhil and PhD degrees in remote sensing studies of vegetation, both from Cranfield University's School of Agriculture Food and Environment in 1986 and 1993 respectively. In the 1990s he co-chaired the International Geosphere Biosphere Programme's Land Cover Working Group and chaired the Committee for Earth Observing Satellites (CEOS) Working Group on Calibration and Validation. From 2002 to 2006 he chaired the Global Climate Observing System's (GCOS) Terrestrial Panel and in 2009 he was appointed to the GCOS Steering Committee. He is a member of the NASA and USGS Landsat Data Continuity Mission Science Team and the European Space Agency's Sentinel-2 Mission Advisory Group and is also a visiting lecturer at the Technical University of Vienna.

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Dr Jon Hutton

Director of the United Nations Environment Programme World Conservation Monitoring Centre in Cambridge

Jon Hutton received a doctorate in crocodile ecology from the University of Zimbabwe in 1984. During the next 20 years he held a number of senior management positions in that country, encompassing the government, NGO and private sectors. During the early 1990s he was one of the Zimbabwe Government's negotiators to the biodiversity-related Multilateral Environmental Agreements.

In 1999, he moved to Europe to work as the Executive Director of Resource Africa and Fauna & Flora International's Director for Africa before joining UNEP. Jon has produced over 50 papers, books and conference proceedings covering issues such as conservation policy; wildlife management; protected area management; community-based natural resource management; the sustainable use of natural resources; and the relationship between conservation and poverty. In recognition of his academic interests he was appointed a Senior Member of Hughes Hall College, Cambridge in 2004 and Honorary Professor of Sustainable Resource Management at the University of Kent in 2007.

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Dr Lucas Joppa

Head the Conservation Science Research Unit and a scientist in the eScience Group at Microsoft Research, based at the Microsoft Redmond Campus, USA

Lucas Joppa's research combines science, policy, and tools & technology. This ranges from quantifying the impacts of conservation actions to unraveling the complexities of species interactions and mapping where species are being discovered - and going extinct. He embraces the challenge of predicting outcomes for ecological communities under an increasingly uncertain environment, and unite robust ecological theory, social considerations, and innovative distributed data collection systems to achieve effective environmental conservation.

He completed his PhD in Ecology from Duke University's Nicholas School of the Environment. He is currently an Honorary Research Fellow at the University of Kent's Durrell Institute for Conservation and Ecology (DICE) and an Honorary Conservation Fellow at the Zoological Society of London (ZSL). In 2013, he received the Society for Conservation Biology's 'Early Career Award'.

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1. How can we make sure that the data is turned into something that can be measured or modelled, and turn it into knowledge?
2. How can we enable 'Cross-mapping' between different mapping projects? E.g. between biodiversity mapping and land use?
3. How do we manage the large data flows?
4. How do we deal with the fact that globally, the data is not uniform?

He therefore concluded that remote sensing is an area that shows great promise, and that it is an exciting field in which progress is made daily, but that there are still challenges ahead, particularly in filling the gaps of knowledge in regards to land. Furthermore, emphasizing the notion of land ownership as an example, he highlighted the importance in marrying the view from the sky with a perspective from the ground in order to fill these knowledge gaps.

As part of the follow-up after the meeting, he added:

I suspect there are many areas of overlap. Your forum could certainly provide guidance on synergies between the observation/reporting standards for the three Rio Conventions. This is a sadly neglected area. Finding common ground among them would be hugely beneficial - if we can identify commonality we may even end up with the observations needed... it would certainly help anyone trying to make policy links between biodiversity loss, desertification and climate change.

The land tenure / land cover story isn't closed either. Who 'owns' the land (or has rights of use) is extremely important - the very high resolution satellite image acquisitions may help, but won't provide a complete picture. We need to refine the questions asked of any cadaster. And we only really just scratched the surface of the woodfuel/charcoalhydro//habitat-loss story...

Jon Hutton (Notes by Elena Kazamia)

Introduction: Jon gave an overview of the challenges of collecting and interpreting remote sensing data in the specific context of biodiversity preservation. He highlighted that since habitat loss is the main driver for the loss of biodiversity in all (terrestrial) biomes, an understanding of changing land uses is imperative. He stressed that our ability to quickly and effectively measure land use change is lacking. This is both because land use change outpaces our data collection and processing but also because we do not have an efficient and holistic approach for conducting retrospective analyses. Jon explained that in the specific context of trying to understand changes to biodiversity, a tailored product is required, and whilst many have been developed (e.g. GlobCover 2005, 2009), none answer satisfactorily to our needs.

Key points people took away from the witnesses in the Original Forum

All of the points people e-mailed me after the meeting related to availability and collection of remote sensing data.

- We have a lot of big data at our finger-tips, yet seemingly simple information that would help support land-use decision making isn't there. However, easy access to details of ownership can be a controversial issue. I guess a culture of open knowledge can be introduced over time in the sense that in the UK if you buy land there is now the expectation/condition that this will be publicly available knowledge. But as Lucas raised, should his friends know what his mortgage is by searching online?
- There is huge capability to obtain high resolution data, yet our ability to understand change on a global scale is limited. This was interesting information to reflect on. So, we have the capacity for this knowledge, but there does not appear to be enough incentive to invest in gaining it. I guess that raises the question - in terms of longer term planning (and aims such as the UN's Development Goals), what data that we currently don't have be of most use?
- I was struck by the sense that we are collecting so much data in ever more sophisticated ways but still don't know so much. The lack of consistency in the ways in which data are collected, but more surprising, the apparent inability to join it up over time to show what has been happening. The, less surprising to me but problematic, difficulties in linking the physical data to human/ social/ institutional data in order to begin to understand more about the processes at work. The need for some sort of structure, perhaps something like land systems, that can provide a basis within which the available information can be linked, both the physical and institutional and social. This will sometimes be comprehensive, but often from samples and models of representative units.

- The lack of consistency in the ways in which data are collected, but more surprising, the apparent inability to join it up over time to show what has been happening.
- The, less surprising to me but problematic, difficulties in linking the physical data to human/ social/ institutional data in order to begin to understand more about the processes at work.
- The need for some sort of structure, perhaps something like land systems, that can provide a basis within which the available information can be linked, both the physical and institutional and social. This will sometimes be comprehensive, but often from samples and models of representative units.
- Satellite data is now synoptic almost in real time, revisits are frequent and precision is getting very high; we're on the verge of getting real time information (ie analysed data) at most scales on ecological, social and economic conditions of real importance to policy makers. However, we won't have trend data, historical comparability for some time to come in many areas. This provides opportunities for improving policy decision making, especially in the context of fully informed democratic debate. It also opens up less benign possibilities ranging from personal loss of privacy and commercial confidentiality through to support for neo-colonialism, land grabbing or worse. The history of mapping is substantially a military and colonising history; maps provide power but not always to the right people.
- Jon highlighted that one of the reasons we have not interpreted historic data on land use is that the type of work required would *not* involve using cutting-edge technology, which is off-putting to prospective researchers. Manual archival work is both expensive, laborious, time intensive and would not necessarily constitute a type of project that lends itself to doctoral training. I found this point particularly interesting as it is rarely considered. In our rush for better technology, retrospective analyses are... unappealing!
- Elena Kazamia was surprised to hear that data from products such as GlobCover 2005 and 2009 were impossible to compare. Jon implied that there was fundamental technological challenges that meant that any attempts would constitute bad science. Of course this raises a number of "why" questions. Why is there a lack of consistency and can no amount of data correction overcome the stumbling blocks?
- It was disheartening to hear (and have confirmed) that our technological capabilities are outpacing our needs but also our rational thinking. We are collecting haystacks of data that we do not need, struggle to interpret, without asking constructive scientific questions. I was left contemplating the scale of effort and communication required to improve on this?

There was no Parallel Forum related to this meeting.

January: Changing our thinking



Aims

This month, the meeting asked 'Does the way we think need to change?' and our aim is to use the interests of the panel of three witnesses to explore new ways of thinking about the impact of land use change on the supply of natural resources and drivers behind the demand for them.

Witnesses

Professor Charles Godfray	Hope Professor and Director of the Oxford Martin Programme on the Future of Food at Oxford University
Professor Georgina Mace	Professor of Biodiversity and Ecosystems and Director of the Centre for Biodiversity and Environment Research (CBER) at University College London (UCL)
Dr David Nally	Senior Lecturer in Human Geography in the Department of Geography at the University of Cambridge

Setting the scene

Charles Godfray, Hope Professor and Director of the Oxford Martin Programme on the Future of Food at Oxford University, is interested in how the global food system will need to change and adapt to the challenges facing humanity in the 21st century, and in particular in the concept of sustainable intensification, and the relationship between food production, ecosystem services and biodiversity. He recommended that we should read a Science paper, that looks at ways in which sustainable intensification could help meet the challenges of increasing demands for food from a growing global population.

Georgina Mace, Professor of Biodiversity and Ecosystems and Director of the Centre for Biodiversity and Environment Research (CBER) at UCL, suggested we read her recent Science Essay on 'Whose conservation?' about changes in the perception and goals of nature conservation over the past 50 years. She would also like to talk about how to make the "people and nature" framing more operational, so she recommended that we should also re-read the paper that Ian Bateman presented to us in November.

They were joined by **David Nally**, a Senior Lecturer in Human Geography in the Department of Geography, who is keen to talk about how food security debates are framed and to explore ways in which recent changes to the global policy landscape will affect agrarian land use. His paper discusses this framing in the context of 'land grabs' and geopolitics.

Background papers

T. Garnett, M. C. Appleby, A. Balmford, I. J. Bateman, T. G. Benton, P. Bloomer, B. Burlingame, M. Dawkins, L. Dolan, D. Fraser, M. Herrero, I. Hoffmann, P. Smith, P. K. Thornton, C. Toulmin, S. J. Vermeulen, H. and **C. J. Godfray** (2013) Sustainable Intensification in Agriculture: Premises and Policies. *Science*, 341, 33-34

G.M. Mace (2014) Whose conservation? *Science*, 345, 1558-1560

D. Nally (2014), Governing precarious lives: land grabs, geopolitics, and 'food security'. *The Geographical Journal*. doi: 10.1111/geoj.12063

Parallel Forum (2nd February)

Each group had a **facilitator** and a **note-taker** and everyone spent 20mins in each one:

Table 1: Charles Godfray and sustainable intensification – **Roz Almond** and **Regina Hansda**

Table 2: Georgina Mace and the values of conservation - **Jon Green** and **Kristen MacAskill**

Table 3: Framing food security with **David Nally** and **Therese Rudebeck**

Witnesses

Professor Charles Godfray

Hope Professor and Director of the Oxford Martin Programme on the Future of Food at Oxford University
Charles Godfray is a population biologist with broad interests in the environmental sciences and has published in fundamental and applied areas of ecology, evolution and epidemiology.

He is interested in how the global food system will need to change and adapt to the challenges facing humanity in the 21st century, and in particular in the concept of sustainable intensification, and the relationship between food production, ecosystem services and biodiversity.



He chaired the Lead Expert Group of the UK Government's Foresight Project on the Future of Food and Farming and is a member of the Strategy Advisory Board of the UK Global Food Security Programme and the Steering Group of the UK Government Green Food Project. He is also a member of the writing team for the UN's Committee on World Food Security, High Level Panel of Experts report on Climate Change and Food Security.

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Professor Georgina Mace

Professor of Biodiversity and Ecosystems and Director of the Centre for Biodiversity and Environment Research (CBER) at University College London (UCL)

Georgina Mace is Professor of Biodiversity and Ecosystems and Director of the UCL Centre for Biodiversity and Environment Research (CBER). She joined UCL in 2012 from Imperial College where she was Director of the NERC Centre for Population Biology.

Her research interests are in measuring the trends and consequences of biodiversity loss and ecosystem change. She led the development of criteria for listing species on IUCN's Red List of threatened species, and was a coordinating lead author for biodiversity in the Millennium Ecosystem Assessment (www.maweb.org). Recently she has worked on the UK National Ecosystem Assessment (uknea.unep-wcmc.org/), was a co-investigator on the NERC Valuing Nature Network, and Associate Director of the Ecosystem Services for Poverty Alleviation Programme, funded by DfID, NERC and ESRC (www.espa.ac.uk). She was elected FRS in 2002, and was the 2007 winner of the international Cosmos prize. She was President of the Society for Conservation Biology from 2007-2009, and President of the British Ecological Society from 2011-2013. Currently she is a NERC Council member, member of the Council of the Royal Society, and Chair of the science committee for the DIVERSITAS global change research programme.



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David Nally

Senior Lecturer in Human Geography in the Department of Geography, University of Cambridge

David Nally is a human geographer and member of the Natures, Cultures, Knowledges and the Population, Health and Histories Research Groups. His research interests include the political economy of agrarian change; the economic and socio-cultural dimensions of colonisation; the history of subsistence crises; and the geopolitics of disaster relief.

He recently completed a monograph, *Human Encumbrances: Political Violence and the Great Irish Famine* (University Notre Dame Press, 2011) and a co-authored textbook, *Key Concepts in Historical Geography* (Sage, 2014). David teaches courses on historical and contemporary human geography, research methods, and the politics of hunger. He was the editor of the RGS-IBG's monograph series on Historical Geography from 2007-2011.



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When questioned on the 2008 food price spike Charles highlighted that research is required into price signals and how they interact with environmental variables. Our markets have an unsustainable response to food price spikes.

Finally, Charles highlighted that the narrative of "duty to produce more food" is outdated and requires more eloquent expression of thoughts that will use the language of sustainability of resource use.

Notes from the Parallel Forum discussion about his paper (by Regina Hansda)

Some of the common themes during the Parallel Forum discussion about this paper included:

- Addressing the *value-chain losses* of food
- *Behaviour change* not just in terms of healthy diet, but also how much we procure, consume and waste.
- *Agriculture research and development agenda* for increasing '*tools in the tool box*' of farmers, for practicing sustainable agriculture.
- Documentation and sharing of *best practices* and up-scaling existing solutions
- Creating new or supporting existing *institutions for support and governance*

Godfray's paper responds to the increasing concerns of future global food insecurity given the complex nature of the challenge. By succinctly laying down the 'logics of agricultural intensification' both on the large and small farms, in the developed and the developing nations and the conditions for achieving it sustainably – it rebuts the charge that 'sustainable intensification' is an oxymoronic term and endeavour.

