Cambridge Forum for Sustainability and the Environment

Original Forum: 18th November 2014

Parallel Forum: 25th November 2014

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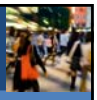
Witnesses: 18th November 2014



Witnesses

Bojana Bajželj

Ian Bateman

Theresa Marteau

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.

In October, we started to think about connections between biodiversity, energy and food security and 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.

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Background paper 1: Bojana Bajželj

Importance of food-demand management for climate mitigation

Bojana's paper was published in September this year in Nature Climate Change and using the BP FORSEER model, the 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.

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

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Background paper 2: Ian Bateman

Bringing ecosystem services into economic decision making: Land use in the UK

Ian's 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. The NEA is continuing its work in a series of follow-on projects.

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

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Background paper 3: Teresa Marteau

Changing human behavior to prevent disease: the importance of targeting automatic processes

Theresa's paper was 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. They discussed specific interventions such as altering environments to constrain behaviour (ease of effort; availability of options; product design) or targeting associative behaviours (activating, inhibiting, altering, creating associations).

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

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Core questions

Original Forum: 18th November

The three witnesses were all asked to focus their 10 minute introductions 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?

Parallel Forum: 25th November

When the Parallel Forum met, we used the ideas in the background papers provided by the witnesses as a starting point to think about two similar questions:

1) What are the main gaps in what we know and what aren't we thinking about?
2) What would you include in the 'next generation' of research questions?

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Key themes

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

Key – the shape of the bullet indicates where the ideas came from

- The Original Forum
- ➢ The Parallel Forum

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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

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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

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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

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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 capita
- 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

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Modelling and scenarios

- 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

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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

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Changing the behaviour of consumers

- The role institutions play in changing behaviour, for example allowing fast food restaurants in hospitals, sweets near checkouts and vending machines in colleges
- How will people change? For example, using 'nudge' to show them what other choices are available or to move people in the right direction versus 'paternal liberalism' where people are told to change
- What would be the impact of changing tax regimes on particular foods?
- The ways in which people's behaviour relates to their values and their affluence and finding common ground between developed and developing countries, including the cultural connotations of diets
- Behavioural change, ranging from how people behave from day to day to thinking more broadly about environmental and social awareness and how to connect these together (for example, through a carbon tax and smart metering)

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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?

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Risk and uncertainty

➢ How can the issue of uncertainty in science be addressed to help policymakers act on import issues such as climate change?

➢ Quantifying and communicating uncertainty

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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

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Looking into the future

- If sustainability is about meeting the needs of people today (whilst minimising environmental impacts) so that future generations can meet theirs, are the limits beyond which which things aren't considered sustainable defined? I imagine they would be massively different between say ecological sustainability, growing food, abstracting water from the ground, building materials and performance etc. I'm aware of the idea of 'planetary boundaries' beyond which things cross a tipping point and can't go back but how is this applied across disciplines out a scale smaller than global? Cross-disciplinary working is excellent but how do we establish the common definitions and limits?
- Optimisation and sacrifice – what is the best we can do and what are we willing to give up?
- Quantify the limits of ‘safe’ operating boundaries of sustainability

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Changing the way we think

- I noticed how when discussing these issues there were people who thought that the solution was simple (we just need the evidence so the policy makers regulate or tax in a certain way), but then all of the exceptions and complications emerge about these solutions. We need to recognise and embrace this complexity, not ignore it. Ignoring it may make it easier to find a response to problems, but that response is unlikely to be effective. I think this is an important lesson that emerged
- There are historical aspects to all these discussions as well as path dependence – it isn't just a matter of finding the ideal solution but given where we are and what we know, what would the best choices be?
- Do governments have a mandate to impose change?
- Narratives and change

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Making connections

- 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?

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The next generation of research questions should:

- 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

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Links to material from the meeting

Profiles

The witnesses and guests who came in November:

http://www.cfse.cam.ac.uk/directory/Witnesses_Nov_2014

The members of the Parallel Forum:

http://www.cfse.cam.ac.uk/directory/parallel_forum

Intranet

Meeting resources, including the background papers and notes

https://www.cfse.cam.ac.uk/Intranet/resources_18_Nov_2014

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