



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.

This month, the meeting will ask '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.

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:

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

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

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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Transcript

Duration: 3:09:10

Forum Members

Alison Smith (AS)
Bhaskar Vira (BV)
Charles Godfray (CG)
Chris Gilligan (CG2)
Konstantina Stamati (KS)
Susan Owens (SO)
Will Simonson (WS)
Elena Kazamia (EK)
Andrew Balmford (AB)
Georgina Mace (GM)
Kristen MacAskill (KM)
Martin Rees (MR)
Mike Rands (MR2)
Paul Linden (PL)

Roger Mitchell (RM)
Rosamunde Almond (RA)
Jonathan Green (JG)
Charlie Kennel (CK)
David Nally (DN)
Doug Crawford-Brown (DC-B)
Hildegard Diemberger (HD)
Ian Hodge (IH)
Michael Ramage (MR3)
Miles Parker (MP)
Moira Faul (MF)
Therese Rudebeck (TR)

Contains a transcript of:

- 1) The round table discussion before coffee
- 2) Group 1: Charles Godfray
- 3) Group 3: David Nally
- 4) The discussion over dinner
- 5)

Main Meeting

MR:	Okay, can we start? I'm Martin Rees, I'm the chairman of this outfit and I'd like to welcome everyone here, especially our three experts, Charles Godfray, Georgina Mace and David Nally. What we normally do is go round the table with everyone introducing themselves in just one sentence because we do have a rather sort of floating group of participants.
PL:	So I'm Paul Linden, I'm the director of the forum and I'm also in the Department of Applied Mathematics and Theoretical Physics.
MP:	Miles Parker, I used to be with DEFRA, I'm now with the Centre for Science and Policy here in Cambridge.
CG2:	Chris Gilligan, I'm an epidemiologist and mathematical modeller and I coach the strategic initiative in Cambridge in food security.
WS:	My name is Will Simonson and I'm the coordinator for this same initiative on global food security.
MR2:	Mike Rands, director of Cambridge Conservation Initiative.
BV:	Bhaskar Vira from the Department of Geography and director of the Conservation Research Institute.
EK:	Elena Kazamia, Research Fellow of Corpus Christi and I work with Alison Smith.
TR:	Therese Rudebeck, Department of Geography, I'm a PhD student researching global water governance.
MF:	Moira Faul, I work at the Humanitarian Centre and the Centre for Science and Policy and last year we were working in collaboration with the forum on the cities and climate change



	issue and Roz asked me just to point out the policy briefing which will be formally launched tomorrow. The members of the forum will have already received their copies so there isn't one per person because I know some of you already have yours, but yes, we have a meeting, a public event tomorrow at the European Bank for Reconstruction and Development where we're going to be formally launching that.
MR:	And I think you should introduce yourselves because I'll get it wrong if I do it.
CG:	My name is Charles Godfray, I'm a population biologist. I'm based at the University of Oxford and a director of something called the Oxford Martin Programme on the Future of Food which tries to bring together everything done by the University that is related to food and food security.
GM:	I'm Georgina Mace, I'm an ecologist from University College London.
DN:	I'm David Nally, I'm a member of the Department of Geography here at Cambridge and a member of the Global Food Security Initiative.
AB:	I'm Andrew Balmford, I'm a conservation scientist in the Zoology Department.
MR3:	I'm Michael Ramage, I'm in the Architecture Department and I lead the Centre for Natural Material Innovation.
RM:	I'm Roger Mitchell and I'm chairman of the Cambridge Conservation Forum.
AS:	I'm Alison Smith from the Department of Plant Sciences. I'm an algal biotechnologist interested in sustainable ways to use algae and I'm part of the Energy@cam Initiative.
JG:	Jonathan Green, working as a postdoc in the Geography Department looking at businesses and sustainable natural resource management.
KM:	Kristen MacAskill, I'm in the Centre for Sustainable Development in the Engineering Department, I'm currently doing my PhD in post-disaster reconstruction.
KS:	Hi, I'm Konstantina Stamati, I lead the first part of the Cambridge Foresight 2065 Future Visions and I also spend some time in the Centre for Science and Policy.
IH:	Hi, I'm Ian Hodge from the Department of Land Economy. I have an interesting rural, environmental, agricultural, land issues.
DC-B:	I'm Doug Crawford-Brown, I'm director of the Cambridge Centre for Climate Change Mitigation Research with Ian and Elena currently.
SO:	I'm Susan Owens, I work on environmental governance in the Geography Department and apologies for being late.
RA:	Hi, I'm Rosamunde Almond, I'm based in Mathematics with Paul and I'm a conservation biologist.
MR:	Good. Thank you very much. So the format is we invite our three guests to each speak for about 10 minutes and then we'll have half an hour plus of discussions and then we have a tea break and then we'll get together in three groups separately for about half an hour and then reconvene for dinner and over the main course of dinner we'll have some reports of what was said in the three parallel sessions.
	So can I invite Charles to start off?
CG:	So what I thought I would do would be to talk a little bit about food security challenges and move from there into issues of biodiversity and along the way try if not directly but at least tangentially answer the two exam questions that you have on the list there. One of the things I had the privilege to do a few years back was to Chair the government's GO-Sciences Foresight Programme on the Future of Food and Farming and so quite a lot of what I'm going to say comes out of thinking from that. And also from the project I wasn't involved with, the Royal Society of Reaping the Benefit and then moving into things which

	<p>have happened since then.</p>
	<p>I think that if you look at the simple macroeconomics for food over the next couple of decades the growing population, if we're lucky global populations are going to [inaudible 0:05:46] around 10 billion and we want people to be wealthier, we want them to be wealthier for two reasons: it's the right thing and secondly rich people have fewer children. Then both the growing number of people and the fact that there will be a demanding and more resource intensive diet is going to put significant pressures on the food system. There's a whole sub industry of economists, of econometricians, of biologists who are trying to predict exactly what the demand for food by midcentury is going to be. In a sense - including the nice work done by the people around the table - but in a sense it doesn't really matter because all of them, at least in my view, indicate that we have a potential issue up ahead and that potential issue is so great that if one looks at possible future challenges the need to feed 10 billion people is going to be of the order of the way we worry about terrorism, the way we worry about climate change. To me that mandates action on all fronts. We need to think seriously about politically very difficult issues and diet. We need to think about the governance of food system. It's probably not the subject of the discussions this evening but I'm very worried about the resilience of the global governance, the global commodities trading network. And we need to think about production, although some quarters like to say we needn't worry about production, we needn't worry about producing more food, we can do everything by reducing waste, by changing diets. That's a huge gamble with the future.</p>
	<p>So I think we have to think very much about how we can increase production and that has enormous consequences for biodiversity because of all the threats to biodiversity probably the largest is habitat conversion and the single greatest driver of habitat conversion has been habitat conversion for agriculture.</p>
	<p>So I think if one is looking ahead about what are the policy needs on the production side then there's almost, I would argue, a straightforward simple heuristic which is don't convert land into agriculture. Because even if you don't care about the biodiversity the carbon dioxide consequences of converting the land into agriculture are pretty awful. Nick Stern said a few years ago that the most efficient way of getting carbon dioxide into the atmosphere is to cut down the rainforest and to turn it into pasture.</p>
	<p>So if you accept that as an argument then that means the deduction from that is if we are going to produce more food we have to produce it from the existing land. A concept that has quite a long pedigree, it was both a major theme of the Royal Society report I mentioned and also the Foresight report, is sustainable intensification. We're going to have to produce more food from the existing land and we're going to have to do it in a way that can be continued into the future that doesn't undermine our capacity to produce food in the future and I think that's what's called sustainable intensification.</p>
	<p>I'd argue that not only do we have to produce more food from existing land but we will want to increase that on some land so that we can use other parts of the agricultural landscape to produce other products in addition to food. And those other products they might be bioenergy, although I think that the role of bioenergy is not that great, but it will be all sorts of other things: carbon sequestration, it could be flood protection and it could be biodiversity as well. So I think an important way we need to change our thinking about biodiversity and about food production is to realise that essentially virtually everywhere in the world we are in the endgame when it comes to land allocation and we need to think in terms of multifunctional landscapes, what we want our land to produce in terms of food, biodiversity and all of these things. To me, going to your exam questions, one of the areas that we need far more research into it, it's not a natural science question but it's the political economy of land use. How we make decisions, how civil society comes together to have those decisions and to me one of the depressing things about public discourse in this country, and in fact anywhere at the moment, is that when we talk about food we talk about GM which is important, but actually it's not that important; we talk about making</p>