The group however felt, and which links with the concerns raised by other witness papers – that there is a danger, however, if we uncritically accept the popular narrative about 'food insecurity' based on the various statistics that almost seems like a truism. If we do so, we lend ourselves to believing that the solution lies in 'producing more to feed more' when the problem could be more complex and inter-related with other social and environmental domains. In addition, the question arises producing more of *what* and *where* and in doing so, are we irreverently alienating certain groups in certain societies. If that is the case, can *such food* from such processes and outcomes that find their way in our super-markets and into our kitchen fall within the ambit of 'sustainable practices'?

Some of the other themes, which emerged, were the unattended area of *food waste* and loss of food at the various levels of the *value chain* - both in the advanced, and the developing economies. Additionally, the food fetish of increasing the variety on the shelves of the same item in response to the 'needs of the consumers', and then subsequent wastage without proper recycling essentially leads to producers and consumers incurring double costs – of having to produce more, and then later to trash even more, both at the supermarket and household level. Many of the food we consume or waste has a transnational carbon footprint, and it is not an issue that can be viewed as 'not in our backyard problem'.

Some of the questions therefore, in view of this growing narrative about food security that warrant consideration and further work: are we clear in terms how the local or the micro-level needs and issues of 'sustainable intensification' link with the concerns at the global, macro level? Can we think of developing contextualised strategies for each level, which is affordable, accessible and inclusive? Farmers – whether large or small, from developed and many food insecure developing nations who are largely implicated in this intensification debate respond to any seeming crisis based on the available '*tools in the tool box*'. Therefore, can we think of increasing such tools for the farmers in their toolbox, through research and development; and/or by collating and sharing best either practices or solutions available in different parts of the globe? What about rethinking the way agriculture research and development agenda is shaped and money spent. Can there be a way where institutions that are interested in addressing this growing global challenge work in a synergy instead of duplicating or nullifying efforts? After all, there are enough evidences to suggest that concerns of food, energy, health, water and biodiversity are different ends of the same spectrum. Moreover, can we think of doing *scenario modelling* that can give us indication of how pressure on production of certain kind of input-intensive food can be reduced; if certain percentages of the population were to turn complete or sparingly vegetarian? Based on some of the findings if we can get governments to encourage such change in consumption behaviour through awareness and education?.

The crux is, it time for *action*, without waiting for the perfect answers and solutions. Some of the problems are structural, while others behavioural. What is needed is to begin doing what is possible at various levels. More than money, it is the will to change and work collaboratively and inter-disciplinarily towards addressing this common global problem.

Georgina Mace

Notes from the Parallel Forum discussion about her paper (by Krtisten McAskill)

Key themes:

- Valuing ecosystem services
- Impact of our change in attitude towards conservation & towards our general interaction with the environment

Georgina Mace, in “Whose Conservation?” published in *Science* magazine, traces the changes in attitudes or “framing” of conservation in the past 50 years. She identifies four different phases in framing of nature. The phases have reflected in a shift in emphasis from species to ecosystems and from viewing nature as separate from humans to considering direct benefits that nature can provide humanity. Mace suggests that analysis tools and techniques have not always kept pace with changes in framing and draws attention to the challenges surrounding appropriate evaluation of the benefits of nature for economic analysis.

This led to a series of reflective discussions around how we understand nature and the impacts of how our attitudes impact on government policy. While our models and framing of nature seem to have become more complex over time, we have not necessarily become more effective in managing a more sustainable relationship between humans and nature.

The idea of how to value ecosystem services was the source of much deliberation. *If* one could quantify effects of changing land use on a range of services, decisions could be more informed as to the trade-offs between benefits and losses. However, while there is evidence of attempts to do this at a more local or regional scale, many challenging questions remain, including: how do we put a price on conservation at a broader scale given different attitudes and values in different locations? What possible hidden parts of the system are we not valuing? How reliable are the statistics and tools we use as the basis of measurement? In terms of determining “value”, there is also an issue where expressions of value may depend on the question framing.

A psychologist in the group found interest in how our views on the interaction between society and the environment have changed; raising the question: how has this affected the way we live?

Ideally, humanity should take a balanced approach towards the relationship between nature and people, but there remains tendency towards focusing on what nature can provide for people, rather than what we can do for nature. Perhaps there is a new way of making connections, for example developing products that align with the idea of conservation; that is, products that ultimately contribute back to the environment, rather than being down-cycled or thrown out as waste.

Mace’s paper reflected what we identified as a western view on the conservation and the environment, rather than a global one. Perhaps more research is needed on how people view the environment and how we should interact with it.

David Nally (notes by Therese Rudebeck)

Dr Nally’s talk focused on the framing of the global food security debate. In his talk, he posed the argument that the manner in which any issue – in this case ‘food security’ is framed impacts on the manner in which it is being solved. In other words: to frame an issue in a particular way does not only defined the actual issue, but also formulates a particular solution.

Dr Nally argued that in the present time, there is a consensus among the dominant players in the field (e.g. IMF, the World Bank, G8, the World Economic Forum and large Agribusiness) for how to tackle global hunger, and it is through high-tech large-scale agriculture embedded in the capitalist system. In his talk, Dr Nally illustrated how this consensus – i.e. this solution – is directly derived from a particular framing of the issue of food security.

He argued that this solution is justified through a number of myths, that is, through a number of assumptions that we have come to accept as true. The first one of these myths is the assumption that food insecurity is always an expression of scarcity. In other words, that poverty is always causally related to hunger. When framed in this particular way, the problem becomes a monetary one and the solution that follows is naturally more investment. The second myth is the assumption that a solution can be reached through technology. Thus, the solution becomes a question for engineering, e.g. the genetic modification of crops.

However, the problem is that both of these myths overlook the underlying structural dynamic that causes hunger and starvation in the first place, indicating that the efforts are in the best case only treating the symptom of the problem, and in the worst case making matters worse.

Thus, the next set of research questions ought to be:

1. How do we re-evaluate small-scale peasant knowledge and integrate this into the narratives?
2. How do we design adaptive pro-poor technology?
3. Are there alternatives to commercial Intellectual Property Rights?
4. How do we farm *with* rather than *against* nature?
5. How do we re-embed markets in society so they serve social functions rather than commercial players?

Notes from the Parallel Forum discussion about her paper (by Therese Rudebeck)

David Nally's paper was used to inspire the group to take a step back and look at the bigger picture to question some fundamental assumptions.

Global food security has been identified as one of the greatest sustainability challenges of the 21st century. Many areas already experience severe food shortages, and with the human population steadily growing, expected to reach approximately 10 billion people in 2050, the demand for food will only increase. This places a huge pressure on available land, a pressure that is further exacerbated by climate change, and the pressure to use arable land for other purposes such as e.g. growing biofuel. It has become a truism that this yield gap – i.e. the difference between demand and supply – exist, and that the only way to close it is to produce more food, and to do so more efficiently. However, examining the present situation, the problem is not one of supply, but of distribution. We are already producing enough food to feed the entire population, and yet, over 800 million people wake up hungry every day. As noted by Amartya Sen, hunger is not caused by there not being enough food, it is caused by some people not having enough to eat. Thus, we need to ask ourselves, will the production of more food really lead to global food security and equitable distribution, or is the hard truth that in a system where food circulates according to market power, more food will simply lead to more food inequality?

When speaking of this yield gap, it is common practice to focus on the supply side. However, there are at least two other crucial aspects that have to be accounted for. Firstly, the amount of food wasted globally every year is staggering. The United Nations Environmental Programme estimates that one third of all food produced every year is wasted along various stages of the supply chain. Solely examining the United Kingdom, household food waste is estimated to 6.7 million tonnes annually, accounting for about 32% of the food purchased (FAO, 2011). Thus, we need to ask ourselves, is more food really what we need, or do we simply need to manage our available food better? Secondly, we need to critically assess human demand, and distinguish between want and need. From a sustainability perspective, it is clear that a behaviour change is needed, and that we should shift away the meat dominated diet we have today. Although achieving behaviour change is hard, the retail industry that make great financial gains from the current unsustainable trends have demonstrated that it is possible to alter human consumption behaviour. Perhaps it is time that to learn from the industry, and apply similar techniques to alter behaviour in a more sustainable direction?

Key points people took away from both Forums

Questions of scale

- There is scope for thinking about both the big picture and local issues in terms of sustainability. Hopefully they will meet in the middle somewhere!
- I am not sure that multi-function, segregated landscapes are understood or even properly researched. As someone said, we need more metrics. Organisations like the Local Nature Partnerships need clear guidance through tool kits to apply multi-functional sense when striving to advise on achieving sustainable landscapes, with 'nature at their heart' at a county level. Even more so when trying to build in resilience to climate change and other pressures. Also, for this, how would one measure success?
- Chris's mention of spatial structures of food supply/demand and at what scales they operate/become important. The term 'multi-functional landscapes' was used several times, but what do we mean by this? A finer scale in the mosaic of different land uses? Within-field multiple uses?
- Small holders and conservation outcomes: There seemed to be a big focus on the merits of small-holder based farming compared to large-scale intensification. It was not clear to me on what basis these

statements were made and it would be interesting to explore how small-holdings fit in with conservation outcomes. Questions here are: Have there been empirical studies on the conservation outcomes of small holdings vs. large scale operations? How do these studies fit with the general assumption that economies of scale bring about efficiencies? Do these efficiencies actually translate into conservation benefits?

Food supplies and markets

- Governance of food supplies/markets etc needs addressing although it was not made clear how. David Nally was clearly very dismissive of the WTO, and yet this is an organisation that the majority of the world's countries have signed up to (a necessary prerequisite for the governance structure to work) - I would think it would be possible to get anything with more teeth in place.
- D Nally and subsequent discussion. Markets (for food, water, energy and others services) are not "free"; they are social constructs. As such they need to reflect changing social goals including sustainability
- Optimisation. This includes making the best use of the land we have and minimising the waste food we produce at the moment. How can we optimise land to ensure that it delivers what it does best, at the right time in the right place? Are crops always grown in the most appropriate place or could that land be better used for other things? How would we know and what criteria could we use to say?

The demand side of the equation

- Want and Need: In the global estimates of food production, how do we measure and balance what we want to consume and what we need to consume. Again, this is probably about waste and over-production. Is it true that in the West we produce more than we need? How could we allow people to make informed decisions about what they actually need to eat versus what they want? Isn't that just market forces or are there alternatives?
- "More" of what we currently do isn't necessarily what we need to solve food security. Does more population necessarily mean the need for more food? Not necessarily. [KM comment- I feel this is more related to other table topics rather than the one had at my table. However, there could be a link made or question raised in terms of perhaps a new phase of conservation linking into new ways of thinking about food security – i.e. these issues impact on each other.] Jon mentioned this during the introduction – while this was not discussed in GM's paper, in her original presentation to the main forum she discussed how our attitude towards nature and conservation needs to be merged with how we need to think about future food security.

The policy agenda

- Given the importance of ecosystems in terms of services, not just production, it is crucial to get this sense across in the policy agenda.
- Translating academic ideas into policy implementation: I feel that there was a big gap in our understanding on how to take interdisciplinary ideas and fashion them in a form that is understandable to policy-makers and the public. It would be fascinating to gain an insight into the drivers behind policy-makers, hopefully at a future forum.
- **Policy formation:** The idea of finding a 'good enough' solution rather than attempting to obtain a tried and tested solution prior to implementation. The obvious question to ask would be how to assess what is good enough. I wonder if lessons might be obtained from the business world in this context - often businesses are rewarded for taking a calculated risk (first to market advantage, start-ups etc).

Sustainable intensification

- The way that terms such as 'food security' or 'sustainable intensification' can sometimes become loaded with unintended meaning, or else be used manipulatively to style self-seeking business or political interests as good for the community/environment.
- I liked the concept of sustainable intensification, but what was interesting was the discussion about how that might work in practice. Georgina mentioned that it wouldn't be that hard to influence behaviour through better incentives. However, when it came to discussion over dinner, no one could come up with practical examples of where this is done well. I think this contributes to my feeling that the reality of implementing such an idea feels a while off.
- C Godfray - "now is the end game on land allocation"; the next steps are about intensification. My thought - what does this mean and is it actually do-able?

The next generation of research questions

- I was very swayed by the argument that there should be more 'public good' research and development (by contrast with commercial) for the examples of plant and animal breeding that were given. Could this not be tested/funded by crowd funding or, with the right arguments mustered, philanthropy from high net worth families and individuals?
- I particularly like being reminded of the George Patton quote: 'If everyone is thinking alike, then somebody isn't thinking'. I'm a deep believer in that by challenging the orthodox and the comfortable and, occasionally, pointing out that 'the king's got no clothes' new ideas emerge and we move on. With quite a few of the lines of discussion at the forum there was no consensus, but there is a clear need to arrive at a consensus which inform those that make decisions and fund action. The challenge then is to avoid a 'lower common denominator' consensus which, although safe, may not take us along the action path as fast as the 'problem' requires. This requires strong and well informed leadership and begs the question, do we have it?
- Charles Godfray mentioned the UK food supply system as a priority for further research - Chris questioned whether we should not be focusing on where there was dire hunger - but the retort was that we should understand and address our own backyard before anything else. I thought this was an interesting exchange which supports the idea of a local focus at the March forum meeting.

Incorporating ecosystem services values

- Georgina highlighted in her introduction that a focus on provision of food, energy and water has come at the cost of losing ability of an ecosystem to provide for other values (such as hazard mitigation). She emphasised for discussion to be put into the broader context of benefits to be gained from the land.
- Georgina highlighted the value of supporting ecosystem services other than "provisioning" in sustaining provisioning services. IE a holistic approach is inescapable.
- Discussed concerns re: land grabs and the need to internalise negative externalities. – Currently focusing on buying up land for food production, but what are the ramifications for losses in other ecosystem services?

