



### 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.

### Agenda

All the witnesses will give a 10 minute introduction and their perspective on the two core questions followed a general discussion:

- 5:00pm Welcome by the Chair and an introduction to the topic  
Each witness gives a short introduction and thoughts about the questions (10 mins)  
Questions and beginning the open discussion
- 6:00pm Coffee break  
Continue the discussion in three groups and then come together for final thoughts
- 7:15pm Reception and dinner, which will include a working session

### Witnesses

This month, the three witnesses are:

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

### Questions

This month, the witnesses have all been asked 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?

Each of these questions will be posed to everyone and their answers will then be used as a springboard for further discussion. The main points raised will then sent to everyone to use as a starting point for the next meeting.

### 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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### Background papers

#### Paper 1: Bojana Bajželj

##### **Importance of food-demand management for climate mitigation**

Recent studies show that current trends in yield improvement will not be sufficient to meet projected global food demand in 2050, and suggest that a further expansion of agricultural area will be required. However, agriculture is the main driver of losses of biodiversity and a major contributor to climate change and pollution, and so further expansion is undesirable. The usual proposed alternative—intensification with increased resource use—also has negative effects. It is therefore imperative to find ways to achieve global food security without expanding crop or pastureland and without increasing greenhouse gas emissions. Some authors have emphasized a role for sustainable intensification in closing global ‘yield gaps’ between the currently realized and potentially achievable yields. However, in this paper we use a transparent, data-driven model, to show that even if yield gaps are closed, the projected demand will drive further agricultural expansion. There are, however, options for reduction on the demand side that are rarely considered. In the second part of this paper we quantify the potential for demand-side mitigation options, and show that improved diets and decreases in food waste are essential to deliver emissions reductions, and to provide global food security in 2050.

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 (2014)

#### Paper 2: Ian Bateman

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

Landscapes generate a wide range of valuable ecosystem services, yet land-use decisions often ignore the value of these services. Using the example of the United Kingdom, we show 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. We use spatially explicit models in conjunction with valuation methods to estimate comparable economic values for these services, taking account of climate change impacts. We show that, although decisions that focus solely on agriculture reduce overall ecosystem service values, highly significant value increases can be obtained from targeted planning by incorporating all potential services and their values and that this approach also conserves wild-species diversity.

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

#### Paper 3: Theresa Marteau

##### **Changing Human Behavior to Prevent Disease: The Importance of Targeting Automatic Processes**

Much of the global burden of disease is associated with behaviours —overeating, smoking, excessive alcohol consumption, and physical inactivity—that people recognize as health-harming and yet continue to engage in, even when undesired consequences emerge. To date, interventions aimed at changing such behaviors have largely encouraged people to reflect on their behaviors. These approaches are often ineffectual, which is in keeping with the observation that much human behavior is automatic, cued by environmental stimuli, resulting in actions that are largely unaccompanied by conscious reflection. We propose that interventions targeting these automatic bases of behaviors may be more effective. We discuss specific interventions and suggest ways to determine whether and how interventions that target automatic processes can enhance global efforts to prevent disease.

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