	your own ciabatta and all the wonderful artisanal foods and things, and I'm a foodie as well, but we miss out the hundred million dollar subject in the middle, the macroeconomics of food.
	So I think we need to think far more about multifunctional landscapes and the whole political economy of land use. I think when it comes to thinking about land use itself one of the areas we do need to think more about if, and I'll say very little about this because I'm sure Georgina will talk more about it, is that the synergies that are possible. That there are circumstances where if one designs landscapes well one can get win-wins, one can capitalise on the benefits, the instrumental benefits of biodiversity. I think we need more research on this.
	I think we have to be far clearer about when we want to use agricultural land to support biodiversity and when actually we want to use that land in order to create food such that we can spare land elsewhere. If Andrew Balmford wasn't here I'd be very complimentary about the work that his group has done in actually putting some hard data into this relatively fractious subject, but as Andrew is here I won't be nice about him!
	So that's an area that I think we need considerably more research on.
	One of the things that we've seen in the last six years or so, in 2008 we had a food price spike and in historical terms it wasn't that big a food price spike but we'd been lulled into 40 years of security. It was during the oil price crises of the 1970s that we last had a major food price spike. So one of the reasons we've talked so much about food security recently is because of what happened in 2008 and two years later in 2010. At the moment there are people losing lots of money in commodities. We've seen the economic system responding to the food price spike as economic systems should do and we're now awash with many commodities. Now actually that's happened because there's been an economic response at the same time as there's been a series of good harvests and things like that. So going back to the exam questions I would like to see far more research into what that response to a price signal has meant when it's come to environmental variables. Has that much greater yield that we've seen over the last couple of years, how has that happened in response to the environment? Has more land been converted? Have we seen land being farmed more unsustainable? So again that's one of the areas I would like to see more research on, because what really scares me is that if we're right that we are going to see food security...we'll see increasing food prices and the response to those price signals will be unsustainable rather than sustainable increases in food production.
	Then finally my last 30 seconds and this may be slightly tangential to the conversation, I think we need to have a far clearer narrative about UK agriculture and food security. I'm dismayed by one narrative which says we have a duty to produce more food to alleviate global food security - I think that's agricultural exceptionalism as an argument to go back to fairly crude subsidies and productivity. I would like to see a far more sophisticated argument about what we mean by having an agricultural industry in this country that can be responsive to global food security. How do we respond to food price signals? Do we do it efficiently in an economic sense and do we do it sustainably in the environmental sense?
	So quacker has quacked so I'll shut up.
MR:	Thank you very much Charles. Since the presentations interrelate I think it's probably best if we hear the other two speakers before we have the discussions, so can I invite Georgina to go on?
GM:	So I'm going to take a more ecosystem, ecological-based approach to these questions and I'll just start with a number of observations and I'll just expand on those a bit and then at the end I'll come back and address the two exam questions that we were given.
	So the first observation is one that Charles has already mentioned: the growing number of people, the increasing demands that they will have for all kinds of resources and the



	<p>pressing need to eliminate inequalities in standards of living across the world. So in just the next few decades means that we are going to see huge and increasing pressures on natural resources and especially on the land. Those pressures are in most areas going to be further intensified by various global change processes, including climate change, globalisation and demographic shifts of people across the world.</p>
	<p>So these challenges have largely been presented over the last few years as being about pressures on food, water and energy, the food, water, energy nexus. Sometimes, as from what Charles has just said, they are also tensioned against the need to conserve biodiversity, although the conservation of biodiversity is then primarily for its own sake, it's nature conservation. I'm going to argue that we need to broaden this perspective a bit. Food, water and energy are obviously of immediate importance to many people's lives and livelihoods and we've made radical alterations on land surface over most of human history but particularly in recent decades to provide these essential goods. But those alterations to the land have compromised some other equally significant benefits that we derive from the environment. So to take a few examples, natural ecosystems are furthest from climate change, about 20% of anthropogenic carbon emissions are effectively sequestered by terrestrial vegetation. Ecosystems buffer people from natural hazards, storms, floods, droughts and heatwaves, they provide resistance to pests and diseases. So this dominant focus on the provisioning services, food, water and energy, has come at a cost and that cost is seen in less resilient ecosystems and a need for further interventions to reverse the loss of these regulating services: these things that we define as hazard regulation.</p>
	<p>So I believe the framing of discussions about land use have been too narrow and that we need to put the discussion in broader context that looks at the entire suite of benefits that we get from the land. Now when you first think about this it seems that that may be exacerbating the problem, we're just adding more demand on the landscape. But actually I think there are several reasons why it's not adding, it's actually going to make achieving some of those provisioning services more achievable, but it will also stop us storing up other problems for the future.</p>
	<p>So these regulating services such as climate control, hazard control, pest control are now causing us additional problems, but a past failure to consider them has substantially increased the difficulties of meeting targets for food and fresh water.</p>
	<p>So for example because we are now concerned about carbon emissions there's now an industry of planting biofuels which are at least to some degree competing for land area with food production. Another example comes from floods and droughts: vegetation supports soil, soaks up rainwater, slows the flow of water through a catchment, so vegetation can help us avoid costly floods and soil erosion and the need for artificial infrastructure such as dams and levees or massive amounts of agricultural additives to provide these provisioning services.</p>
	<p>Many of the artificial infrastructures when they fail fail catastrophically, they're costly to maintain and they have very few side benefits, unlike natural ecosystems.</p>
	<p>Secondly there's quite a lot of experience and experiments that have now clearly documented that these regulating services that are provided free by nature are the most difficult to restore. Unlike provisioning services they can take decades to recover and they never, ever recover full functionality.</p>
	<p>So the future pressures on land will also mean that increasingly people will need the same area of land to be used for multiple functions - Charles already mentioned this. So as well as producing food we need to manage for carbon, soil quality, for water management simultaneously. And again artificial landscapes are demonstrably less effective at these multiple functions.</p>
	<p>So in the Bateman <i>et al.</i> paper that was circulated to you we looked at five kinds of</p>



	<p>benefits for which we were able to estimate economic benefits from enhanced management over the next 50 years and we showed how this more inclusive suite of benefits and values increases the overall economic value to society - so not just a focus on food production. Those five are a subset. There were others that we couldn't assess including some of the ones I've talked about - hazard and pest and disease resistance, the health benefits of green space and other cultural benefits from the environment.</p>
	<p>Now I haven't mentioned biodiversity conservation so far and so rather this being an awkward addition I see it is a central plank of exactly the same framework. I don't see it as something that we have to tension food production against. Some kinds of biodiversity are essential underpinning for these other benefits - for these provisioning, regulating and supporting benefits. A diverse functional soil biota, mixed woodlands, mature salt marshes and wetlands all provide the nutrient cycling, carbon sequestration, they support the water cycle and so on. So that kind of biodiversity is necessary for food, energy and water. But on their own that's not enough, there are important conservation targets that society has identified already - threatened species, protected areas, endemic species list and so on. I suggest we simply add this list of benefits to all those others that we need from the landscape and again in the Bateman <i>et al.</i> paper we included a goal to maintain bird species richness alongside all these other benefits and found this place only a small additional constraint on land use when it was prioritised against a broader set of objectives, but at a stroke something like that would meet many conservation targets.</p>
	<p>So I'm suggesting that we need a broad-based inclusive framework that allows people and nature to live, grow and develop harmoniously with their environment, people as part of nature exploiting these positive feedbacks and synergies with natural systems. This is the people and nature framing that is in the science perspective that was circulated to you.</p>
	<p>So to address the two questions the main gaps in knowledge from the perspective of an ecologist are to do with these processes and dynamics of ecosystems that we can harness to support this multiple functionality and particularly the allows us to exploit ecosystems for a resilient and productive environment. There's a lot of hard-core ecology that we don't fully understand. In the next generation of research questions I'd add a couple of things to that: so one is I think we need a more sophisticated look at both the demand side from society over the coming decades and the supply side from ecosystems. My world in ecosystems tends to look too much at the supply side; I think some of the food dialogues tend to look too much at the demand side and somehow those need to be overlaid on each other at relevant spatial and geopolitical scales so that we can harness what ecosystems can provide.</p>
	<p>Secondly I think the next generation of research questions needs a bit of a renewed focus on the regulating and cultural rules of ecosystems and how those can be managed in concert with these provisioning services to increase the capacity of the landscape to support resilient and productive human societies. Thank you.</p>
DN:	<p>Well thank you again for inviting me. The primary question I was asked to consider this evening was does the way we think need to change and my short answer is yes, but I suspect I'll need to elaborate. The paper I've circulated is about one aspect of the food security question and it's about the practice of land acquisition or land grabs which of course have been the future of human history for a very long time, just think of the history of colonialism. Although arguably they've taken on new features, new dynamics since the food price crisis of 2007 and 2008. So the paper tries to elaborate what precisely is novel, what precisely is new about land grabs, what are their structural features in the global economy that makes such land grabbing practices possible, but also no less crucially what sort of thinking justifies such actions, lending them a sort of moral imperative if you like and I argue that food security or food insecurity and global hunger provides a sort of moral sanction for such practices.</p>
	<p>But in my comments this evening I won't focus on land grabs per se but rather on the way</p>