Framing food security

- David highlighted a gap in structural understanding of food security and the reasons for hunger, framing his thoughts in terms of myths of food security, He highlighted that food security is not necessarily an expression of scarcity.

Food equality

- Although we discussed the assumption 'more people = more requirement for food', we agreed that this was a simplification. In fact it may even be used to make people fearful and justify inappropriate use of land for example. It's possible the case that the volumes and type of food grown now may be sufficient in the future but there may be inequalities in where food is available and transported. This results in food waste in some areas and shortage elsewhere. How can this be balanced?

Cities and urban areas

- And a hobby horse - the link to the cities discussion is that cities/polities will have an imperative to protect their own provisioning (food, water, energy) and will be in greater competition with each other for these resources as the proportion of the population living in cities rises above 50%. We need some social scientists, economists and historians to address this aspect. It could lead to aggressive sequestration of services by powerful/rich polities.

February: Cotton – from source to shop



Aims

This month, two multi-national companies will bring a business perspective into this debate. Cotton will be used as a case study to look at how companies respond to the demands being placed on their supply chains and the greatest challenges they can see on the horizon.

We are co-hosted this meeting with the Natural Capital Leaders Platform at the Cambridge Institute for Sustainability Leadership (CISL) who are developing a cotton focus for their Platform Members. This work also relates to the ESRC funded Nexus Network, which CISL is leading in collaboration with the University of Sussex and UEA.

Witnesses

Chris Brown	Sustainable Business Director at Asda
Dr Helen Crowley	Head of Sustainable Sourcing Innovation at Kering

Setting the scene

Dr Chris Brown is the Sustainable Business Director at Asda, a British-based, American-owned supermarket chain. In 1999, Asda became a subsidiary of the American retail company Walmart and today is the UK's second-largest chain by market share.

Dr Helen Crowley is the Head of Sustainable Sourcing Innovation at Kering, a family-controlled, listed company and a world leader in apparel and accessories, which develops an ensemble of powerful brands. Focused on a single business, they design, manufacture and market desirable products across two fast growing segments:

Luxury: Gucci, Bottega Veneta, Saint Laurent, Alexander McQueen, Balenciaga, Brioni, Christopher Kane, McQ, Stella McCartney, Tomas Maier, Sergio Rossi, Boucheron, Dodo, Girard-Perregaux, JEANRICHARD, Pomellato, Qeelin and Ulysse Nardin

Sport & Lifestyle: Puma, Volcom, Cobra, Electric and Tretorn

Questions

Both of them were asked a series of questions related to sustainability, risk and the future supply of cotton:

1. What have the threats and pressures on cotton supply meant for your business?
2. What do you perceive as the biggest risks to your business when considering the competing demands from food security, energy and fibre supply?
3. What does the cotton industry/your business need to know to secure its supply and what gaps and burning issues do researchers need to focus on?
4. What are the key drivers/barriers for change in the cotton supply chain?

Parallel Forum (24th February)

Each group had a **facilitator** and a **note-taker** and everyone spent 20mins in each one:

Table 1: Focusing on cotton - **Dai Morgan** and **Bhavna Sharma**

Table 2: How models help companies to look at supply chains - **Liz Curmi** and **Milica Vasiljevic**

Table 3: Framing natural capital and climate change in a business context with **Nikki Bartlett** and **Jon Green + Marina Romanello**

Witness profiles

Dr Chris Brown

Sustainable Business Director at ASDA

Chris is the Sustainable Business Director at Asda. Previous to this, Chris worked in Government before joining the Meat and Livestock Commission as Beef Strategy Manager. He moved into retail as Agriculture Technologist with Marks and Spencer before Asda as Agriculture Development Manager with a remit to develop Asda's strategies and activities across all sectors of agriculture. His role has now been extended to become Head of Ethical and Sustainable Sourcing covering waste and resource management, communications and sourcing.



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Asda

Asda is a British-based, American-owned supermarket chain, which retails food, clothing, general merchandise, toys and financial services. It also has a mobile phone network Asda Mobile. In 1999, Asda became a subsidiary of the American retail company Walmart and today is the UK's second-largest chain by market share.



For more information about Asda and sustainability: <http://your.asda.com/sustainability>

Dr Helen Crowley

Head of Sustainable Sourcing Innovation at Kering

Dr. Helen Crowley joined Kering as the Conservation and Ecosystems Services Specialist in November 2011. Prior to Kering, Helen was Associate Director at the Wildlife Conservation Society for 11 years. She has a background in field-based conservation and development projects particularly in Africa and Madagascar, as well as market-based conservation initiatives and designing corporate-NGO partnerships. Helen has also worked as a consultant to several corporations where she was responsible for helping them implement sustainability strategies. During her tenure at Kering, Helen has been advising and supporting Kering's Luxury and Sport & Lifestyle brands with a focus on innovative cross-cutting sustainability solutions, including sustainable sourcing and manufacturing processes, to help guide the Group's overall sustainability strategy and programme implementation.



e-mail: helen.crowley@kering.com

Kering

A family-controlled, listed company, Kering is a world leader in apparel and accessories, which develops an ensemble of powerful brands. Focused on a single business, they design, manufacture and market desirable products across two fast growing segments:



Luxury: Gucci, Bottega Veneta, Saint Laurent, Alexander McQueen, Balenciaga, Brioni, Christopher Kane, McQ, Stella McCartney, Tomas Maier, Sergio Rossi, Boucheron, Dodo, Girard-Perregaux, JEANRICHARD, Pomellato, Qeelin and Ulysse Nardin.

Sport & Lifestyle: Puma, Volcom, Cobra, Electric and Tretorn

More about the Kering group can be found here: <http://www.kering.com/en/group/about-kering>

For more information about Kering and sustainability: <http://www.kering.com/en/sustainability>

Word Cloud

Created by using Word It Out - www.worditout.com – based on the transcript of the meeting (edited to exclude non subject-specific words).



Introductions by the witnesses

Helen Crowley, the Head of Sustainable Sourcing Innovation at Kering

"We are far from being 100% organic in Kering, but it is something we are looking at moving towards."

There are two pillars of Kering's sustainability strategy

- 1) Public targets, aimed at making the business more sustainable
- 2) Environmental Profit and Loss – EP&L - accounting

Initially these two approaches were developed in Puma, and they have been expanded across all of their brands and include indicators of land use change, water use, water quality, green house gas emissions and the state of the soil.

Most of work with the individual brands focuses on how to reduce their materials sourcing footprint. In these conversations, she finds monetising and EPL an amazing internal change management tool as it allows her to show and talk about what sustainability means, create baseline meaning and context about what it means to the business.

Cotton is important to Kering because it is a core product across all their brands. Cotton also represents a significant part of their Environmental Profit and Loss accounts, having the greatest impacts on water use and GhG emissions.

The risks associated with cotton, such as volatility in price, the prevalence of child labour, farmer suicides, integrity and quality of the product and traceability of the raw material are all business risks which are common across all apparel companies. Ultimately, Kering want to reduce their impact and their philosophy on sustainability asks: where can we, as a company, create positive outcomes?

Organic cotton production accounts for around 1% of global cotton production and does not allow the use of any GM seed, synthetic fertilisers or pesticides. She sees organic cotton as the gold standard for ecologically sustainable production. Kering therefore came together with a small group of like-minded companies to develop their own Life Cycle Assessment so that they can compare conventional cotton farming and organic cotton farming. According to the latest LCA, all measures, including nitrification, GHG, water, ecological impact are all better in organic farms. The EP&L also clearly showed environmental benefits. Social well being and social value (organic cotton) are also both very important elements to consider and she argued that organic can help with those too.

Chris Brown: Sustainable Business Director at Asda

“Cotton is not the fore-front issue at the moment. However, we are interested in investing time and resources in it because we believe that it may well become significant in the future.”

Asda is the largest retailer of apparel in UK based on volume through its George brand. They are aware of the significance of cotton as a commodity:

- 20 million tonnes produced globally by 90 countries
- Takes up 2% arable land – the equivalent to 1/3 of the area of the size of the maize crop
- In Africa and Asia, its production is largely dependent on smallholder farmers – 100,000
- Large scale production is more common in Australia and North America

Cotton production is rising and has doubled over the last 40 years to meet increasing demand:

- Cotton is traditionally a toxic, thirsty crop requiring a lot of water, fertiliser and pesticides
- 80% of cotton worldwide is now GM, with as much as 95% on the Indian sub-continent

Although the ‘nexus’ debate is traditionally food/fuel, he believes that because of the importance of cotton as a crop, the debate should be centred on food/fuel and fibre. In general, he tends not to talk about sustainability internally, but instead talks about land and resource stewardship.

If cotton is to become more of a forefront issue in the future, Asda will handle it based on the experience from other commodities, such as palm-oil and soy. This experience has shown that unpicking a supply chain and getting to know farmers and producers are key factors in ensuring a more sustainable and de-risked supply.

The challenges for cotton

The two witnesses highlighted the following challenges for the cotton and clothing industry:

Low customer awareness: Despite the importance and prevalence of cotton, customer’s awareness on the importance of sustainability issues with cotton is low compared to food commodities.

Supply chain traceability: In the past, Asda looked at avoiding buying cotton from Uzbekistan due to problems with child labour, but they had to retreat from that as it proved to be too difficult. This is partly because the supply chains are very opaque at the moment – it is impossible to trace where a batch of cotton is coming from. This is unsurprising as the supply chains have developed with the goal of efficiency, not traceability. But that can change if there is a will and reason to unpick the supply chains.

A lack of clarity about the impacts of different production systems: Asda doesn’t hold views on which cotton production system is better (organic vs. ‘better’ vs. conventional), however Chris himself does not hold much respect for organic farming.

The lack of availability of financing systems to smallholder cotton farmers: One problem Asda recognises is the lack of availability of financing systems to small holder cotton farmers (to improve the agronomy practices, and overcome gaps between farmer costs and income). But unfortunately, until Asda gets into direct touch with their farmers, they feel there is not much they can do. In Chris’s experience, drip-feed irrigation is too capital cost intensive for a commodity crop such as cotton. When drip-irrigation was put in place in Morocco, farmers transitioned from corn to horticulture, now producing vegetables and fruit. In his view, drip-irrigation is only compatible with high-value crops.

Organic cotton farming in general is declining as there is not enough support for farmers. There is a significant premium for it but smallholder farmers are not receiving that premium.

Developing meaningful impact indicators: When indicators are used, the reductionist focus on a particular issues, food miles, organic, child labour, then extremely difficult to know what effects that has on other aspects of the complicated system.

Their gaps and burning questions

- How can smallholder farmers get access to good quality seed?
- Looking at the best varieties to grow in different areas. If we are going to continue to grow cotton in India, what other locations are there?
- How can farmers best match growing cotton with other rotational crops?
- Integrity and visibility is needed throughout the supply chain and all actors need to be engaged in this discussion, including the farmers, spinners and ginners and retailers.
- How can we unpick supply chains and create new business functions that allow traceability throughout the cotton supply chain from source to shop?
- There are cost issues associated with organic cotton as it is more expensive than conventional cotton. What incentives do farmers need in order to grow it and how do these vary from one region to another?
- Can we develop indicators to help us to determine the impacts of cotton production on the environment or will these in danger of being too simplistic?
- Could we open questions of sustainability out to think about whether a commodity like cotton is sustainable more generally, rather than just concentrating on cotton production?
- Given the world is the way it is, where do we leverage to make cotton production better, both for the environment and for the people who grow and harvest it?

Chris Brown is also keen to:

- Focus on natural capital sustainability (as opposed to social questions)
- Be able to justify what production system to use and what approach to take based on evidence (organic being only one option – there are also systems such as Fairtrade, Better Cotton)

Additional speakers adding their thoughts

Bryony Worthington (Labour Shadow Minister for Energy and Climate Change)

Although it seems to be a pre-set condition we'll be using cotton and production will stay the same, we should also ask:

- What is the trend in use and is it predicted to continue?
- What other fabrics can we use to replace it?
- What is cotton going to be used for in the future?
- How can we close the loop – recycle - and get the maximum benefit out of that?
- How can we look at the entire supply chain for cotton
- What impact is cotton production having on food production or energy provision?

Lydia Smith (NIAB Innovation Farm)

Quality of production: She found it saddening that discussions that look at sustainability of cotton production tend to be polarised into talking organic production and conventional production in very black and white terms.

The role of Genetically Modified cotton: There are two transformations.

- 1) BT cotton contains a small amount of chemical coming from a bacillus – preventing insect predation and reducing pesticide use
- 2) Roundup ready – allows the plants to withstand Roundup herbicide. Cotton growers can therefore spray their fields with Roundup herbicide to control weeds without damaging the cotton plants and need to use less herbicides/

Although organic farming reduces pesticide and herbicide use, both of these types of GM cotton do as well. For example, in Australia, 100% of cotton is GM and farmers have reduced their pesticide and herbicide inputs by 80% and biodiversity is increasing.

Low input farming is another approach and the Soil Association has been involved in the certification of low input farming in the UK. She argues that this results in input reductions, increases in biodiversity and toxic reduction.

Quality of cotton: The genetics of cotton varieties are more important than the way you drive the agronomy of cotton. Plant genetics should therefore be where you go to create higher quality cotton.

Howard Griffiths

Is there really a conflict between what companies who sell cotton products want and what the people who are buying them want? As with any debate it may just come down to cost. How much can you charge for your product? He can imagine that when you go to the supermarket in 20 years, there will be many types of cotton offered - organic, non-organic, Gm wheat - founded on ideologies rather than practicalities.

Whether we will be growing cotton in 20-50 years depends on the extent to which we can improve the agronomy of water use and salinization.

Choices about whether to choose organic or GM cultivation will become increasingly urgent as competition for land increases and land quality decreases.

Key points people took away from the witnesses in the Original Forum

Organic cotton versus other production methods and certification

- There also seemed to be another elephant in the room re: organic cotton vs better cotton - the two speakers seemed to fundamentally disagree here but didn't want the conversation to be overtaken by this debate. Chris highlighted the need to focus on the "impact" of cotton. Perhaps the topic for further research?
- Aliso Smith found Helen's assertion of organic cotton being the "best" unsatisfactory given that the system she described is so limited. As Lydia Smith said, it seems very unfortunate that people who are clearly passionate about environmentally friendly methods of agriculture are ideologically opposed to GM (or other technological approaches to plant breeding such as TILLING), even if the methods are shown to reduce inputs. The Bt example is particularly ironic since the Soil Association promotes spraying it on organic crops as a 'natural' insecticide.
- Since Helen was so certain organic cotton is more sustainable, I think it would be important to establish if this is realistic goal or an irrelevance. Organic farming is only a few % of current production. What % could convert to organic? Much cotton is farmed in areas where it would not be viable, or at least productive- inefficient rotation crops or inability to fertilise organically. I suspect actually very little cotton could be grown with such positive environmental credentials as the small amount that is currently grown. In that case, we should focus on the more important question of minimising the impact of the conventional farming- through minimisation of demand (c.f minimising food wastage and low energy light bulbs), and use of best practice farming methods -GM, drip watering.
- Does certification of the product actually prevent the development of intermediate production systems that might combine best aspects of the organic and conventional systems?
- Should we focus on organic cotton when most of the population uses conventional cotton? If yes, how slower organic cotton grows and are there any additional risks compared to conventional cotton?

Sustainable consumption versus reducing consumption

- Sue raised "an elephant in the room" – sustainable consumption vs reducing consumption? Helen said they focus on working to improve their production system and make better products, less so/ not on changing people's behaviour, where people make their own individual choices.

Lifecycle analysis and supply chains

- Finally (a fourth point I realise...) I really liked Sue's comment on the "secret life of a cotton t-shirt" - it could be a great concept for an article. That is - the need to understand the lifecycle of cotton products - how does it come into being and how does it get thrown away? - .eg. worn out or is it that it is not "cool" to wear it anymore?
- My main take-away was that there is complexity around each step in the chain and opportunities for unwanted feedback and side effects. I suspect the answer relates to a combination of intelligent proselytising for sustainable solutions, good intelligence about each point in the chain and its lateral links to other issues, and some sort of Sustainability Assessment on every step, including questions about the secondary relationships of the activity concerned to others. All of which is very heavy duty, so a further element needs to be a sort of sustainability entrepreneurialism to provide the energy and impetus

needed. Taxing "bads" might help to drive the process along, if vested interests (cotton-vested interests? sorry) can be overcome politically.

- The issue about financing small scale producers to become more efficient and to develop separate supply chain processes. I would have expected that institutions could be developed to allocate finance for this - so is it prevented by high transactions costs or is small scale simply not competitive.
- Is it true that the price premium doesn't get down to the initial producers. Is this an issue of a lack of competition in the supply chain or something else?
- Unfortunately we didn't have time to talk about the workers in the cotton industry, the working conditions in East Asia and children involvement in the production chain.

Economic costs and incentives

- Do we really need to rely on valuations of external costs that are derived without knowledge of the methodology and assumptions used?
- Who absorbs the risk in the production chain and who has a profit elasticity according to the cotton prices set in the stock market? There are three different components here. I suppose that the risk is absorbed by the producer (see cotton producer suicides), the profit elasticity will be found in the final product and especially in expensive brands and the stock market price is a parameter that effects every part of the process.
- Interesting that Helen was incredibly enthusiastic about monetising impacts as an internal management tool and create a baseline understanding for sustainability in the company

Summaries of the group discussions in the Parallel Forum

Group 1: Cotton and supply chains: (by Bhavna Sharma)

To develop sustainable cotton, a clearer picture of all aspects of production is essential to reduce impacts and increase the sustainability of the industry. To drive corporate change toward sustainable production, the benefits and opportunities for industry need to be developed. Companies need to define their vision of what is sustainable in terms of the cotton industry. Based on these principles and criteria, researchers can develop metrics and new methods. Current sustainable production is limited to a niche scale and large advances in all aspects are needed to scale up. While the cotton industry is well established, the methods of practice are not widely known and need to be evaluated and standardised within the system. With an evidence based argument, new standards of practice can be promoted and adopted.

Models for sustainable cotton should explore the multi-crop and crop rotation to optimise methods of production in terms of seeds, irrigation, chemicals, and land use. Additional areas of research include development of productivity predictions to explore the required inputs and ideal geographical locations for growth. Current leading producers include China, India and the United States, and there is a lack of understanding of how climate change may affect the yields in these regions.

To reduce risk and increased yield, a global trend is emerging to utilise genetically modified seeds, with the majority of cotton produced today being genetically modified. Further research and identification on the types of seeds used and their associated benefits should be conducted. Comparison of the current production methods available (conventional, GM, and organic) will provide the advantages and disadvantages, as well as serve to evaluate risk. The producer has limited profits and assumes all risk, representing the weakest part of the supply chain. Further understanding of the economics of the different types of production and the potential impacts of climate change are needed at both a small and large scale.

To evaluate the production process, transparency is needed, not only for accountability but also for researchers to effectively develop alternative solutions. Supply chain traceability would allow for evaluation of environmental and economic issues. Furthermore, the information collected would allow for development of certifications. Focused on risk, sustainability and profit, models will reveal critical nodes and where metrics can be applied. While it may be easier to account for some parameters and effects (i.e. resources, profit), social aspects may be harder to capture. One billion people rely on the cotton industry and small changes in the production have the potential to impact approximately one hundred million farmers and a quarter of a million workers. Modelling must also focus on the social and economic constraints that need to be considered while increasing the sustainability of the field. Increased transparency will also allow greater understanding of the natural capital costs. Water is the major input in cotton production and represents the highest cost in terms of natural capital. The consumption of resources is dependent on the end-product due to the differences in

manufacturing and the efficiency of the process. A resource map would provide comparison of the utilisation of resources and indicate the efficiency of the different processes and associated impacts.

Cotton represents 40-45% of the EU textile market and the largest global consumer is China. While alternatives have been developed (i.e. rayon, viscose, Lyocell) the processing methods do not necessarily produce a more sustainable product in comparison to cotton. Demand is a complex topic and should investigate the types of applications or products, consumer awareness and behaviour. Consumer demand in driving the sustainability is increasing, however the scope is limited to specific groups and interests. In effort to achieve broader impact, the industry should focus on high street and develop commercial hooks that will drive sustainable cotton production. For example, the business case for sale of both organic and conventional cotton products, which provides the consumer with options. Additionally, extending the lifespan of cotton products would be a more effective use of resources, and could be reflected in increased cost rather than the cheaper but less durable model for products. Recycling of cotton products is a niche market. Challenges include the need for processing to address mixed materials, embedded pesticides and other chemicals. Furthermore, the processing results in shorter fibres which have limited applications. Development of new processing methods is necessary to develop a market for recycled material.

Group 2: Framing Natural Capital and Climate Change in a Business Context (by Jon Green)

The private sector is made up of a multitude of actors, all with different goals and values. Within it, there are many sectors, companies and individuals all very different. The language of someone working in procurement is likely to be very different to that of someone in the sustainability office, even within the same company.

One of the most effective ways that CISL engages with business and natural capital is by looking at impacts and dependencies through the lens of a single commodity supply chain. This grounds the discussion in a tangible product and can be effective in highlighting, particularly, the risks, vulnerabilities and costs associated with degraded natural capital.

Language

There is a drive within engineering to move from 'sustainability' to 'resilience'. However, resilience still suffers from problem of meaning different things to different people (e.g. engineering resilience vs ecological resilience). But, does resilience deal so well with efficiency (i.e. does it build in more redundancy than is necessary)? If so, how can this be dealt with under current economic models.

Private sector have used changes in terminology to gain traction. For instance, rather than referring to "energy efficiency", Velux Windows are now selling by referring to "warm and healthy homes".

Businesses should care

If natural capital is truly important in providing material benefits to a company, then they surely would be interested. So if there is a good evidence base that sustainable rubber production is linked to higher profits, then businesses will act..no?

BUT:

1. Companies may simply invest elsewhere (i.e. hedging their bets/diversifying could increase their resilience and financial sustainability, but won't contribute to improving their environmental sustainability/performance).
2. The timescales for loss of benefits may be too far off. Short-termism can be a problem. Businesses are worried about acute risks – slower or longer-term risks do not have such traction. Accounting has an important role here. Accountancy has driven efficiency decisions, but if timeframe is <1year, then this will effect *what* efficiency measures can be invested in.
3. So long as businesses are doing as well as competitors, then there is little incentive to act.

What motivates businesses to (e.g.) join a certification scheme?

A multitude of reasons, including:

1. Individuals within a business that genuinely care
2. The history/longevity of the company can affect sustainability planning
3. Ownership and structure
4. Shareholders
5. NGOs – especially for brand image
6. Leadership
7. Financing – responsible financing may become a more important factor as lenders increasingly require evidence of good natural capital management. Financing may also be a mechanism by which consensus at management level can be translated to action at ground level with business units.

It isn't always just about profit maximisation and to suggest that is naïve and can offend/alienate some business people.

Greenwashing

How much do companies care about natural capital vs. actually just implementing because worried about their image. Does this matter if greenwashing is actually resulting in a positive impact?

Hydrocarbon industry

Does not really need to invest in brand image around natural capital because:

1. Hydrocarbons are so integral to our economies and lives
2. Brand image has little to do with the choice that people make. Largely it is to do with price.
3. This, then, drives the culture within businesses.

Roundtable for Sustainable Palm Oil example

Consumer demand is not meeting supply – only 50% of product was sold at higher premium. This links to:

1. Whether price premiums actually obstruct the mainstreaming of more sustainable methods that could bring whole industry along (example of Better Cotton Initiative, which absorbs the higher costs of production in order to maximise demand for BCI cotton)?
2. Whether companies, who are clearly good at manipulating consumer demand, should be doing more to encourage change in consumer behaviour towards demanding higher sustainability? Currently companies are not good at recognising this and proactively changing demand.

More thoughts on demand

Demand is crucial to the solution (e.g. of meat consumption and climate change). However, this is not necessarily a problem for business. Needs to be reframed as an opportunity to do other things. How do we help businesses/individuals to find their role in the solution (rather than just confrontation).

Effecting change

We need solutions instead of just problems. If we know what needs to change, then:

1. We need to identify what motivates business to change
2. We need to provide alternatives

But it isn't always win-win. Who is responsible when someone loses. How do we manage this. When there are going to be losers (e.g. decreased profits), companies are keen to engage on (at least) a level playing field so that their competitors face the same constraints.

Collaboration can also be a useful tool, sometimes private sector collaborations can drive policy change. However, competition law can make this difficult, particularly when dealing with quantities and prices (danger of creating a cartel).

Is change driven at the bottom or the top of a supply chain? Enhanced sustainability could be pushed up from the bottom or pulled up from the top. Most examples appear to be the latter. Linked to bottle-necks/power. Tend to be fewer retailers/commodity traders. Cooperatives may help if producers want to push change from the bottom, but much harder to mainstream.

What are the biggest drivers for business?

Arguably, companies are more interested in increasing revenue (new markets, new products) than increasing efficiency (which can also reduce costs), unless there are risks to having high costs or unless the company has limited resources (e.g. during financial crises etc).

Group 3: The role of models in visualising and understanding supply chains

[notes to come]

March: From local to global



Aims

This month, our theme is 'From global to local' and we will explore questions that focus on the impacts of changes in land use, climate change and the demand for resources at a range of scales.

Witnesses

Dr Toby Gardner	Research Fellow at the Stockholm Environment Institute, Sweden
Dame Barbara Stocking	President of Murray Edwards College, University of Cambridge
Professor Tim Wheeler	Deputy Chief Scientific Adviser at the Department for International Development and Professor of Crop Science at the University of Reading

Setting the scene

Barbara Stocking, the Principle of Murray Edwards College is interested in talking about land grabbing and giving a practitioner's view of the connections between land use, food security and climate change.

Toby Gardner and came over from the Stockholm Environment Institute. He is keen to explore some of the issues around "the tropics in transition" and how our increasingly globalized and interconnected world is driving rapid processes of change across tropical developing nations. More specifically, he would like to speak to some of the sustainability challenges and opportunities that brought into particularly sharp focus at forest-agricultural frontiers - where the global and the local often collide.

Tim Wheeler is the Deputy Chief Scientific Adviser at the UK Department for International Development (DFID) and he is currently on secondment from the University of Reading where he is Professor of Crop Science. He is particularly interested in how climate change could impact on the sustainability of agriculture and food and has carried out research in a range of countries including Bolivia, Honduras, The Gambia, Uganda, China and India.

Full references

Stocking, B. (2014) Is there Enough for All of Us? Global Growth, Climate Change and Food Security. The Inaugural Gates Cambridge Annual Lecture, given on the 11th November 2014.

Gardner, T., Godar, J. & Garrett, R. (2015) Governing for sustainability in agricultural-forest frontiers: A case study of the Brazilian Amazon. *Stockholm Environment Institute (SEI) Discussion Brief*, Published by: Stockholm Environment Institute, Sweden - [direct link](#)

Gardner, T. (2013) The Amazon in transition: The challenge of transforming the world's largest tropical forest biome into a sustainable social-ecological system. *Tipping Points*, 130-148

Wheeler, T. & von Braun, J. (2013) Climate Change Impacts on Global Food Security. *Science*, **341**, 508-513.

Parallel Forum (24th February)

Each group had a **facilitator** and a **note-taker** and everyone spent 20mins in each one:

Table 1: A Skype discussion with Toby Gardner, with **Roz Almond** and **Rosemary Ostfeld**

Table 2: A Skype discussion with Kate Reworth, with **Lara Allen** and **Shadrach Kerwillain**

Table 3: Food security and climate change, with **Will Simonson** and **Bojana Bajzelj**

The three note takers – Rosemary Ostfeld, Bojana Bazelj and Shadrath Kerwillian – also interviewed Tim Wheeler on the 24th March to ask question raised during the meeting the previous week.

Witness profiles

Dr Toby Gardner

Research Fellow at the Stockholm Environment Institute, Sweden

Toby Gardner joined the Stockholm Environment Institute in January 2014 as a Research Fellow funded by the Swedish Research Council, Formas. His primary focus is on transitions towards more sustainable land-use systems in Brazil.