	<p>that food security debates are commonly framed, which I address I suppose in the latter half of that paper. So I'll state upfront the crux of my argument: my concern is that a consensus is emerging on how best to tackle global hunger and spur agricultural development. The consensus I'm talking about I need to be clear is evident in briefings from the World Economic Forum, especially its new vision for agriculture, the G8's New Alliance for Food Security and Nutrition, the Grow Africa Campaign which is in Africa led campaign to stimulate private sectorial investment. The US government's Feed the Future Campaign, the philanthropy led alliance for a green revolution in Africa, not to mention the many policy reports emanating from the international financial institutions: the World Bank and the IMF and various statements coming from leading food retailers and leading agribusinesses.</p>
	<p>So to my ears the formation of a consensus is troubling. I don't often quote US Army officials but General George Patton used to say that if everyone is thinking like then someone isn't thinking and it seems to me that this truism applies to the food security solutions today where the trend, with a few important exceptions it has to be said, is to promote high-tech capitalist agriculture as the answer to global fooding security. If pursued this solution will lead to lasting and perhaps drastic changes to land use - most notably in the supplanting of small-scale peasant and subsistence agriculture with large-scale industrial production of just a few commercial crops. This incidentally is what's been happening and the aegis of land grabs - local farmers are pushed off the land and that land is given over to the production of biofuels and cash crops destined for export. But unfortunately the dynamic I'm describing is more general than the specific case of land grabs. So in my reading the consensus as I'm calling it rests on a series mythologies about global food insecurity. By mythologies I mean a series of socially constructed ideas and narratives that over time are naturalised as truth. But all myths as Roland Barthes reminds us are created for a reason. Modern myths no less so. In most cases Barthes says myths help perpetuate an idea of society that suits the interests of the dominant and ruling classes, and that's certainly something I've found in my readings.</p>
	<p>There are a number of mythologies, I'll list just five, I'll discuss just two. First, food insecurity according to the first myth is primarily an expression of scarcity or declining food availability. Second, technology is the solution to global hunger. Third - and I'm presenting these in stylised form - fully liberalised markets are an essential first step to rural development and modernisation. Fourth, food insecurity is the outcome of unrestricted population growth. Fifth, food insecurity rests or results from a restive or retarded social development in various geographical areas.</p>
	<p>So let me just deal with two. So the first: food insecurity is an expression of scarcity. I think it's more than three decades since Amartya Sen published a small book with the not very appealing title called <i>Poverty and Famines: An Essay on Entitlement and Deprivation</i>. The main aim of Sen's study is stated on the very first page in very clear language: starvation he says is the characteristic of some people not having enough food to eat, it is not the characteristic of there not being enough food to eat. In case study after case study, Bengal in 1945, Ethiopia in the 1970s and so on, Sen showed that food shortages are not a necessary precursor to mass starvation and as most will know Sen went on to win the Nobel Prize for his contributions to economic theory.</p>
	<p>But what I find I suppose remarkable is how little dent this scholarship has had on popular appreciations of food insecurity. The discussion of the so-called food price crisis in 2007-8 is a case in point. In 2010 the FAO reported that as a result of that crisis a further 150 million people were added to the hunger ledger. Indeed the global figure for those experiencing hunger was said to surpass the figure of 1 billion in 2009.</p>
	<p>For the most part the narrative around that surge in food insecurity was one of demand outstripping supply. So for example the Global Harvest Initiative, the private sector voice for productivity growth as itself describes itself, has loudly called for at least a doubling of food output by 2050. Each year the GHI publishes its trademark GAP Report which aims</p>



	<p>to quantify global agricultural productivity and establish benchmarks to meet those predicted scarcities. At the crest of the food price crisis the Monsanto company announced its own sustainable yield initiative, the company's promotional literature emphasises the gravity of supply constraints. Experts now predict they say our planet will need to double, again double agricultural output by 2050. By some estimates that means producing more food in the next 50 years than has been grown in the last 10,000.</p>
	<p>Demand is in the hunt for supply says James Borel of DuPont speaking to an audience at the Federal Reserve Bank in Kansas City and because he said only a small percentage of food is traded internationally productivity is going to happen where the hungry are. He says the geography of agriculture is too often overlooked, we speak of the looming food gap between production and population but we don't speak enough of the potential mismatch between the location of production and the location of people. Actually it turns out that many others have been thinking about the hard facts of geography. In 2006 The Rockefeller Foundation published a seminal report called <i>Africa's Turn: A New Green Revolution for the 21st Century</i>. The report laments the fact that the 20th century's green revolution which it plays such a big role in had a geographical blindspot - it stopped at Africa. What follows is a clarion call to quote: 'For a fundamental transformation of Africa's agricultural economy'. The call was answered in the same year by the Bill and Melinda Gates Foundation who joined forces with The Rockefeller Foundation and set up AGRA, the Alliance for a Green Revolution in Africa and much like the industry voices I've just quoted from AGRA repeatedly links production shortages to hunger and poverty as though the first automatically causes the second. Africa's agriculture routinely falls far short of potential they say, I'm quoting, cereal yields are one quarter of world average, nearly 220 million on the continent are hungry, national grain reserves in most African countries are too low for comfort - no context given why those grain reserves are low in the first place.</p>
	<p>A World Bank study on land grabs partly excused the practice of foreign land acquisitions on the grounds that the potential surge of productivity and yield increase outweighed the risks involved. None of the African countries of most interest to investors the World Bank report says is now achieving more than 30% of potential yield.</p>
	<p>So over and over again hunger is presented as an index of scarcity and when viewed this way the food crisis must be addressed through a greater investment which automatically triggers more production, higher yields, less hunger so the idea goes. But is this picture of the food crisis accurate? Are we experiencing global scarcity and consequently our low yield countries needed to be targeted for productivity increases and what are the consequences if that is the case? Can we really feed three extra Indias by 2050 to quote the deliberately alarmist provocative language of <i>The Economist</i> magazine?</p>
	<p>The fact is the world already produces more than enough food to feed the planet. Indeed there is more than enough food to feed the planet twice over, especially if one takes into account food waste, estimates vary but many agree that a third of all food is wasted of food produced and if one takes into account the use of crops to fuel cars rather than people Lester Brown has estimated that the grain required to fill an SUV tank is enough to feed one person for an entire year.</p>
	<p>Furthermore the call to double food production which is repeated ad nauseam as I've sort of indicated seems to have originated with an FAO report but actually the report in question says that the scale of the increases will necessarily depend on the food groups involved. So if we assume as natural and sort of inevitable that we will consume more and more fish, meat and eggs and if agri-fuels are here to stay, well yes, we'll need to increase yields but those assumptions depend on prioritising the energy and food needs of the affluent, something we need to be upfront about rather than hiding behind the philanthropic language of feeding the planet.</p>
	<p>Most importantly the FAO original predictions published in 2006 were never meant to be a</p>



normative goal of policy, they were meant to be mere projections, as I said, depending on the sorts of decisions that we make about what sorts of food we want to produce. It's amazing that they will quote that FAO report rather than something like the High-Level Expert Forum of the FAO report which Charles I think was a member of, writing in 2009 they pointed out that despite the food crisis and the surge in prices that 2008 was a bumper year for cereal crop production, yet more people starved in that year than any other. They finished by quoting and italicising that '*...adequate supply of food at the aggregate level, globally or nationally, does not guarantee that all people will have enough to eat or that the hungry will be eliminated.*'

So let me just briefly talk about one other blackbox panacea if you like, what we might call technological utopianism. For techno-optimists virtually every social problem we face has an engineering solution to it, geo-engineering will reverse climate change, DNA engineering will eradicate disease, workflow technologies will connect the world ensuring that the poor and marginalised through globalisation processes can plug and play in the global economy. Smart technologies will replace dumb people. The iPhone I have in front of me has new iSight technology on it, Apple justify this by saying it's easier to teach the iPhone how to take great pictures than teach people. Technology promises to render difficult problems tractable and that's why it's seductive. And in the food space scientists claim that they can get crops to behave in new ways, pest and disease resistance can be engineered, high yielding varieties can adapt to environmentally stressed soils and so on, maybe a panacea for global warming, climate change. We can produce nutrition smart foods through bio fortification. There's been a lot of discussion, a lot of chest beating around the issue of golden rice which some see as a sort of answer to child mortality in poor countries. The Pope has personally blessed golden rice and powerful voices around the world are lobbying for its rollout.

Citing these sorts of new technologies President Obama with G8 support set up the New Alliance for Food Security and Nutrition in Maryland in 2012 at Camp David it was announced. Governments that sign up to this new alliance must sign cooperation frameworks with private investors and businesses. Among other things these frameworks commit governments to policy reforms that abolish barriers to use, flow and acceptance of new agrarian technologies. To give a flavour in Mozambique the cooperation framework stipulates that the government must completely cease the distribution of free unimproved seeds except in pre-identified staple crops or in emergency situations. In Burkina Faso the Alliance has brought in Monsanto to help promote the intensification of agriculture through mechanisation and the adoption of Bt cotton. In Tanzania Vodafone is working to optimise food supply chains by linking smallholders with large agribusinesses. Other cooperation frameworks include reforms to regulatory and legislative frameworks in order to promote intellectual property rights, private fertiliser supply contracts, nutrition fortification, the distribution of agrichemicals and so on. As these snapshots illustrate the goal is not simply to embed new technologies in traditional social structures but rather to fashion the embryo of a new society in which private property rights and rent seeking practices are normalised. This we might say is commercialisation by stealth. And yet discussions of agrarian technology, as Charles said, especially GMOs, rarely if ever talk about the question of ownership, they focus on Frankenfoods or golden rice at the other end and we ought to ask really who stands to benefit from these new technologies and their IP regimes, not whether technologies are in and of themselves good or bad. It's the social dimensions, how they're embedded within society that really counts and if history is any guide poor countries have cause to be apprehensive. In North America the big seed and chemical companies have not hesitated to sue farmers who claim they've contravened company patents of protected crops. In self provisioning societies this is a threat to the existing moral economy of seed sharing and seed saving. Seeds that were once free in exchange through the common become subject to commercial exchange and transaction or we might say that trade replaces forms of mutual aid and some see this evolution as positive since mutual aid, while it might be life-sustaining does not contribute