Toby has over 10 years' experience in science and science-policy issues in human-modified landscapes across the tropics, with a strong emphasis on the management and conservation of biodiversity and ecosystem services in multiple-use agriculture-forestry landscapes, and the challenges of balancing environmental concerns and rural development priorities.

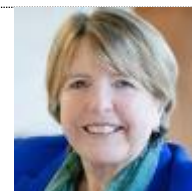
Before joining the Institute Toby was a research fellow at the University of Cambridge for five years, and helped found and coordinate the Sustainable Amazon Network. He is an affiliated researcher at the Goeldi Museum in Belém (Pará) and the International Institute for Sustainability (Rio de Janeiro). He has previously led research projects in Belize, Tanzania, and in Caribbean coral reef ecosystems.

He has authored more than 80 peer-reviewed publications, including a reference book on the monitoring and management of biodiversity in forest ecosystems (Earthscan, 2010). In 2012 he was awarded the biannual British Ecological Society's Founders' Prize for significant contributions to the science of ecology.

Dame Barbara Stocking

President of Murray Edwards College, University of Cambridge

Dame Barbara Stocking became the 5th President of Murray Edwards College, founded as New Hall, in July 2014.



Prior to taking up her post at Murray Edwards College, Barbara was Chief Executive of Oxfam GB from May 2001 until February 2013. During this time she led major humanitarian responses including the Horn of Africa and the West Africa food crises, as well as the Haiti earthquake, Pakistan floods, and Tsunami. On campaigning, Barbara led Oxfam's work on Make Poverty History, and more recently their work on climate change and the current Grow campaign on food justice in a resource constrained world. Barbara regularly spoke at major global meetings; for example at the UN, in New York and Rome, and at the World Economic Forum in Davos.

Previously a member of the top management team of the National Health Service, in her eight years with the NHS Barbara worked as regional director for the South East of England, and then as the founding Director of the NHS Modernisation Agency. Barbara has a Masters degree in physiology, and has broad experience of healthcare systems, policy and practice, including periods at the National Academy of Sciences in the USA and with the World Health Organisation in West Africa. She was awarded a CBE for health services in 2000 and a DBE for humanitarian services in 2008, and was elected an Honorary Fellow of Murray Edwards College in 2010.

Professor Tim Wheeler

Deputy Chief Scientific Adviser at the Department for International Development and Professor of Crop Science at the University of Reading

Tim Wheeler is Deputy Chief Scientific Adviser at the DFID and he is on secondment from the University of Reading. At DFID, Tim provides science advice to Ministers and oversees the research portfolio of the Research and Evidence Division. He has extensive experience of working with policy-makers in the UK and internationally and was Specialist Adviser to the House of Lords in 2010.



Tim has published more than 170 scientific papers over the last 20 years on how climate change could impact on the sustainability of agriculture and food, undertaking research in Bolivia, Honduras, The Gambia, Uganda, China, India and elsewhere. His research group identified how temperature extremes reduce annual crop yields under climate change, developed novel ways of modelling climate change impacts on crops at a global scale and produced the first crop model to be coded within a global climate model to allow the study of land-surface-climate interactions over croplands.

He has provided advice on the sustainability of food and farming to agri-businesses and food multi-nationals, often up to Board level. In 2005 he delivered a Royal Society Public Lecture titled 'Growing Crops in changing climate' and co-authored a Royal Society Statement on Climate Change and Agriculture tabled at the G8 Summit in Gleneagles.

Yet, in an increasingly interconnected world we need to move towards an uncomfortable middle ground of both research and policy endeavour that seeks to untangle and address some of the concerns that link the local and the global, and are so critical to devising lasting solutions, without being lost in their complexity. In this I believe we still have a very long way to go

In responding to our charge of key knowledge gaps and frontier research questions I would like to briefly outline first how the imprint of global dynamics on local patterns of land and resource use manifests itself across multiple scales; and then zoom in to highlight how despite the seemingly overwhelming influence of remote and distant drivers of land-use change, local phenomena and priorities can scale up to reshape the global picture. In making my points I will draw particularly on work and experiences from Latin America, and particularly Brazil.

At the global level

Concepts of global footprints of resource use are increasingly appreciated. The latest WWF Living Planet report and impact of “green” Nordic countries that are import dependent. Yet we are only just starting to scratch the surface of understanding impacts of global connections.

We need to go much finer-scale than country to country, and unpack how specific geographies of producers are linked with specific geographies of consumers.

- *Work of SEI-PCS on coupling specific areas of Brazil with EU and China. What does this mean?*
- *We need to contextualize global footprints with respect to local dynamics; water footprints and water scarcity – almost entirely unexplored.*
- *New dimension of climate change, revealing indirect climate impacts can transmit through the global system such that a drought in one corner of the world can affect food prices in another. Such indirect effects call for global-scale approaches to climate adaptation as well as mitigation if we are to avoid devastating local consequences.*

At the regional level

Dropping to the regional level we can see how shifting patterns of demand and the price of land, juxtaposed on a highly heterogeneous landscape of environmental regulations and enforcement can result in profound interconnections in how landscapes change in neighbouring regions. We are only just starting to appreciate the myriad ways in which this is occurring

Take Brazil, and look at major areas of expansion of 3 of the main land uses, sugar cane, soy and beef, and a clear pattern of highly interconnected land-uses emerges with three belts

Success of deforestation falling in Amazon offset by

- Increased deforestation in the Cerrado
- Increased soy expansion in less regulated neighbouring countries of Paraguay and Bolivia

And at the local level

At the local scale we can see how rapid processes of agricultural change and expansion, driven by domestic and global demand, are giving rise to what I suggest are novel spaces (or even societies) in frontiers around the world. Areas where the local and the global truly collide.

Very recent and close approximation of starkly different actors. GPS guided tractor next to manual tilling

The fate of different actors in such landscapes is strongly determined by the many connections that bind these actors together, for better or worse. Interconnections that are very rarely accounted for in research or policy design, and that all too frequently focus on specific actor or land-use types, glossing over the fact that these different actors coexist in mosaic landscapes

- How to develop tailored policies that can account for side-effects on other actors?
- How to explicitly account for and exploit the positive interactions that exist between different actors in setting a given region on a more sustainable trajectory.
- And how to do this recognising that such landscapes can change rapidly, and the window of opportunities for shaping their trajectory endogenously can rapidly close as the system becomes increasingly rigid.

And then zooming out

In zooming back out from the local I want to end by emphasising the fact that despite the ever increasing influence of global dynamics, local dynamics matter and can have a profound influence on large-scale processes, yet they are often ignored

- Example of this in our recent work presenting the first assessment that couples actor-dynamics with regional deforestation, overturning popular assumptions about who is to blame
- Another, more positive example in Brazil is the case of the green counties program from the municipality of Paragominas, now a global poster child of progress in land-use sustainability
- Also at the global level, actions by local indigenous groups in Panama led to the UN-REDD program being temporarily ejected from the country in protest over the way in which local concerns over customary rights were not being adequately accounted for in carbon finance and accounting programs
- These examples underscore the fact that the notion of the Anthropocene - i.e. that the combined effect of local human activities is having an overriding effect on the global biophysical system - is also true of the social system. Reflecting on the old saying of “think global act local”, the fact that we live in an increasingly interconnected world means that acting locally can influence global conditions whether or not we are “thinking globally”.

And to wrap up

From a research and policy perspective a main point I want to make is that these connections that tie the local and the global, which I have only been able to scratch the surface of here, force us move to the uncomfortable and awkward middle ground of devising solutions for a more sustainable planet that take account of both scales. Ricocheting effects across scales are overturning common assumptions – such as fast local dynamics shaped by slowly changing global drivers – that need to be increasingly recognised and accounted for in our work.

Possible add-ons depending on time

- Many regions of the world stand at a cross-roads
- The consequence of which is giving ever more prominence to meso-scale solutions.
- Something we are trying to do in P2CS. UN Declaration on Forests as a starting point; but what does this mean for distributed responsibilities across global supply chains, not just on producers but to unpack levels of engagement and attribute a more nuanced distribution of responsibilities, but also motivations, perceptions of risk and capacities to act. And to try to intelligently combine both supply and demand side options as part of a hybrid model of assessing and delivering a more sustainable system of land and resource use globally.

Additional reminders for discussion

Need to think about a more strategic framework for research (individually and in the institutions, i.e. publishing)

And for dialogue. Often scientists working at different scales have different ontologies or world views i.e. solving global hunger vs. food sovereignty. They are no incompatible, but the area in between is unexplored and grey and difficult to publish in. No top ranking journal wants a paper that says : hang on this is complicated we need to open up a debate or discussion here. It's all about clear results. And global is sexier, let's face it.

- Linking research on problems with research on solutions
- Conceptual and methodological pluralism
- Power, equity and justice dimensions largely absent from many debates
- Need to invest dedicated resources in development of a stronger science-society interface
- Drawing from Chapin et al's three approaches to sustainability, that comprise managing risks, building resilience to change, and achieving transformation

Key points people took away from the witnesses in the Original Forum

Food production and vulnerability to climate change

The coincidence of areas of hunger with areas predicted to experience the greatest impacts of climate change. Maybe giving this more prominence would help frame the discussion required about the first point.

I noted a clear emerging theme over the past few sessions on food security and the fact solving the problem is not really about needing to produce more food, but to make better use of the food we already produce.

Waste is an important aspect not discussed in the earlier session

Supply chain analysis is difficult - hard to identify where/how much surplus/profit is coming out at each stage of the process.

Measuring economic growth and degrowth

The concept of de-growth was something that I hadn't heard of before, so that was intriguing.

What are the alternatives to GDP? - this conversation keeps coming up. What was interesting that this was raised again tonight by Sir Partha Dasgupta at the CSaP event - I didn't see you but perhaps you were there?

The complexity of the debate about growth in terms of simultaneously accepting the need for fairly conventional growth in less developed countries while challenging the conventional concept of growth in developed countries - and recognising that the priority given to growth as measured by GDP has increased in recent years in most developed countries.

The scale and the speed of change

I was impressed with Toby's work showing how compiling data for the same region but collected in different ways turned out not be congruent, and this chimed with Tim's questions about how do we know what evidence is believable.

Reading my notes from Toby's presentation, it is clear he is very much about understanding systems - where he raised a great example: while there may be deforestation in Brazil, this may be offset by what is happening in neighbouring areas.

The accelerated speed with which physical and economic (and social?) shocks are transmitted and their widened spatial extent. Does building resilience into societies also imply some degree of greater insulation between countries (or sectors) within the global system?

How do we respond?

The one negative was the common theme of our meetings - it is clear that the situation is dire (just how dire will depend on how the data are collected). But what can/should we do to tackle it?

Need better consistency in policies to support change (sometimes policies can create competing priorities)

The next generation of research questions

I think Tim made a great point around the "not enough evidence" argument - should we be putting existing information to more use or should we be embarking on a continual search for new and better information? I believe the answer is yes to both, but at the moment there is perhaps not enough effort on the the former because it doesn't appear as exciting. Also, perhaps it is harder to prove that it is legitimate research in the sense is not necessarily about creating "new" information. I thought Tim's comment around finding a point where you have confidence in the information was a critical one.

The Parallel Forum

Table 1: A Skype discussion with Toby Gardner, with **Roz Almond** and **Rosemary Ostfeld**

Table 2: A Skype discussion with Kate Reworth, with **Lara Allen** and **Shadrach Kerwillain**

Table 3: Food security and climate change, with **Will Simonson** and **Bojana Bajzelj**

[Notes to come]

Group 1: Skype conversation with Toby Gardner

The March Cambridge Forum for Sustainability and the Environment focused on the theme "Global to Local." The Forum featured expert witnesses Dame Barbara Stocking, Dr. Toby Gardner, and Professor Tim Wheeler...

Dr. Toby Gardner is a Research Fellow at the Stockholm Environment Institute (SEI), an environmental policy focused non-profit. Dr. Gardner's research pertains to the affects of globalization on tropical regions. The Forum focused on two recent publications by Dr. Gardner to spur conversation: "The Amazon in transition: The challenge of transforming the world's largest tropical forest biome into a sustainable social-ecological system," and "Governing for sustainability in agricultural-forest frontiers: A case study of the Brazilian Amazon." During the Forum, conversation centered on several key themes: scaling, interconnectedness between actors, and the need for urgent environmental policy action.

The Forum explored challenges in developing environmental policies at a local level, and how those policies scale to higher levels. Dr. Gardner's research indicates that 'limiting deforestation,' 'expanding protected areas,' and 'expanding responsibly managed agricultural land' are several among many aims that must be accomplished for sustainable development to occur in the Brazilian Amazon (Gardner 2015). Forum participants noted local consequences can be persuasive for local action, but often, policy decisions are made at a higher level, making some policies difficult to implement. While the national scale is often the default decision-making level, decision-making on a local level is often innovative and agile. An example of local innovation occurred in the Paragominas region of the Amazon when a local farmers union decided to register their land and commit to zero deforestation (Gardner 2015). Dr. Gardner and the Forum also noted the

importance of developing local approaches that are not “one-size-fits-all” and regional scale policies that could work to link local policies (Gardner 2013).

The Forum also explored complex interactions between stakeholders. The Forum noted that there is a dearth of research documenting and highlighting the positive interactions and environmental efforts of stakeholders. Social network analysis was mentioned as an emerging field used to research such interactions. The Forum also discussed the implications of the lack of connectedness many consumers have to the food and nutritional resources they consume. While the global market has made it simple to access certain items at any time of year, consumers typically have little awareness of the effects of agricultural production such as in the palm oil, or soy industries.

Finally, the Forum discussed the issue of urgency related to environmental policymaking. Forum participants noted that the timescales for academic research and policy are vastly different – while extensive research on a given topic may develop over years or even decades, political systems often demand solutions on a much shorter time scale. Dr. Gardner and the Forum discussed the importance of making research findings known to both the general public and policymakers, and continued funding for interdisciplinary research initiatives that focus on the connections between food, energy, and water, such as the ESRC funded NEXUS NETWORK.