	to GDP.
	In this respect it's very significant, and I'll stop here, that alternatives to commercial IP such as Open Access and things like that were after further assessment dropped from the agenda of the New Alliance on the grounds that they give, quote: ' <i>They can see little benefit in this approach to development</i> '. The report fails to elaborate but one can safely assume that benefits here are really narrowly defined as profits for the companies who are going to engage with these countries. One might offer more reservations about technology focused agrarian development, for example will imported laboursaving technologies advance or hinder countries where under and unemployment are serious problems? Might bio fortification divert attention from primary causes of nutrition deficiency? Will climate smart foods steer research away from mitigation towards climate change adaption? And is it wise I suppose to replace reproductive capacity of nature with the productive capacity of industrial inputs, given the ecological cost, the volatility of energy markets, so who will benefit and who will lose for those changes?
	So just to sort of conclude and sort of tangentially address the questions that were put towards us, it seems to me that the gaps in our knowledge are really a failure to understand the structural dynamics that cause rural hunger and poverty. The problems are seen to sort of lie over there and they are seen as various lacks, the lack of high yielding seeds, the lack of rural credit, the lack of household entitlements and if you see everything as a deficiency then the object of development is to provide the things that are missing in the first place. Of course that deflects attention away from the sorts of things that we over here do that is linked to the instance of hunger, for example unfair trade relations, intellectual property rights that I've been talking about, a history of structural adjustment programmes and so on and so forth.
	So just to list, because that's all I can do, what would be the next generation of research questions I might see: one would be how can we revalorise peasant knowledge making farmers partners in scientific discovery rather than depicting them as obstacles to development and progress; how can we design and implement adaptive pro-poor technologies that are capable of dealing with diversity. A lot of technology looks for homogenisation because it's easier. What are the alternatives to commercial IP? Can we foster innovation yet protect against corporate capture? Are there other IP regimes? We need to learn more about how to farm with rather than against nature, which Georgina was talking about, integrated pest management, agri-ecology, I'm thinking in this direction. I think we need to think seriously about how we might re-embed markets in society so that they serve social functions. It seems to me that so much of the solutions offered prioritise commercial solutions and liberalisation of markets without really seeing those solutions as having winners as well as losers.
MR:	Thank you very much indeed. Well I'm sure we could let the three panellists loose to debate among themselves and enjoy listening but this is really a time for everyone to join in. So thank you very much to the panellists and who would like to start?
MP:	I mean they're all interesting and thought-provoking and challenging so thank you. There's a sort of theme...I mean I guess we could look at the land sparing and sharing sort of theme. It seems to me that at some scale we have to share land, either in terms of biodiversity or in terms of simply saying well we need to produce a variety of ecosystem functions from a given area and that many of those services that arise from those functions are non-market, so there isn't a market, we can't step back and let the market do it which I guess sort of speaks to the point that David is making about using market mechanisms to sort of plonk down particular sorts of technologies that don't arise from that sort of wider mix of values. So I guess the question is well how do we engineer that and I think we've talked a lot about problems and I guess the nature is what is the solution, how do we engineer governance that identifies appropriate trade-offs between the various different sorts of values that we can get from areas of land and at what scale do we do it. I think there are questions about technology. So if we're looking for change



	<p>what is going to motivate change in developing countries? I guess in a world where it is the multinationals that have the capacity to engineer change, how do we stimulate change via I guess appropriate technology. I don't know, do people still talk about appropriate technology? It seems to me almost an inevitable thing that we want but we seem to have stopped talking about it. So what would that appropriate technology be? But how would we engineer it? How do you get an initiative to make that happen rather than just sort of identify some of the obvious...or well not obvious, but the manifest examples of the problem? I'm not sure it's a question really, it's just a sort of...but I think there's a connection across the three talks that we've had.</p>
MR:	<p>Shall we have another comment before we invite the speakers to respond?</p>
CG2:	<p>Two things, well lots of things struck me but there was the difference in the nature of the rhetoric between the social sciences and the natural sciences and something we need to debate is how we move that on so that we can really understand what the next set of lines of discussion and argument might be. That's a generic point but I think it's really important. What comes to mind though more is the phrase 'public good plant breeding' which is something that we've experimented with in the past and continue to do and I'll explain briefly. So we tend to think about new developments very much in terms of commercialisation. We had in this country a plant breeding institute which was government funded and extremely successful until Margaret Thatcher's government unfortunately sold it off. But that was developing germplasm, developing new varieties and these were made available and many of the potatoes still, barley for example, some wheats, we still benefit from those. And we also have CGIAR institutes, a whole range of them, one for wheat and maize for rice, these are producing germplasm that are then released to individual countries where they are taken up in different ways. But a major problem has been I think a reduction in the funding to these institutes so that they have lost a lot of their potential and strength. So one mechanism we might look to is how we would manage that better and as an equivalent of course for public good animal breeding.</p>
MR:	<p>Who would like to respond to either of these questions?</p>
CG2:	<p>Can I respond and perhaps touch on some of the fascinating things that David brought up as well and different narratives. I have lots of sympathy for many of the things David has said, I think what the West has done through distorting markets and the way we protect our own agriculture can be just awful for developing countries. I think many though by no means all private sector interventions in developing countries have been to the detriment of the individuals, of the people there and there's all sorts of things that are wrong here so I have much sympathy. I worry a bit about the sort of selective choice of myth and I'd say that with respect that there are other myths there as well and there are myths on the left as well as on the right. To me the biggest myth is that the problem of food security is just a question of redistribution and Amartya Sen who like David I revere dealt with that or has dealt with it in his writings for food and like David I'm frustrated by especially some of the industry documents who say it's all about production, realising that the reason why people are poor is they cannot afford to buy food. So addressing the additions of hunger is largely a question of development but it also depends on food prices as well. So I think economics sort of links some of the often fairly unsophisticated rhetoric you get from the private sector with the issues that Sen brought up. But there are some real issues here. Just bring up very briefly the country of Egypt, so Egypt produces a fair amount of wheat but it's not going to feed 90 million people from the agricultural land that's available. It's the biggest importer of wheat of any country in the world. Were we to screw up global commodity prices, were we to screw up the way we distribute food then we're going to see Cairo, which has currently I think 11 million people, projected to be 20 million people by the turn of the century, we'll see that country starving right on the borders of Europe. One has to be very careful about the application of markets but actually markets are the only efficient way we have of distributing food that we know of at the moment. So I would love it if we could go to some sort of world government that could take food and redistribute it but the only practical way we have at the moment is through markets and to me this</p>



	seems to be a really strong argument for getting governance of global commodities working well, working in favour of the poor rather than throwing it...it would just be an enormous unconscionable gamble to throw all that over.
DN:	To tie in some of the comments and Charles's remarks, Chris spoke about plant breeding as a public good and it's got a longer tradition here in the vestiges of still being a public good as opposed to the United States where that plant breeding has largely been given over to private corporations and when that happens the sorts of research that get done, that gets implemented is largely, not exclusively, but is largely driven by the investors, the companies, what they will get from it. So you get transgenic research that is really about producing crops that are resistant to increased use of agrichemicals, tying certain seeds to certain chemical uses because the seed companies are in league with the agri-companies - they're often the same company.
	But we sort of face a fundamental issue I think that the food security question throws into relief and that is that what is often economically optimal is not always what is socially optimal and nowhere is that sort of choice between the two more stark than the issue of food which is not a luxury but a life necessity. I agree very strongly with Charles that markets are very powerful actors. I guess what I was trying to say was...and market signals are very powerful signals, so are producers...I guess what I was trying to say, maybe inelegantly and not very clearly, was there is a sort of free market fundamentalism I think that's sort of dominating global policy space that if you introduce entrepreneurial values into smallholder communities that's what's absent, they don't behave like entrepreneurs and we bring in technologies that make them behave like entrepreneurs we suddenly get development or we need to sort of reduce restrictions on the imports of agrichemicals, reduce restrictions on trade and so on, that suddenly you get development. What's missing from that is any real historical reflection on the way that markets often tilt against the poor, you know that it's something that many, many reports, FAO reports, Conservative reports talk about that. That's precisely what we saw in 2007, 2008 when the price of rice in Sierra Leone went up 120% in six months period, it was those who relied on the markets to buy rice who suffered, those who were subsistence farmers, one might say in a poorer position, actually were better off or more food secure because the markets in that case didn't work for the poor.
CG:	So we're probably agreeing that we need better markets and markets that are more inclusive.
DN:	Yeah. The one thing I would add on that is...and I didn't touch on it but it's a tremendously big, big complex topic and it's the role of commodities speculation in 2007/2008. So not just trading on crops which has been going on a long time but trading on the trade of crops and there's a lot of research, some of it very difficult to understand, economic, geometric and all of that, that links that very heavily to global food insecurity, rising numbers of [inaudible 0:55:40] people, but it's almost absent from the debates I've been reading. There's a very sophisticated discussion by Greg Page who is the CEO of Cargill and he talks about the intensification, extensification debate and we can't just rely on smallholders and so on and he talks about it as a sort of social premium that we must pay as a society if we want to have smallholders on the land, or he calls it elsewhere a Solomonic burden, if we want small peasant subsistence farmer and a bucolic ideal we'd better be ready to pay higher prices for food, but he never talks about the Solomonic burden of agri-fuels production, crop commodity speculation. In other words he doesn't talk about the Solomonic burden of how agri-business has behaved throughout the food crisis and they've all reported massive profits throughout 2007 to 2010.
MR:	I think we should have comments from a couple more people.
BV:	I wanted to comment a little bit about what I see as an agreement about the role of the market. Certainly I think both David and Charles will be talking here about regulating the market and I think David your point about speculation is particularly pertinent here. I think



	certainly the idea of speculating on food futures is really incompatible with the social function of markets and I think what we're saying here is that markets are clearly important from the human production signal to the scarcity signals that markets do provide, but the question really is how do you regulate that market so that it provides the signals that are relevant for the social ends that those markets are trying to pursue? So what comes to mind particularly and in the most recent round of WTO talks was significantly stole by what has widely been reported as Indian intransigence over the food security issue.
CG:	But you've given in haven't you?
BV:	And an exception has been made in relation to that particular point which is that the Indian government was arguing that it should be allowed to stockpile for the public distribution system in order to allow buffers for lean production periods, which is apparently against WTO rules. And every other government in the world had signed the agreement and the only ones holding out on this was the Indian government and they've been given I think a five year moratorium before they are being forced to get in line. So that's the power of the rhetoric of free trade which comes up against these sort of social ends that some markets are trying to protect. So I think it's really important to see this just not as a rhetorical device but the reality of the way in which the world system actually does function and when there is momentum behind opening up markets things that will seem quite reasonable to most people appear to be political intransigence and people coming in the way of this massive deal which has so many benefits for the world. So I think there is a lot in this question and we've seen this in the context of financial markets, you know this kind of logic of the market should be left to do its own thing, but it's well beyond the food debate and I think there's a lot we can learn from trying to understand. The countries which suffered least during the financial crash were the ones who had protected financial markets, so actually protectionism isn't always bad in some cases and we need to think through that logic of free trade versus protectionism is often cast as too simple a binary.
MR:	Comment from Sue?
SO:	I think three really rich presentations and I'm interested in Chris's observation about the different narrative and partly because it's a research interest of mine, I've been observing in this field. Whilst all three of you have sophisticated and nuanced approach to what you're saying the wider public and political discourse seems to be reduced to terrible simplicities when it comes to this issue about, quote 'feeding the world', unquote. That seems to me to be both an interesting and important process and one that is also quite disturbing. I don't know if any of the three of you have any quick comments on why that happens? Why this incredibly complex area where I think everyone round this table would acknowledge we need insights from a wide range of disciplinary traditions why does it get reduced to these incredibly simple storylines which on all sides, I mean whether the divisions are left, right, natural, social science, technology versus other kinds of solutions. Do you have any comment on what one might call the simplification of the discourse in relation to these sorts of issues?
MR:	Any response on the last two questions?
CG:	I want to respond to Bhaskar. So I'm going to find myself in a funny position of defending markets which I'm not normally in as a signed up pickety person and things like that. One of the problems with food markets is that we don't have any free markets in foods and the worst culprits are actually the rich world and I think we actually want freer markets in the rich world and it's quite right that in a high income country we have to put money into our rural community otherwise...you probably have some agriculture around here, we won't have any around Oxford and to the west, but we have a completely distorted narrative about how we do that. So I would like to see more free markets in the highly developed countries. I don't think anyone, not even the sort of most...well probably the most fundamentalist of the Washington Consensus would want free markets in the poorest countries and then I think India and China is really interesting, exactly where do they play



	<p>in that area? So I think there is room for market liberalisation. I tend to agree with you that WTO is not providing that and it's a sort of forum for vested interests. I would also argue with David slightly on the role of specula...well first I want to argue with you Bhaskar, I think there is a social good for some speculation, it provides liquidity to provide insurance. I mean the reason why one originally had futures markets going back to Chicago 150 years ago, if regulated well they can be socially useful and I agree and as Mervyn King said one of the problems with our current financial system has gone way...the tax that the financial system puts on the world. Commodity markets are nowhere near as bad as some of the other financial markets. I would argue if you go back and you look at the research that has been done in 2008 the role of speculation in that is actually very minor. Most of the academic studies of that have argued it's minor. There are some NGO reports that put a much higher importance on it. So I'd argue in 2008 it was largely stock to use ratios plus a couple of bad weather things. But having said that I think looking ahead we don't want commodity markets to go the way that many of the other complex financial markets had. You mentioned the head of Cargill, so Cargill is one of the big four international commodity markets, they are A, B, C, D and C is Cargill. If I were them I would be putting myself in the place of the banks in 2005 because these big companies, hugely powerful, all private owned control so much of international trade and food that they really have the capacity of screwing up global trade and food in such a way that one might see Egypt starve or something like that. So I think David's warning should be taken very, very seriously, I don't think there is evidence of it in 2008.</p>
GM:	<p>I'll try to address Susan's question but I don't know the answer to it. All I can say is that in different areas these are very complex questions and in any discipline the immediate tendency is to simplify it within the framework that you think in. So for engineers it's one solution, for agricultural scientists another, for social scientists another, for political economists another and I think the answer to some of this may come from having a more sophisticated discussion across disciplines because of the complexity which kind of comes back to something that...well the first question about how you actually engineer landscapes to do this, but also something that I think all three of us said in different ways which is that a lot of the solution about this is to recognise the place-based contingencies of supply and demand. That it's too complex a system to be solved by simply pulling a lever in one place and expecting that to have a general answer. I don't understand markets really but it feels to me like that's when markets let us down, that they don't recognise that spatial contingency. So in very small scale analyses you can show that different ways of managing the landscape have very radically different social benefits. So I don't mean market values now, I mean real social benefits, the shadow values for people depending on just how you do it. So in a pure engineering sense if you really understood all that you could manage the system much better and when you get international trade and international markets that becomes a whole lot more complicated. But it does feel to me as though progress in this area requires us to build in sort of political aspects, the socio-economic ones, but also the ecological aspects that give you some of this place-based specificity. I guess this is the political ecology that Bhaskar talks about.</p>
MR:	<p>Let's have a couple more questions.</p>
AB:	<p>So I had a question about multifunctional landscapes. So I'd agree completely with what you were saying about the need to be much broader in our thinking about what we as a society get out of land use and to incorporate many more metrics in thinking about coming up with sensible solutions or promising approaches. This may be particularly for Georgina, I'm wondering how far you see the scope for that being consistently win-win so we can get lots of these out of the same thing, the same approach, versus win-losses and therefore the need for thinking about trade-offs and then in turn what that means in terms of whether you see the least bad solutions being necessarily integrationist. I mean we try to produce all things in all places versus segregations.</p>
KS:	<p>I think my question is a bit similar to one of the previous ones but I was wondering what your opinion is or your suggestion is about communication and collaboration? Because I</p>

	<p>worked previously in conservation projects for endangered species and then I have worked in crop development or crop sciences, but none of these projects were collaborating or communicating to each other [inaudible 1:08:40] to achieve food security or food sustainability. I was wondering what is the best way you think that you can communicate your evidence, your findings, your results so you can build together these bridges to start work together and hopefully address this area that is food insecurity which covers almost everything.</p>
KM:	<p>I have a quick question. I was just wondering in terms of trying to address all of these questions what kind of data do you think is missing? Because I guess one good thing about markets is that we have a lot of numbers to work with and perhaps a better understanding of a system which isn't perfect and if we are to solve the rather simplistic way of framing the question of is there a food shortage what else do we need to know?</p>
DC-B:	<p>This sort of comes back to a theme that we discussed when we were initially talking about the direction of the forum this year and David you specifically mentioned rural poverty and hunger and I guess the question I would ask is how much of this is a rural issue and how much of it is also urban or semi-urban? Certainly in many cities in the United States there is a tremendous amount of urban food insecurity which is perhaps a different question as rural food insecurity but I think certainly inter-related.</p>
GM:	<p>Well shall I just address this multifunctionality question. So I don't think that there are universal win-wins and I think there's a whole range of multifunctionality in different landscapes. So for some purposes you probably want to focus on just one function at a time and some kinds of food intensification may be one of those or intensification for carbon or whatever it may be. There are win-wins and there are also quite a lot of win-loses. We did a little analysis actually of just cases that have been reported of win-wins and win-loses and it's not very comprehensive but it points to the fact that whenever there is a private interest you're more likely to get a win-lose and when there are public interests you're more likely to get win-wins, and when you have these provisioning services, the food energy stuff, you're more likely to get win-loses. That feels important to me and it's something about the way that markets may be unhelpfully driving land use relentlessly towards one particular use that may turn out to be a win-lose type of thing. So I just think we need a more sophisticated way of looking at this and understanding that the land use needs to be across a mosaic of different uses and to come back to the data and communication question, that mosaic of land uses needs to meet the needs of people now and in the future. So you need not only what the capability of those land systems are and can be but also what the needs of people are going to be and they need to be mapped onto each other, and I don't think we have anything like a sophisticated analysis of that at the moment. There's just this rather stark poverty thing which as both Charles and David have said is not carefully thought through in terms of what we need from the food system, let alone from the landscape overall.</p>
CG:	<p>I'd like to strongly endorse what Georgina has just said there about...and the way I tend to think of it is that we as a society needs to make up our minds about...it's an ethical, it's a political economic decision and then beneath that is subjugated markets and ecosystem services. David do you mind if I just say something about the urban question because I think it was directed to you? I think that's a really interesting and fascinating issue. As I'm sure most people around the table will know a couple of years ago the global population went over 50% urban and it used to be rural. So FAO was set up in the 1940s to look at the rural poor and it's now struggling to change its agenda and even more and more people are in urban poor. Although having large urban communities, especially in Africa, can have positive effects, remittances go back to rural areas, they can potentially be a market that can stimulate the rural economies, at least for the moment and for the foreseeable future most of those big urban centres in the global South are going to have to be fed from global commodity markets. If you look at FAO projections about the food trade deficit in developing countries that is going to go up, just because there's going to be more people there and things. Then it goes back to the sort of mantra I have is we have</p>