Interviewing Professor Tim Wheeler

Professor Tim Wheeler is the Deputy Chief Scientific Adviser at the UK Department for International Development and was interviewed by the Forum. Forum participants reviewed Professor Wheeler’s recent publication “Climate Change Impacts on Global Food Security” and developed several questions asked on behalf of the Forum.

Forum: What are some of the current limitations to climate change models and global vegetation models, and how could they be enhanced to better project regions suitable for agricultural development?

Professor Wheeler first discussed the importance of communicating where model uncertainties exist. For example, some uncertainties exist due to a lack of past and current data on the regions of interest. While some regions have a plethora of existing weather data, and well-studied seasonal characteristics, regions in Western Africa have experienced a decline in the amount of weather stations monitoring this data, and the Western African monsoon is poorly studied. Next, Professor Wheeler discussed the development of programmes that combine climate and crop models with economic and trade models. He explained that there are currently the largest uncertainties in the economic and trade models. Professor Wheeler’s research indicates, “climate variability and change will exacerbate food insecurity in areas currently vulnerable to hunger and undernutrition” (Wheeler and von Braun 2013).

Forum: What current agricultural subsidies do you think should continue, and which do you think should be phased out?

Professor Wheeler discussed the implications of subsidies for biofuel crops. Many of the biofuel policies have failed to achieve the objectives they aimed to achieve. Some of the biofuels produced fail to satisfy the lifecycle analysis approach. Professor Wheeler discussed the implications such policies have had on food security. According to Professor Wheeler and his co-author von Braun, future research on food security should explore “gathering evidence on the effects of climate change impacts on the food access... understanding the indirect impacts of climate change on food security... improving projections of regional climate change effects at country level... and better integrating of human dimensions of climate change impacts into food security planning” (Wheeler and von Braun 2013).

April: Looking into the future



Aims

This month, we are 'looking into the future' of a specific resource - wood - and we'll use it to make links between innovation and design, and the future supply and demand for natural materials.

The panel of witnesses will explore how shifts in the way we use wood may change and by focusing on timber in buildings, we are hoping to generate questions related to both forestry production and the kinds of materials that architects, designers and engineers will be looking for in the future.

Witnesses

This month, the three witnesses are:

Professor Peter Freer-Smith	Chief Scientist, Forest Research and Forestry Commission
Jon Kirkpatrick	Head of Sustainability, Europe, Lend Lease
Michael Ramage	Senior University Lecturer, Department of Architecture, University of Cambridge

Setting the scene

Professor Peter Freer-Smith, the Chief Scientist for Forest Research and Forestry Commission, will bring a 'supply side' perspective to this discussion. He will explore trends in planted forests and the implications for the future of forest products supply in the context of a changing population and climate.

Jon Kirkpatrick is the Head of Sustainability, Europe, for Lend Lease and acts as the central liaison for all sustainability issues across all of its business units. In addition to embedding sustainability across the business, he works primarily on significant urban projects across Europe including regenerating over 28 acres across three sites at the heart of Elephant & Castle in the heart of London.

Michael Ramage from the Centre for Natural Materials Innovation will begin by talking about why architects and engineers need to move beyond thinking about tall buildings in terms of steel and concrete. He will also discuss some of the work that he and his group are doing to develop new sustainable applications for renewable, energy-efficient and plant-based natural building materials, such as bamboo and cross-laminated timber.

Full references

Tim Payn, Jean-Michel Carnus, **Peter Freer-Smith**, Walter Kollert, Shirong Liu, Christophe Orazio, Luiz Rodriguez, Luis Neves Silva, Mike Wingfield (in prep) Changes in planted forest and future global implications
Patrick Fleming, Simon Smith and **Michael Ramage** (2014). Measuring-up in timber: a critical perspective on mid- and high rise timber building design . Architectural Research Quarterly, 18, pp 20-30
doi:10.1017/S1359135514000268

One of the projects that Jon will use as an example is the regeneration of Elephant and Castle and you can read more about it here: <http://www.lendlease.com/emea/united-kingdom/projects/elephant-and-castle-regeneration>

Witness profiles

Professor Peter Freer-Smith **Chief Scientist, Forest Research and Forestry Commission**

As Chief Scientist for Forest Research and Forestry Commission, Peter ensures that Forest Research provides the scientific knowledge and expertise required to achieve sustainable forest management. He ensures that advice to policy makers and practitioners is based on good scientific understanding and sound research and contributes to the formulation and implementation of the Forestry Commission's policies and objectives. Additional responsibilities include Head of Station at Alice Holt Forest near Farnham in Surrey (where he is based) and representing Forest Research on the Forestry Commission Research Management Board.



Peter studied for his first degree at Stirling University gaining a first class degree in Biological Sciences. His PhD was on the Impacts of Air Pollutants on Trees. Both his PhD and DSc are awarded by the University of Lancaster. Peter did two periods of post-doctoral research at Lancaster before moving to a lecturer's post at the University of Ulster. He joined the Forestry Commission in 1987. In June 2005 Peter was appointed Honorary Visiting Professor in the School of Biological Sciences, University of Southampton. He was appointed Forestry Commission Chief Scientist in 2009.

Jon Kirkpatrick **Head of Sustainability, Europe, Lend Lease**

Jon Kirkpatrick heads up sustainability for Lend Lease across the EMEA region, and acts as the central liaison for all sustainability issues across all of its business units. His role covers two essential areas, environmental operations plus associated performance and development innovation and strategy (both environmental and community investment).



In addition to embedding sustainability across the business, he is also ultimately responsible for sustainability on major projects at Lend Lease, and works primarily on significant urban regeneration projects across Europe (such as Elephant and Castle & The International Quarter). Jon works closely with the development teams to focus on comprehensive urban and infrastructure problems, including finding solutions for renewable energy, water, waste, transport, biodiversity, green infrastructure and public realm issues through integration of sustainability into design. Before joining Lend Lease, Jon has experience across a wide number of major projects globally including the London 2012 Olympic Park and Education City in Qatar as an associate director of EDAW/AECOM.

Michael Ramage **Senior University Lecturer, Department of Architecture, University of Cambridge**

Michael Ramage is an architectural engineer and Senior Lecturer in the Cambridge University Department of Architecture, a fellow of Sidney Sussex College, and a founding partner of Light Earth Designs. He studied architecture at the Massachusetts Institute of Technology, and worked for Conzett Bronzini Gartmann in Switzerland prior to teaching at Cambridge.



His current research is focused on developing low-energy structural materials and systems in masonry, better housing in the developing world and improved engineered timber and bamboo through natural material innovation. He teaches, researches and designs buildings, and receives research funding from the Leverhulme Trust, the Engineering and Physical Sciences Research Council, the Royal Society, the British Academy, Cambridge University and industry.

Introductions by the witnesses

Peter Freer-Smith: Forest resources and management (he sent us his notes)

I'd like to explain that my professional responsibilities are for UK forestry that is the full range of stakeholders/beneficiaries – to a) see that the sector delivers what it has the potential to deliver and b) to see that the forestry sector gets a fair deal in the light of its potential to deliver and when confronted with the pressures that there are on land and other resources.

Secondly as a forest scientist my interests are at the supply end of the discussion today and I'm particularly concerned with the science/policy /practice linkages.

In this introductory 10 mins I want to say a brief work on three areas:

- 1) Global resource supply and some of the associated issues, pressure points and governance.
- 2) A quick word about the UK specifically – we are an interesting case
- 3) And Rosamunde asked me specifically to consider next generation research questions – by far the hardest bit.

Global resources are covered in the paper which was e mailed round – this is a quick preview of the FAE Global Forest resource assessment which will be released in September this year at the World Forestry Congress in South Africa.

Forest cover globally has been declining since the iron age at a rate which accelerated during the industrial revolution and – in terms of the loss of primary forest – is still increasing. This loss of forest cover has had a number of effects including making a contribution to atmospheric CO₂ content and some equally dramatic effects on the environment and biodiversity locally. We are very fortunate to have the FAO GFRA and all the numbers I'm about to quote are from it. The Assessment was started in 1980 and so we have good quantitative data since then.

The net loss of forest area globally is the combined outcome from deforestation and woodland creation. It shows that the area of forest cover globally has decreased from 4.13 Billion ha in 1980 to 3.99 Billion ha in 2015.

Rates of overall loss have been:

- 1990 – 2000 8 Million ha/year
- 2000 – 2005 5 M ha/year
- 2005 – 2010 6 M ha /year
- 2010 – 2015 8 M ha /year (UK is c 24 Million ha)

Since the world land area is c.11.623 Billion ha globally forest cover has now decreased to 34.28%.

There is not an International Convention on Forestry or a European Legally binding agreement on Forests although over the years there has been much talk of it. The FCCC and Biodiversity Convention all impose forestry instruments.

The UN has run a Forestry Forum and important UN initiative has been the REDD and REDD + . That is funding to schemes to Reduce the Emissions of Green House gases from Deforestation and Forest Degradation. Essentially a UN funding scheme to protect forests in developing countries.

Other key international instruments have been on Illegal logging, EU Timber Trade Regulation and Forest Law Enforcement Governance and Trade (and VPAs) and Forest Certification to achieve sustainable forest management although this still covers on 4 % of global forest area. CITES – global; agreement on endangered spp.

Since the area of planted forests has been increasing the net forest area data hide a continuing decline in primary and natural forest area.

Of course it's bad that primary/natural forests with all their biodiversity, conservation and environmental benefits are declining.

However it is good news that plantation forestry is increasing – it becomes possible that planted forests will supply a bulk of wood requirements and act to protect the remaining natural forests. Currently planted forests make up 7 % of the total global forest area but provide 45 % of industrial roundwood consumption.

There is considerable scope for planted forests to contribute to biodiversity, landscape and other ecosystem services as well as to meet the bulk of global wood needs. Tree breeding can substantially increase

production – In Eucalyptus tree breeders have more than doubled productivity and even the UK SS breeding programme has increased yield by 23% without loss of wood quality.

Planted forests may be very acceptable as a land use on degraded land and thus as long as we continue to create planted forests and to manage them sustainably we are likely to be able to meet global timber needs.

Just want to mention two more points on the international side. Firstly IUFRO have just established a Task force on Planted forests for which I am the UK contact point. This is an important initiative which aims to move forward the potential of planted forests

Secondly illegal logging, governance, international trade and controls. Remain very important.

A very brief word about the UK then as on industrialization – we led the world on deforestation and by the end of the second war had decreased our forest cover to c. 4% - its now 12 % so we feel that we are experts on reforestation – woodland creation.

One reason it's worth mentioning the UK is to illustrate how national policies operate – it was a national programme to re- establish forest cover and it was achieved by a combination of a Government programme which included land acquisition and grant aid to private forestry. Not more than 20 years ago the domestic market only provided c. 10% of softwood roundwood needs and the processing industry was on its knees. Today its 40% as a result of the new forests coming to production. This is influenced strongly by the price of roundwood on the world market and the use of wood as a biomass fuel has helped to hold up prices.

Softwood production in the UK is about 8 – 10 Million m³ per year, and does support a processing industry. Including my multinational like UPM Tillhill.

Hardwood production is much lower at 0.5 to 1.0 Million m³ per year and is potentially much greater. There is talk of a potential as high as 5 million m³ per year. Only about 58% England's woodlands are managed and there is a target to raise this to 66 % by 2018. Recently policy has moved away from woodland creation to woodland management and protection. Grown in Britain – new initiative.

On **future research needs** I'm going to keep my initial comments quite general and perhaps we'll get into more detail during the evening.

I'd say that within the UK we have moved from a past focus on woodland creation and to some extent biodiversity which has been a major focus in recent years to an agenda driven by climate change adaptation and protection from pests and pathogens, (both crouched in terms of resilience). Climate adaptation work focuses on different species their silviculture and wood properties. And in upland forestry in particular this means a serious look at species mixtures to achieve resilience. These policies have implications for wood processing and utilization.

Carbon management and other ecosystem services are important. We still have a National Capital committee I think!

In Europe there is a stronger interest in novel uses for wood – the bioeconomy as it's often called. And internationally – as I've already indicated conservation, social and governance issues will remain important. Forest pests and pathogens will remain important since the threat they pose will continue to be present as long as we have timber, plants and wood packaging moving internationally.

Jon Kirkpatrick, Head of Sustainability, Europe, Lend Lease (by Bhavna Sharma)

Need to understand pressures and drivers of market globally for developers and clients

- 50% of populations in urban cities
- Represents 2% of landmass of the world
- Expected growth by 2050 is 5%
- Increased footprint

Accountability

- 100 year old building
 - Design of structures not optimised for long term use and focus on long term planning will allow buildings to be reused in the future
- Health and safety
 - Instant injury free
 - Extends to supply chain
- FSC UK
 - Resource focus and supply chain

Timber construction

- Perception issues
- Sustainability benefits
 - Example CLT structure in Melbourne: Carbon footprint lower than concrete building equivalent, even though timber shipped from Austria
- Drawbacks
 - Contractor and developer perception
 - lower grade
 - low class
 - Fire risk
 - Mortgage/insurance issues

Social

- Design
 - Low VOCs
 - Natural material interiors
 - Feature wall in Melbourne to display timber construction
- Accountability
 - Material choices decision making for process (lack of research)
- Schools
 - Effects of materials of experience of space, behaviour, health (lack of research)
- Cost/benefit analysis
 - Value of natural materials
 - Requires full construction scope rather than solely a material comparison

Additional comments:

Process

- Upfront process in CLT design, which is set early on in manufacturing, compared to concrete or steel where adjustments can be made on site
- Lean design - speed of construction an argument for CLT to be used
- Hybrid technologies for design appropriate

Summary of points

- 1) Perception from an economic and social standpoint needs to be explored if timber will be a competitive alternative to conventional materials
- 2) Market drivers are demand and cost, but need to be explored through full scope of construction
- 3) Social aspects not only focus on the design and construction, but extend to responsibility and impact on the overall supply chain

Key points people took away from the witnesses in the Original Forum

After the meeting, everyone was asked to outline the three things that they took away from the discussion and what aspects of they found most interesting. These included ideas or questions that they would like to explore more or those we didn't talk enough about.