	to have discussions about getting the global food governance right, getting markets right so that it acts in the needs of the very poorest who are increasingly going to be in the global South.
DN:	I very strongly agree with what Charles has just said about the urban problem, not only is it going to be a bigger problem but it's going to be much more difficult to find solutions to it, we'll rely on...if you look at the example of the United States I think the latest figures are something like 30 to 40 million people insecure, something around 10% of the population. A lot more research being done on things like food deserts, areas where people don't have access to fresh food and vegetables. I mean where do we see the causes for this? We tend to think of the agricultural system that we have today in the West as a very successful one, it's fed more people with fewer people working the land until 2007/8 with lower cost for the consumer, but there's a lot of fallout to that system. It hasn't fed everyone equally. Rising obesity levels, we're getting our calories from fewer sources, the loss of our genetic library, globally just three crops dominate global trading and so on and so on, one could keep going on, the dominance of fossil fuels. So what do we characterise as development and progress? We haven't really I suppose really tackled the big, big elephant in the room which is consumption, is development really about raising the floor or lowering the ceiling? Big, big question.
MR:	I think we ought to take our break now but before that I'm going to ask Roz to tell us what should happen next. The idea is we then reconvene in three groups for half an hour's discussion.
RA:	Yeah, sure. So I've rather schoolteacherly divided you into three groups. So if one group clusters round there. So Charles, if your group goes in there and Georgina if you cluster around there and then David round here. We'll put dictaphones in each one. This is Chatham House rules by the way, so you can say anything, this is mainly from writing up the notes afterwards. But then as Martin said then we'll come together and have a bit of a chance over dinner to hear what the other groups have talked about. There isn't a particular agenda to these groups, it's more continuing the discussions we've had now and picking the brains while we've got the people.
Group 1	
CG:	Charles Godfray from Oxford.
AS:	I'm Alison Smith, so Elena works with me, I'm from Plant Sciences and I'm a biochemist and I know nothing about conservation or ecology or anything like that.
CG2:	Chris Gilligan, modeller and somebody who is really keen to look at how we cross the disciplines which I hope we'll do in a few minutes.
KS:	I'm Konstantina Stamati, my background is in conservation, genetics and sustainability of natural resources and I work in different plant groups and I'm currently in the Centre for Science and Policy and the Foresight 2065 Future Visions.
WS:	My name is Will Simonson and I've also got a background in conservation but as of yesterday I've taken up a new role as coordinator for the Global Food Security Strategic Initiative in Cambridge.
SO:	I'm Susan Owens from the Department of Geography here.
BV:	I'm Bhaskar Vira also from Geography. I have to confess to a background in trading in economics.
AS:	Being an outsider I feel I can say this, I don't know a huge amount about development or economics or markets or anything like that but I was actually just talking with David Mitchell in the break and I just wonder whether it is appropriate to think of the difficulties, it is appropriate to think of the problems, but I forget who it was, somebody said 'What are the solutions?' I think the other way of thinking about it is are there any positive things



	that we can say are happening now and that they should be maintained or lessons learned and one of the things that I think would be...well it seems to me slightly perverse is to say...and I'm paraphrasing, and I don't mean that it's a complete [inaudible 0:02:22] 'Ooh, it's absolutely terrible, it's dreadful, we've really got to change the whole system in the world.' Well actually in the last 50 years the system in the world, I think the quality of life generally has got better and if nothing else as an indication of that the world population has gone up and I find that hard to square the idea that population growth can occur if there is insufficient food in the world and insufficient infrastructure to distribute it at least. So although the Western world is very profligate and keeps all the resources to itself or however extreme view you want to have and I'm just being a bit controversial here, it's not in the Western world that the population is increasing, it's in the developing world or in the BRIC countries or whatever you want to say.
CG:	So could I agree with you but for a different reason. So I agree with you that sort of gross well-being and happiness has gone up and I would look to the deceleration of population as a reason for that or as the indicator of that. So as people move out of poverty, become wealthy, have a better lifestyle they reduce the number of their offspring. So the fact that we are going through a demographic transition, that populations are increasing less rapidly, we've probably gone through peak children, we've probably gone through a time when the world has more children than we'll ever see again unless something happens. So I agree with you that we need a positive narrative, that more things are going well than badly but I would actually see the deceleration in population growth as the indicator of that rather than the first derivative is the critical thing.
AS:	I just find that quite hard to understand, how if there is famine, if there is disease, if there is lack of dealing with natural disasters and so on how the population could increase.
CG2:	It's easy to breed and we're on almost an Malthusian exponential curve in some parts of the world still.
SO:	But it's because where people are least secure and often the poorest their children are their means of security and they have a lot of...
AS:	I know all of that but surely the population doesn't go up because their children are subject to disease and early death and so on.
CG:	On balance the population goes up. So if you plot across all countries a measure of well-being, and actually there are many different measures but it doesn't make any difference, as well-being goes down population growth rate goes up.
AS:	Well there's...okay, I don't know enough about this. I can see about having lots of children but I'm not certain how that necessarily translates into large population. At what point did population increase because for a very long time population increased a little bit, I mean the rate of population increased a little bit but then it speeded up and I thought it was associated with better agriculture.
CG2:	There is that but I'm not sure that it...because it's non-linear I don't think we should describe it as speeding up, the underlying rate per person...so if you took the logs it would be a straight line in...
CG:	But Alison is right that the log has gone up...
CG2:	...over a longer period.
CG:	So because even in the poorest countries more people are surviving it's then...there's a time delay so as things get better then...but fecundity lags behind and so that's responsible for that, but as Sue said it's a very clear thing that...
SO:	So it's both ends, it's the births and the deaths.
CG:	Yes.



SO:	If I remember [inaudible 0:06:39], if I remember from that study the fastest growing populations are in sub-Saharan Africa and also in some of the Middle Eastern countries...
WS:	Afghanistan.
SO:	...where population pyramid is incredibly broad, I mean it's extraordinary, so that's [overspeaking 0:06:58]. But I think the positive narrative that came out in the [inaudible 0:07:15] report is that there is a positive relationship between human well-being and the ability to choose the size of one's family and there isn't necessarily a positive relationship between human well-being and endlessly increasing GDP. So if you take those three things together to me that's actually quite a positive narrative, though how it would play out is still very open to question.
CG:	So I worry that we in academe have given up talking about population, largely because the...when people think about academics talking about population they think of Paul Ehrlich in the 1970s, a very coercive doom and gloom and I'm not sure you could really...what they knew then it really did seem one was in for a fairly rapid Malthusian hard landing because we didn't know about the demographic...
SO:	I think Garrett Hardin didn't do much for population debate because of the living on a lifeboat essay.
CG:	No, no. But there is such a positive narrative.
SO:	Yes, there is a positive narrative.
CG:	That you can get into a positive economic...you give...educate children, especially girls, access to reproductive healthcare and then you get this positive narrative.
	So after you did the report I chaired an inter-academy panel coming up to Rio and then was blogged against, I bear the scars of being called a rat faced eugenicist for saying this wasn't... I had a very sweet PhD student who started sending me pictures about cute rodents! [inaudible 0:08:59] this really isn't hurting, helping.
BV:	The other part of that demographic story which I think isn't talked about enough is that a lot of the UN models stop at replacement fertility but the evidence from a number of parts of the world, including developing countries is that people go well below two.
CG:	Mmm, Russia.
BV:	So the models projecting 10 billion potentially are based on an assumption that we'll stabilise at replacement fertility, much of the evidence suggests that people have started having one and a half on average or something like that and actually those numbers might be a lot less than the projected 10, depending on where you stop that fertility transition.
CG:	So people have looked at that but that means things will drop towards the end of the century, it doesn't do a lot in the [inaudible 0:09:51].
BV:	Yes. No, no, not in the short...no, in the near term momentum is continued, but it does mean that people, as you're looking into that...
SO:	And introduces crises of its own.
CG:	Absolutely, which your report discussed.
BV:	It does of course, it does of course.
SO:	It does indeed. Other kind of population pyramid.
BV:	But you know the absolute numbers [inaudible 0:10:08], there's an interesting range within that absolute number.
CG:	Susan's husband's car broken down in the middle of nowhere.
WS:	I was going to ask, is the control of population growth, is that ever put forward as a sort of



	solution to problems of global food insecurity or is it just the assumption that it's all to do with the wealth indicators and how that plays out in terms of...?
CG:	Well it was in the 70s. So one of the arguments for and in fact China implemented and well India did the forced sterilisation and things and food security... But I think there's pretty much a consensus now that can only be counter-productive to have that coercive type approach.
CG2:	It's also confounded by then the imbalance that China will have over not having enough youths to support an aged population as well.
CG:	Yes.
CG2:	So I don't know enough about it but I've been wondering quite a bit about that policy in China and the fact now of course there's the China view to land grabbing to making sure that there will be sufficient land to provide food, but there is that confounding factor about not having enough youth.
BV:	Yeah, absolutely and the high dependency ratios that you'll have with aged populations as well. As people live longer and they are increasingly living longer because of medical care and life expectancy is actually improving as well, so that's the other side of the kind of demographic story.
MF:	So is that a good thing or a bad thing? It must be good surely?
BV:	Yeah, it must be good, it's got to be.
CG2:	Look at my age.
BV:	It's got to be good, but then the question is precisely about you've got an unproductive cohort that adds to your burden.
MF:	Well I think Susan said that GDP is not necessarily connected to well-being, I guess longevity is similarly not necessarily connected past a certain point, infirmity in old age and dependency as you say.
CG:	So in most policy areas now longevity being replaced by this terrible term 'DALY' which is disability adjusted life years, so you look into future. One of the good things about longevity is it was an open question as longevity got greater whether one would have a longer period of declining into the grave or whether one would continue and then drop off and most of the data is pointing to the good...something that Chris is particularly concerned about! That you go along in a plateau and then drop off.
MF:	Is that true? I would have thought in the Western world there's a lot of evidence for really people living with chronic conditions.
AS:	Protracted.
CG2:	No, no.
CG:	No. Well there are two things: more people live to the period when you go into the decline but the decline itself has been pushed later. So we see more people going through the decline but the average length of decline isn't longer. There is some variation around that but largely it's the more cheerful of the two options.
MF:	So it is good.
BV:	Of course my generation knows we'll never be allowed to retire, we'll just work forever.
MF:	There won't be any pensions.
BV:	There won't be any pensions left.
CG:	But then we academics never started work in the first place so it's not that bad!



CG2:	Charles, you used the term political economy of land use and macro economics but then we also heard elsewhere about thinking about spatial structures. I haven't got a well-articulated question but essentially we are thinking about the spatial structure, the production of food, the consumption of food and what are the natural scales that one could work with, so thinking about countries, thinking about counties, thinking about continents feeding themselves. Who is looking at this? Who is working on it? Who is making progress?
CG:	On the sort of global... Well, I mean as you know because you're one of the people who sort of studied it from the statistical extrapolation side and there are a number of groups who are trying to look at this. There's a big economic literature and a group that have come together in a grouping called AgNET which now gets together to compare different approaches.
CG2:	So underneath or maybe surrounding my question was going back to how do we take the discourse on. So that you find that there are a lot... a lot of reports are published, a lot of meetings are held but what really has the influence and who are the influencers and how would we follow up in fact from Oxford's food security, from Cambridge's food security, UCL, Imperial and beyond.
CG:	So can I answer that in terms of land use and things and when I was talking about the political economy of land use and clearly one does need to have a dialogue that is wider than just the UK. But having said that, unless we have a dialogue in the UK we're going to be in no position to say that other countries have and I think that we are not having that discussion in the UK about how we manage our land and want our land. Now it is actually quite complicated in the UK because so much of our rural policy is dominated by Europe and the CAP and the CAP is such an unsexy thing to talk about that very few NGOs campaign on it, it's not up there in the political discourse. I think if you talk to the NGOs, the sort of more sensible mid-range NGOs, the RSPBs, the WWF, they realise that the last round of the CAP reform was pretty much a disaster for biodiversity and conservation and I think there's a general feeling that they want to have a more mature debate going up to the next round. I think there's an interesting... some of these questions can span the political divide, so... about the only sensible thing Owen Paterson said when he was Secretary of State for the Environment was public money should go for public goods. Then if you go to the... more on the left side then they are concerned about single farm payment giving money to very rich farmers. So I think that there is a debate there is how can we use the money we put into supporting our rural communities more efficiently and that almost uniquely in the age of an austerity one can have this debate about demanding more money. It's a talk about reallocating the money and I think one of the big issues is going to be the degree of subsidiarity that allows this country to be able to do it and there are real pressures operating at European level, absolute simplicity so you can defend a legal challenge from Latvia to Greece, to Scotland, but then the absurdity of having the same rules for [inaudible 0:18:02]. Bhaskar, you are much more of an expert on this than I am.
BV:	But this is when the politics of reallocation becomes interesting because when we talk about reallocation you are forced to think about moving resources from one sector or one part of the economy to another and what normally gets in the way politically is those who've got a stake in where you are moving the money away from. So who is willing to have the argument with those who will be losers under that reallocation? The political economy question is normally reallocation means that there are some winners and there are some losers.
CG:	But it's a much more subtle form of reallocation the normal because we're not talking about moving between industrial sectors, we're talking about within an industrial sector and then if you look into the real politics of it you're looking into who actually is the constituency of the National Union of Farmers and things, you're looking at how the RSPB campaigns. The RSPB are terribly afraid of losing the farm and bird index and what's



	depressing is you can get smart people from the RSPB, NFU into a room and have a really sophisticated debate about how one might do this and then they go anywhere near a microphone and it's back to speaking notes and things. So we have a sort of institution, institutional inertia about it. In fact going back to your point Chris, I think that's a role for the major universities and forgive me I'm going to use a terrible, terrible jargon term, to act as a safe space in which people can have some of these discussions.
CG2:	Yes, there's another step to them though that the...at one stage I looked at Treasury modelling and DEFRA modelling for CAP and what really struck me is they didn't look particularly at detail what they'd done previously, they just had some very simple assumptions that they thought they wanted to achieve. I think if we get the timing right we have a hope of being able to influence this. But you're right, we've got to get NGOs and others into the room. Whether or not we should...you said we should be sorting out what we do in our own backyard, but is that the best use I wonder of people's time as opposed to thinking about Africa, India, South America?
BV:	Well let them sort out their backyard.
CG:	You want to sort out other people's backyards before your own?
CG2:	Well we're not starving.
MF:	No, but I think it seems like...I mean maybe I misinterpreted...
CG2:	It was a rhetorical question.
MF:	...what you were implying, but for example the question of dairy farmers which is very much in the news and people are saying it's absolutely essential that we support dairy farmers, that they're given the equivalent of a living wage for a pint of milk and supermarkets shouldn't undercut the prices and so on because at the moment there's a glut of milk and what we want to do is to make sure that in the future when there isn't a glut of milk we've got some dairy farmers. I thought, well, yeah, that's probably a good idea but I thought your point was is that a sensible idea? Would it be better to say here is an opportunity to consolidate the dairy farmers and free up some space in our country which we could then use for another thing. I mean I don't know whether that's what you meant or to make the offer in global markets, the excess milk that we have to something, but we don't make biofuels out of it but that's certainly what happened with the very large wheat harvests in whenever it was, when that was started [inaudible 0:22:08].
CG:	So I think that's exactly the right question to ask. It does not seem to me that the dairy farmer has a right to maintain a non-economic business. We wouldn't say that if we were talking about, I don't know, restaurants in Cambridge or something like that. We need to support restaurants in Cambridge because if they all go bust maybe we can't get food sometime in the future. So I then think you need to have a sophisticated discussion about why you might or might not want to support...
MF:	Exactly.
CG2:	And what the value is to the land return as well and what the alternative uses would be.
CG:	But there are two arguments: one exactly you said, supply of milk into the future, to me that's the harder one because we are such a rich country it's almost inconceivable that we cannot feed ourselves in global markets. You have different arguments certainly from India. So to me that's a poor argument, however we as a society might want to have landscapes that have dairy cows in and things like that and that...and to me we need to have a discussion in that terms and then actually we would be paying our farmers as custodians of a landscape and that's how I think we need to do that. That would then be a rather different discussion because then we'd be saying well we want a custodian of a landscape, perhaps we don't want you to maximise your profits as a dairy farmer, we want you to have a landscape that is really rich in biodiversity, rich in carbon sequestration or something like that, and that to me would be the way to go and I would pay for that by



	taking away the single farm payment from the grain barons up the road from here where it's just the sort of icing on the cake rather than anything else. So I think that's exactly the way the discourse needs to go.
MF:	So I think that maybe just answers or addresses your point Chris, is that there is scope for thinking about things in the UK because it's not a matter of life or death. I mean obviously if the dairy farmers lose their livelihood it would be bad from their point of view but it's not going to affect food provision in the UK so you could...
CG2:	That's predicated on the assumption...so it's about 60% isn't it on sufficiency? One of the problems with the price spike or one of the problems driving the price spike I think was that countries began to stockpile and refuse to trade, so that if we were to withdraw from the EU that would change the freedom of trading. If there were any other fears internationally that could have a very rapid effect. So then there is a question to what extent should we be self-sufficient. I know we shouldn't be self-sufficient but it is where do we have the cut-off there and over what time period should we be thinking about discounting what we're doing. Are we thinking about the next five years? The next 10 or 20?
CG:	Sorry, discounting in what sense?
CG2:	What we decide now when we are assuming that today is much more important than tomorrow, than the usual discounting. So what should be our time horizon in what we're thinking about, five, 10, 20 more years? Because that would affect the different strategies we'd have for supporting a dairy industry for example.
BV:	So Chris, two separate things, I think one is about the self-sufficiency argument and I think that connects with your original comment about scale, because self-sufficiency at the level of a county makes no sense. The national is an artificial boundary that we've created, why is self-sufficiency at the unit of the nation, were Scotland to become a new nation you'd have a kind of different boundary around what self-sufficiency is. So when you talk about self-sufficiency what's the unit, that's the scale question. The market argument has essentially said that national level self-sufficiency no longer makes sense when you can trade in international markets and purchase food and by every country to try and be self-sufficient in food you destroy the system. So where self-sufficiency goes is kind of very closely tied up with the scale at which you are making the analysis.
CG:	I'm hugely suspicious about self-sufficient arguments because it tends to...
CG2:	So am I but I just posed a...there is a cut-off though somewhere that you have to think about.
CG:	I think that's actually an area where the market should find what that area is and again in...and I think you only have to look what's happened in the few years since 2008 or what happened in 1939, in that you can convert land very fast into food production.
CG2:	Yeah, but could you do it reversibly? If we were feeding a smaller population with actually much lower expectations in terms of development.
CG:	But we're getting three tonnes of wheat a hectare and we're now getting eight and if we really pushed it we could get 10.
CG2:	It would be interesting to do those calculations. But in terms of that natural scale there are also natural scales in terms of the ecosystem services and there thinking of ourselves as an island or two islands becomes important in that respect I think. So there are a whole lot of these different scales and how do we optimise across those. I feel a modelling problem coming on.
SO:	Sorry to come in on this fascinating exchange, I mean this may have been said already but after the war the food from our own resources, determination really led to one of the most comprehensive destructions of biodiversity that has ever taken place in the UK.