The future of plantations and sustainably managed forests

Is there a significant role for mono-culture 'crop' forests to play in the future supply of timber? It wasn't said explicitly last night but I got the feeling that the consensus was that there is, I just wonder how significant they should be.

Through well managed forests, we can withdraw a lot more wood - sustainably - than is currently the case globally. But this requires a view to forests as to some extent being a resource base rather than only a conservation zone. Research is needed to quantify this potential increase in sustainable withdrawal and how this compares with potential demand for wood products in construction.

I thought the FAO figures presented by Prof Freer-Smith were revealing: such a large proportion of industrial roundwood still coming from natural forests at present, but production from plantations on the ascendancy. I

came away with a changed perspective on tropical plantations - perhaps they could be good for biodiversity conservation if they help relieve pressure on primary tropical forests. If.

What tree species do we need?

The potential of plantation forestry to take the pressure off global deforestation. In particular, the ethical and practical implications of increasing wood production in certain countries through the intensive cultivation of genetically modified species such as the Eucalyptus in Brazil.

The most productive trees are fast growing eg eucalyptus, but how many and which aspects of construction are they suitable for? Does reduced use of timber for paper really increase the supply of suitable grade wood for construction? Can we increase the use of such timber by material innovations?

Exploring the social and ecosystem services value of forests and forest landscapes

We didn't discuss the social/ritual significance of woodland, something which emerged viscerally from the national psyche at the great forest Sell Off debacle, when people became aware of a routine operation that had been running for years.

Britain is still a deforested country, even if forest growth has been spectacular recently - its from a very low base. But much of the space in which trees used to grow now forms treasured romantic landscapes, bare and denuded - moors, fells, hill tops etc. Contrast e.g. the Black forest, the lower Alps.

Innovation and design

Developing new ways of processing and using wood in buildings and improving its performance

There is a lot of research still to be done on the properties of natural materials and how well these properties match the performance required in construction. Especially pressing is the need to better understand WHY we have such performance requirements, and whether a shift to natural materials would cause these performance requirements to change because the entire design of buildings would change.

There are many unknowns still about the performance of timber in fire and genuine concerns over some aspects due to the lack of familiarity with the material in the UK (real contribution to the fire load, glue delamination, self-extinguishment etc) and this is an important area for study. It reinforces and supports your (and Arup's) multidisciplinary approach to timber and development of holistic solutions. I came away genuinely buoyed by it.

The value of hybrid technologies - it doesn't have to be all timber

CLT is routinely being overdesigned for structural elements; not enough attention paid to timber floor cassettes which can be installed efficiently.

The potential for research regarding hybrid technologies for modified wood and the economic/social/health benefits of wood if entering the UK construction market. The role of vested interests and building codes in shaping the existing construction industry (concrete, steel, cement).

A paradigm shift in the way we design buildings

We need to re-think the design of timber buildings from scratch, rather than applying concrete-based design expertise

Recycling and re-using timber from buildings

It was clear from Jon that Lend Lease don't focus on embodied impacts as the primary driver, but it is an important part of the story and better end of life information is needed I think; will we be putting large engineering timber in landfill (I think not) or do we, as Peter Guthrie was suggesting, need to think more clearly about future scenarios for timber recycling now including avoiding treatments?

The future impacts of climate change on forestry

I was really interested in how you are working at so many scales on timber: cellular to city.

The future impacts of climate change on forestry seems a major risk, but also an opportunity. Is there a strategic case for scaling up forestry cover in the UK back to the sort of averages in other European countries Peter was talking about?

Quantifying and modelling the value of competing land uses, including forests

The low carbon credentials of the use of wood in construction are still not well quantified with respect to lifecycle carbon. This is in large part because the counterfactuals on the use of the land - if not for timber production - are not well quantified or even specified. Research is needed to allow development of better models for competing land uses, with both economic and non-economic drivers included.

Something that interested me from the discussion was the competing uses/functions of forests (timber, paper, biofuel, biodiversity, recreation) paralleling similar pressures on agricultural land. Has the land sparing/land sharing debate been extended to forests?

The prospects for supply increases seem good - better use of current forest, and improved productivity of trees. Decrease in use of wood for paper.

The supply of timber needs more exposure - there is an OVER supply of softwood timber in Europe, Canada does not replant its softwood harvesting, and there is more potential in European hardwoods such as Beech and Ash.

Costs and benefits

Interesting to hear that wood could be a cost-effective alternative to steel and concrete. Not so if the raw material costs were the only consideration, but the speed of construction at the building site makes it attractive.

Material processing: We didn't discuss the use of glues in laminated woods. These are obviously important contributors to structural strength but what is their environmental impact, esp at deconstruction.

Methane: Is it really correct to assert that since methane is a far more harmful greenhouse gas (~20 times the impact) than CO₂ that we should really just burn wood rather than let it rot? This suggestion seems nonsensical to me, if we consider that at periods during its history the Earth had huge forest cover, all of which was left to rot and release methane, then this would imply that green house levels would have been far higher previously.

Peter Guthrie's reply: As for methane versus carbon dioxide, the rule of thumb is 25x greater in its greenhouse effect (global warming potential =25, GWP of CO₂ is 1), despite being shorter lived in the atmosphere (12 years), see <http://epa.gov/climatechange/ghgemissions/gases/ch4.html> , so it would always be better to intercept CH₄ and burn it to produce CO₂. All rotting vegetation produces methane (eg landfill)

Carbon emissions and shipping: I was interested to learn that shipping timber all over the globe contributed less to the carbon budget than the last 50-100 miles (or so) of timber movement by road.

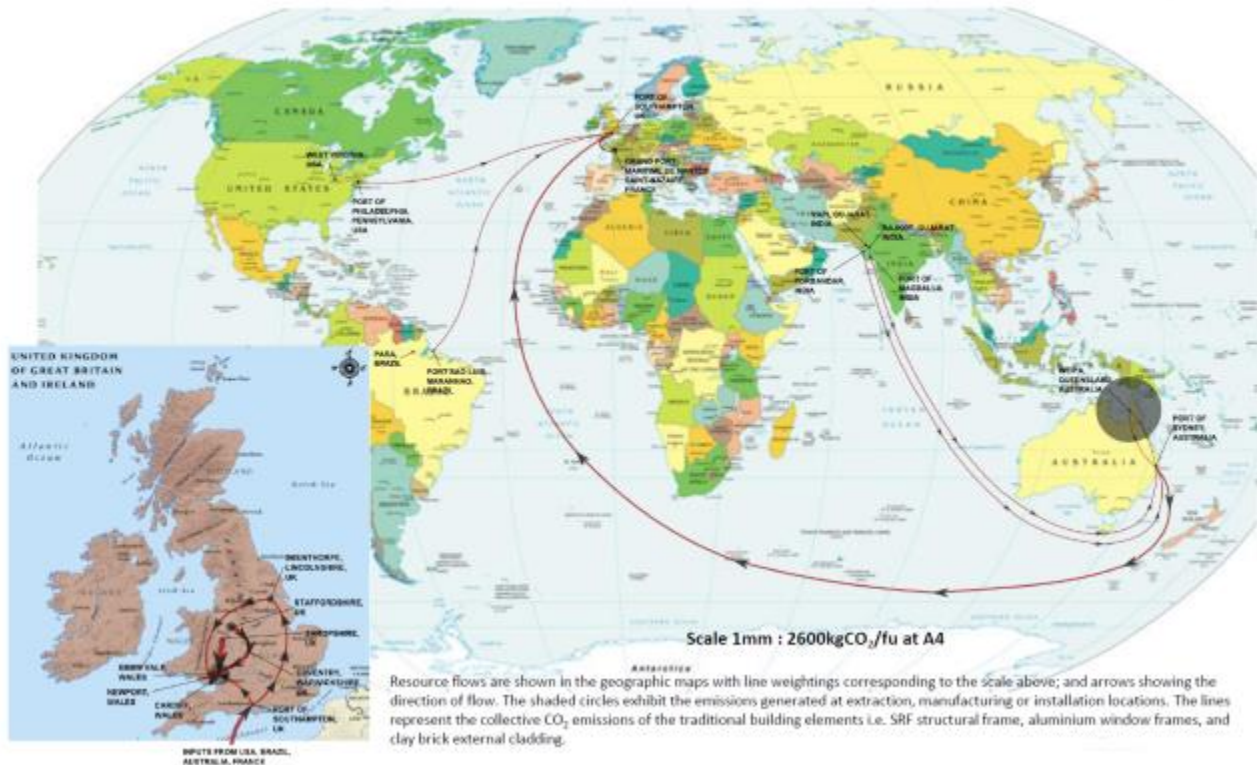
Also, regarding the 'embodied carbon' sustainability arguments of timber constructions - how they can be overstated, and the need for whole-life cycle assessment and deconstruction issues. I still find it surprising that shipping large volumes of timber round the world has a negligible carbon footprint.

Reply from Peter Guthrie: The CO₂ emissions from shipping by sea compared to over land

I was surprised there was not more widespread understanding that the carbon associated with shipping is small comparatively with transport on land and in particular the "last 20 miles". I attach a report done by Sita Shah, a fourth year student studying civil, structural and environmental engineering (not peer reviewed or published) which makes the point well – see figures below:

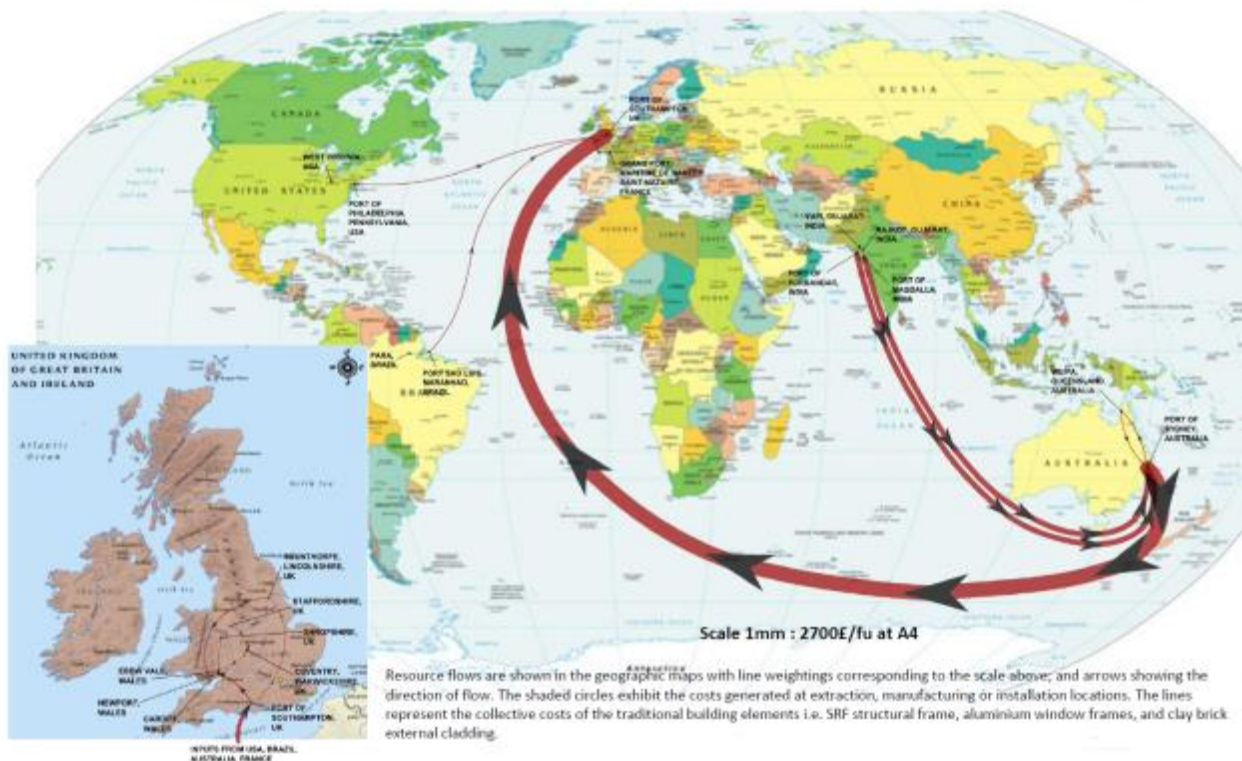
Co2 emissions – the thicker the line, the higher the emissions

5.1.6.1 Insertion III – Geographical distribution of supply chain metrics for Traditional building elements – CO₂ emissions kg/fu



The cost of shipping the timber in GBP – again, the thicker the line, the higher the cost

5.1.6.2 Insertion III – Geographical distribution of supply chain metrics for Traditional building elements – Cost £/fu



Changing people's perceptions of using wood as a building material

Much of the focus was on the structural and architectural properties of wood as an alternative to concrete. I was surprised that the only refs to aesthetic properties were essentially negative; there are significant advantages here, which contribute to well being. Wood enables much more organic forms - cf. the use of wood in art nouveau decoration, window frames etc. Wood panelling has traditionally been associated with warmth and cosiness - watch any period movie!

I was surprised to hear about the resistance to use of wood in construction. I had thought building regs and conservatism in construction would mean changes are slow, but I also thought pressure for change would be high. We need to work at multiple levels to improve this- architect research and education, construction industry education, and material innovation.

The importance of perception, and hence of engaging social sciences

Timber faces many barriers as a mainline construction material, from codes to prejudice in designers to lack of skills on site to fear of fire (made worse by the recent destructive fire at Nottingham University).

As a great fan of wooden building I was fascinated to hear that influential people in the construction industry don't want to see exposed wood in their buildings!

The existing public scepticism on timber-framed and clad buildings and how awareness could be raised on the issue. There is a need for exemplar housing and public building projects.

May: Through an East African lens



Aims

Sub-Saharan Africa is a critical hotspot of hunger and under-nutrition, and also an area whose food security is expected to be impacted seriously by future climate change. At a pivotal moment for agriculture and food security in East Africa, this meeting will pick up themes from previous Forum meetings to explore questions related to the food security and future of agriculture, livelihoods and biodiversity conservation in the region.

We're jointly hosting this meeting with the Global Food Security Initiative and the Cambridge-Africa Programme.

Witnesses

This month, the three witnesses are:

Liz Watson	Senior Lecturer and Pybus Fellow of Newnham College, Department of Geography, University of Cambridge
Tinashe Chiurugwi	Research Associate in the Business Strategy team at the National Institute for Agricultural Botany (NIAB)
Alison Mollon	Senior Programme Manager, West & Central Africa, Acting Regional Manager, Africa at Fauna and Flora International (FFI)

Setting the scene

On the panel of witnesses, Liz Watson from the Department of Geography will be joining Tinashe Chiurugwi, a Research Associate from the National Institute of Agricultural Botany (NIAB) and Alison Mollon, the Acting Head of the Africa and Madagascar Regional Programme at Fauna and Flora International.

Liz will discuss food production and the challenges it faces in the East African region. Her focus will be on dryland agricultural systems which includes smallholders and livestock managers (pastoralists) and there is also an article about her work in Kenya the [University Research News website](#).

Tinashe is interested in crop development and technology transfer in Africa. One of the projects he is working on is a new Agri-Transfer project in Kenya to support the uptake of new crop varieties by smallholder farmers and promote new agricultural and dissemination technologies ([more details](#)).

FFI's Africa and Madagascar programme covers a wide range of conservation landscapes and critical habitats in sub-Saharan countries and their projects aim to generate the incentives to local communities for sustainable use of sensitive habitats and species, and mechanisms to support the management of communal areas of land, coast and sea. Alison will draw on examples from across these and she recommended that we should look at the FFI website provides an overview of where they work and what they do ([more details](#)).

Full references

Chiurugwi, T. & Buthler, S. 2014. Better seeds, better yields. Unknown.

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Witness profiles

Tinashe Chiurugwi

Research Associate at the National Institute of Agricultural Botany (NIAB), Cambridge

Tinashe Chiurugwi's specialities are crop improvement and technology transfer, having worked on a range of horticultural and arable crops in Zimbabwe and the UK at Pioneer Hi-Bred, Seed Co Ltd, University of Reading, Rothamsted Research and CGIAR (the Consultative Group for International Agricultural Research) Consortium.



As a research associate within the NIAB International Initiative, Chiurugwi develops proposals and fundraising strategies and delivers projects to apply NIAB skills and expertise to agricultural issues in developing countries, including year-long scoping study to determine the feasibility of applying the NIAB Innovation Farm concept (a knowledge exchange/technology transfer hub) in Ghana, Uganda, and Kenya. He is now spearheading fundraising efforts to launch NIAB Innovation Farm in Ghana and Uganda.

In Tanzania, he has also been collaborating with Naliendele Agricultural Research Institute, to identify the facilities, practices and mechanisms that would improve the translation of agricultural research into farming practice in Nachingwea District, Southern Tanzania. In addition, he has been assisting in the management and leadership of a research project that has built a UK-Kenya partnership to support the uptake of new crop varieties by Kenyan smallholder farmers. As part of this, he coordinates participation by NIAB staff to help researchers at the Kenya Agricultural and Livestock Research Organisation to develop knowledge exchange models suitable for smallholder farmers, and in the production and distribution of communication materials.

Alison Mollon

Senior Programme Manager, West & Central Africa, Acting Regional Manager, Africa Fauna and Flora International (FFI)

Alison joined FFI in April 2014 after returning from the Democratic Republic of Congo where she was the Programme Manager for the Frankfurt Zoological Society. From early 2011 Alison was based in the headquarters of the Virunga National Park and was responsible for multi-donor project implementation including the GEF National Parks Network Rehabilitation Project. Focussing on protected area management, Alison also oversaw projects that supported the Maiko and Upemba National Parks and led on programme assessment, development of the national strategy and the resulting project design. Alison also became experienced in developing and leading operations in conflict zones. She specialises in species population estimates and has contributed to analysis of sampling methodology of great apes in Central Africa and has advised the government of St Lucia on best practice management and monitoring of the St Lucia Parrot.



Alison is currently leading the FFI Africa Regional Team to address threats to species and habitat conservation focussing on different protected area management systems, sustainable use of forest and forest related resources and engagement with business. Alison previously worked as a Project Manager for the GSMA, managing mobile money projects.

Liz Watson

Senior Lecturer and Pybus Fellow of Newnham College, Dept of Geography, University of Cambridge

Liz Watson's research focuses on the relations between livelihoods, institutions, environment and development in the drylands of the Horn of Africa. In Ethiopia, work in Konso examined the production and sustainability of its intensive agricultural terraced landscape, and focused on the nature and significance of indigenous social institutions for governing land and labour.



More recently, research with the pastoralist Boran and Gabra of northern Kenya and southern Ethiopia has explored the dynamic and adaptive nature of mobile livelihoods. In the context of multiple stresses, social, cultural and political developments - as well as 'Development' projects - have often undermined indigenous institutions and have exacerbated exposure to risk and vulnerability. New research, funded by the Royal Geographical Society with IBG Thesiger-Oman International Fellowship, examines one of the local responses to the current challenges, namely the increased preference for camels. Camels are seen by pastoralists as better adapted to a changing climate, as well as potentially more profitable given the changing nature of regional trade and increased urban demands for milk and meat.

Introductions by the witnesses

Liz Watson, working on pastoralist systems in dryland areas of East Africa

In the rush for new solutions to sustainability problems, the values, capabilities and adaptability of indigenous people are often overlooked. As a result, technological 'fixes' are often mal-adapted to the socioeconomic and cultural context, and the theory on paper looks very different to what actually takes place on the ground. The most important way forward is to strengthen and support indigenous communities, who are a valuable resource for food security.

Liz: In the rush to provide new solutions to problems, we are overlooking indigenous knowledge. Our assumptions are that we need to increase yields in Africa and that can be helped through new technologies and investment in infrastructure. However, increasing resilience, reducing risk and providing a stable, if lower, crop yield may be more important to local farmers and it is these characteristics that can often be found in indigenous farming methods/crops. Moreover, the expected outcomes of a system redesign can fall short of expectations and can have unexpected and unintended negative consequences.

- I realise that is really a whole bunch of points, so if you want one, I would say: "The rush to provide new solutions often ignores the complex realities and needs of those on the ground."

Tanashe Chiurugwi, working on seed systems in East Africa

Applying NIAB's expertise and knowledge to the East African context through Innovation Farm and other approaches. One of the greatest challenges is to provide mechanisms for farmers to access the information that they need, for example on new seed varieties, which varieties best suit the conditions on their land, and sowing rates when using seed saved from the previous season. Information services need to connect researchers with farmers, but are also relevant right along the food value chain.

Tinashe: There is a critical gap in understanding how to communicate solutions (e.g. improved seeds) using existing institutions and communication systems.

Alison Mollon, leading the work of FFI in Africa

One of the main priorities for future research is to investigate the potential for landscape planning approaches to resolve tensions between food and energy production and biodiversity conservation. What are the most appropriate scales at which such planning should be undertaken? One key area within this is the food versus fuel issue, and in particular how to reduce the demand for charcoal – doing so would take an enormous pressure off biodiversity. Another is to develop greater understanding of how the changing physical interface and proximity between protected parks and inhabited areas affects the spread of zoonotic diseases and threats to human health.

Alison: There is a need for landscape-level planning, particularly around water resources.

Key points people took away from the witnesses in the Original Forum

After the meeting, everyone was asked to outline the three things that they took away from the discussion and what aspects of they found most interesting. These included ideas or questions that they would like to explore more or those we didn't talk enough about.

The power of narratives, success stories and storylines

Storylines can be as powerful as evidence and the importance of particular narratives in disenfranchising communities from local resources.

Focussing on genuine success stories in discussion and evaluation of progress: most of what we talk about in our discussions of sustainable development and the environment revolves around the negative things that we wish could be changed. It struck me (when someone mentioned it) that we often fail to cite the positive aspects and genuine improvement that has come from human intervention, be it from outsiders or locals. We try to do this in our work at NIAB but it is challenging to understand other cultures or find local project partners who are bold enough to help in that respect because of constant race towards ever approaching project deadlines.

The power of ideas and viewpoints: I realised that, as someone pointed out, we often hold conflicting ideas about the situations we are trying to intervene in without thinking seriously about what that means for us and what alternative story we would like to portray. In agricultural development, for example, we are aware of the need for increasing productivity of existing systems while reducing the environmental impact and preserving the systems' future capacity, we have even come up with the term 'sustainable intensification' to describe this goal. In reality however, we do not stop to actually think about what it means for the work that we do and the landscapes in which we work are so complex and often under perverse political and economic control that we do not have sufficient headspace to divert our attention from achieving our stated goals and think about the bigger picture. In the end then, sustainable intensification becomes a roof under which different disjointed (and sometimes contradictory) projects/activities are housed and go on without much conversation between them. This cross-fertilization of ideas, I think, is what we got going at the meeting on Tuesday.

There are many beneficiaries from the ways of lives of the people in Africa. These usually perpetuate misleading information in favor of their benefits, leading to speculation e.g Poaching still goes on because the most expensive products from poaching have markets outside Africa. The beneficiaries of the food (cereals like barley, maize and rice) sold in Africa are outside Africa. If correct information about Africa is well articulated, more people will become well informed about the resources they have, & many solutions that are sustainable will arise.

Bridging disconnections between discourses and narratives

Why the disconnects between discourses around competing demands for land and potential solutions (e.g. forest conservation and agriculture) are so persistent, and what is the best way to build bridges.

There needs to be a greater connection between discourses, e.g. between food security and forest conservation. Joining up the dots is challenging and one often has to face some hard facts. One example was the question of how to resolve projected increases in food demand, with zero deforestation targets, in countries such as Ethiopia and Tanzania.

There is a disconnect between what is said in international meetings and what is going on at the ground in terms of addressing food security challenges therefore there is need to harmonize the two scenarios

I thought Phil Franks' points about parallel discourses of forest restoration and increasing agricultural outputs across East Africa was very interesting, and the discussion that followed on how, and what would happen if, those advocating each of these conflicting notions were forced to engage one another.

Be wary of unintended consequences when searching for solutions

The following arose in chats afterwards, rather than during the group discussion: There is a rush to provide solutions and we regularly hear that it needs to be scaleable and "how do we achieve that at scale?". However, each of the witnesses also spoke of the impossibility of being certain that there will be no unintended negative consequences, particular when solutions are devised by those who are not embedded within the particular socio-political system. **There is, therefore, a tension and risk that our efforts to**

achieve results at scale will be thwarted by complex socio-political processes that produce unexpected results.

There are too many solutions being offered by different stakeholders in Europe targeting Africa and some of these interventions have not been extremely carefully thought out. Is Africa being rushed into rapid urbanization? Is it that we are tackling the symptoms of the problem rather than the root cause of food insecurity?

Commitments to zero deforestation by some does not tally with commitments/needs to increase food production by (e.g.) 80% unless we can achieve sustainable intensification on existing agricultural land rapidly and across large geographic areas. This conflict is likely to disenfranchise resource-poor farmers with insecure land tenure who may not be focused on maximising food crop yields.

The movement towards cities and creating alternative rural livelihoods to farming

Rural-urban migration and assumption that the youth will inevitably gravitate to ever larger cities. There was some suggestion that while the youth want to get out of farming it should not be assumed that the only alternative is going to the city in search of work

Finding ways to allow people to remain in rural societies but without having to be a (subsistence) farmer seems to be a way to appeal to people's aspirations but also to provide the means to stimulate innovation at a manageable scale that would not need so much (if any) outside intervention. So micro-financing, increasing educational attainment, etc, could be done with only minor input and allow things to develop hand-in-hand with local skills/expertise

Solutions need to come from the ground, not from outside.

It might be a slower and messier process, but working with indigenous communities is by far the best way forward. Narratives about such communities 'not being up to the job' or not resilient, need challenging.

The importance of respecting 'indigenous' views, customs and practices in agricultural development projects, particularly as most of them have developed over time and have ensured sustainability and resilience in the systems we seek to improve.

For the first time I attended a meeting where facts about solutions to challenges of Africa were well articulated (Liz) and opened up for discussion. The adaptation from cattle to camels exhibit the Darwinism survival for fittest, a response from pressures an environment that is not productive enough to one that is productive.

Very few People from outside Africa understand Africa but continue to influence a lot what go on there. Many people in Africa have not yet recognized the importance land and its resources but are usually misled through policies that cause them to lose land and its resources. The policy makers are a product of an education system that does not value what people have around them. So the policy makers will promote such policies (thinking they are beneficiaries while those whose land has been 'grabbed' loose.

To use the term 'Africa' seemed too all encompassing and there must be as many different problems/solutions as there would be in different European countries.

Avoiding the imposition of solutions from outside would have several advantages not least empowering people to take responsibility for their own actions and also adapt solutions to suit their own circumstances and preferences.

Liz Watson's research into adaptation to climate change within traditional pastoral communities is an area I found fascinating.

I found Henry Busulwa's comments about the competing advice / support for different schemes coming to East Africa from different donors and institutions pertinent. The fact that people who live in the region aren't given space and power to conduct research and make informed decisions is an issue that needs to be tackled.

The importance of education and raising people's awareness of the value of their natural resources

There are the dual problems of misinformation (e.g. when discourses get hijacked) and missing information (on ecosystem values, appropriate new technologies). These issues are tackled by projects such as those

looking at mobile phone usage for farm extension services, and Smart Villages, which promotes off-grid electricity supply including sharing experience between communities.

I was also struck by Henry from Uganda, who said that in the last 50 years, the knowledge of people for the plants and other organisms in the locality had diminished sharply and this has led to the problems with people selling off their land for only a small amount. this goes counter to the received view that poor subsistence farmers are in tune with nature

The need for more evidence from on the ground

Apparently Africa is still lacking in evidence hence there are glaring gaps in research

It was not very clear to me how climate resilient the efforts to introduced new crop breeds are as this is an important phenomenon that could interfere with success of such interventions

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