CG:	Absolutely. It also led to a sort of cultural myth about the noble farmer that pervades all through to today and I think gets in the way with...
SO:	Yes. In fact farming is still in effect our last great nationalised industry.
CG:	We were just talking about that.
SO:	So you've done that? Okay. Those things again are very intricately interwoven.
CG2:	So nationalised industry but driven by supermarkets for example.
SO:	Yes, I mean it's...
CG2:	It's a paradox though isn't it?
SO:	What I mean is there are huge public subsidies [inaudible 0:28:58].
CG:	Which I meant to say when Alison said...I think it's a different question there about whether we have a proper market in the supermarkets and I suspect we don't and Christine Tacon who is the groceries adjudicator is really frustrated how little power she has to change things.
CG2:	Oh yeah, it was in the news today, yes.
BV:	So what would you do about dairies? We talked about it in your absence so we won't tell you what we said.
SO:	Is this a test? It's like are you going to open the box or take the money? I'll take the money. I don't know, I really don't know. But I listen to The Archers so I'm...
Group 3: David Nally	
DC-B:	I think we must just continue with the conversation. Since you're our lead here obviously I think the topic for us is around this issue of what's the narrative that is going on? How did it end up being this narrative when there are these other ones that are possible?
MP:	Can I first move to a question I was trying to catch Martin's eye on before we stopped and it's just picking up on the place-based discussion that was starting and the point that Charles was making about the move towards essentially an urban world rather than a purely rural one. If you look at it historically policies tend to develop around the control of resources, whether that's kingdoms or city states and it seems to be one of the issues we're facing with the sort of scenario you're putting forward is going to be an issue about how cities control or at least assure their own food supplies and you were talking earlier on about land grabbing. I do wonder about the dynamics going forward and the relationship between cities and their hinterlands and relatively uncontrollable trade on the global scales. Is this playing towards sort of issues you were raising in your land grabbing work?
DN:	Yeah, I think the historical issue is quite interesting, certainly in terms of the politics of food provisioning as I would call it, the overriding trend is that the needs of urban consumers are prioritised over and above the trend. You know if you can make a sort of stylised, general statement that's what we see and provisioning politics is often changed on the back of urban demands. So for example the French Revolution began with a bread riot, the Boston Tea Party kicked off the American War of Independence, so provisioning politics has...particularly urban provisioning politics has had a say on what Charles was talking about, global governance, or at least national governance at earlier periods in history. It does kick into the land grabbing debate, if you look at the drivers of land grabs you have countries that are relatively poorly endowed with plant stock. So the middle eastern countries, Saudi Arabia recently announced that it's going to discontinue its wheat growing programme and consequently it's sort of making up for that shortfall by investing in land in other parts of the world and growing produce in them. But it's the deals around these things that are really, really interesting because some of the deals actually allow things like 100% repatriation of what's growing on the land. So



	in other words if the Saudis buy land in Ethiopia, Ethiopia suffers a food crisis, the Saudis would be under no obligation to allow the food grown there to meet local needs.
MP:	But wouldn't the local government just stop that?
DN:	They can.
MP:	I've always assumed that this is a really odd way of trying to solve food supply problems, because if there is a global issue the barriers would come down and the local country would say 'You can't take it out'.
IH:	Think of the 1845 Irish family.
DN:	I guess the real fear is we're not really looking at governments that have had a strong tradition of democratic accountability. So if you look at the history of the Ethiopian, the 1970s, a large part of that was deflection of resources to pay for military funding, the same with North Korea. As Sen has famously said that famine has never occurred in a democratic country with an open and free press, so he's sort of making a claim that it's not a scarcity of food, it's a scarcity of democracy which I think is a really big question because all of the sort of literature I was quoting from, whether it's the Bill and Melinda Gates Foundation, unelected, huge philanthropy, throwing money left, right and centre, skewing research agendas because there's so much money there people want to write research that they want, but they're not really elected. The G8 unelected, I suppose unless you consider the governments within them, and so on and so forth, and particularly the companies being subject to...
MP:	But people are pretty hungry in democracies. I mean there may not have been a famine but clearly there are people [inaudible 1:22:10] in the United States and the UK.
DN:	Yeah, I suppose the counter narrative is that global food prices across North Africa and the Middle East have led to urban riots that have led to all sorts of political revolutions that we've been reading about in the last number of years and there's some interesting research that sort of correlates the incidence of rioting and food pricing and subsequent political change.
MP:	So part of the problem was the introduction of constraints on trade at that point when it looked as though there was going to be real global shortage. So it's that what drove the [inaudible 1:22:46].
DN:	That's sort of the narrative, that governments put up barriers and said...you know the Indian government said 'We're only going to export Basmati rice, it's a high-value crop, every other rice we're not going to export' and then the World Bank and the IMF released reports that say those sort of things were trade distorting and undoubtedly they had some impact, but it does sort of leave to one side commodity speculation and...
MP:	But presumably they accelerate...they affect expectations about prices and the financial market is entirely driven by expectations, so you can see how they sort of feed on each other and drive the thing up very quickly.
MF:	But I think there's something there about the narrative that...you used the word myths and in my work there's policy narratives and understanding the narratives that drive...if I define a particular problem in a particular way then the solution that I am allowed to find or that I allow myself to find to the problem will only be a solution to that particular narrative. So the difference that was brought up between the social science, the natural science, the...you know, sort of whatever it is, is huge, but equally there it's really interesting because you know sort of Arab Spring because of food under production, you go somewhere else and it will say and therefore the solution is free markets and you go somewhere else and it's like 'Oh no, Arab Spring because of overeducated, underemployed youth, therefore free markets'. So it's really interesting that these global problems, these problems that are then identified as a problem that we need to worry about, whether it's Arab Spring, terrorism, whatever it is, the solution...the narrative is

	<p>sort of then made into this particular thing, but whatever it is the solution is always given as something that is very, very economic that fits in with a very particular type of economic thought and type of economic solution. So I think there is something about saying yes there are these narratives over here, and there are those narratives over there, but understanding the narratives that are being used that are actually making change happen means that you can actually see more behind the assumptions that decision-makers are using in order to understand them, number one, but then also in order to rather than just come up with a counter narrative that doesn't address any of those points, actually understand what the points are in that narrative that you can then move. Because you can't come up with a narrative that says destroy all markets, you could come up with a narrative that says there is a social role from markets and there is a role for government and governance of markets in order to make sure that that is fulfilled. I'm not saying...you'd have to go through quite a few steps before you got to that one I would argue.</p>
DN:	<p>I would sort of say two things around that: one would be I think...certainly if you think about the ABC, the Archer Daniels Midlands, Bunge, Cargill and Louis Dreyfus as that deal must be, if you think about the big actors in commodity trading and the say they have on global governance now, why does it seem that surprising to us that they would determine the outcome they want and find the evidence that they would like to support it. That shouldn't at all be surprising because these are companies that prioritise shareholder value and increasing profits and so on and they've got to deliver on that. I guess what I find really sort of strange and Charles spoke about this quite elegantly, it's not that markets are intrinsically bad and I'd say the same about technology, it's not whether they're good or bad it's the social uses to which they're put, and to me it's really about the corporate capture, it's about the big dominance and big, big businesses. It's not just...we saw it with big tobacco, we've seen it with big pharma and big agribusiness doesn't want to be seen in public...you know it doesn't want its books to be opened in public precisely because it has such a huge role on the global governance structure, to its own benefit. The idea that free markets, which is the second thing I'd like to add, if we buy into that sort of view I think we miss a trick because actually for those companies, corporations, to exert control on global economic space they have to use political influence, political power and so on, they're not letting the markets just happen. To allow the sorts of markets that they want they need lots of deregulation, they have to instruct the government of Mozambique to get rid of seed sharing, they have to tell India that it's got five years and then its stockpiles have to go down because they're trade distorting. That's not free markets, that's politicised use of markets for certain kinds of benefit. So when it becomes a regulation/non-regulation debate I just think that misses the point because the global structure itself is regulated at the moment, it's just regulated in favour of corporate interest.</p>
MF:	<p>But that's the narrative.</p>
MP:	<p>Markets are constructed.</p>
DN:	<p>Yes, that's what I'm saying, why didn't I just say that?</p>
MF:	<p>But it's holding the idea of that being the narrative even if it's not the reality and no matter how much evidence you throw at the narrative that's not going to change the narrative, you can't change the narrative with evidence, you have to change the narrative with counter narrative arguably.</p>
DN:	<p>I think you change the narrative with democratic accountability, you know I'm sort of Social Democrat on these things.</p>
MP:	<p>But accountable to who?</p>
DN:	<p>To the public. Bill and Melinda Gates are not accountable to the public, that's the whole point of philanthropy.</p>

MP:	So what is the alternative? I absolutely agree we have this massively concentrated sector with a very small number of players and therefore actually it probably isn't even a free market, I mean it's an oligarchy of some sort. So who might that...so who is managing that market? Well I guess you'd say well it's international...it's the World Trade Organisation, I mean who do we look to do anything about it?
MF:	It's those four companies.
MP:	There is no global anti-trust organisation as far as I'm aware.
DN:	But again that's one of the dilemmas of globalisation. You have all these organisations that manage global economic space and none of them or very few of them are democratically accountable. They're only democratically accountable to the extent that elected governments participate in how they do things.
HD:	Can I just ask how do they actually present their legitimacy, because I do some of this too in my work with regards to water and there's these whole legitimacy issues regarding non-democratically elected actors and something called output legitimacy which is basically defining legitimacy in terms of how successful they are in producing output rather than democracy. Is that the same...?
DN:	That's really interesting. Can I just briefly give the example of the Bill and Melinda Gates Foundation because I've interviewed some of the staff there and I know a little bit about that and certainly their thinking on this. Their argument would be that philanthropy occupies a niche space between public decision-making and private decision-making, public decision-making gets caught up in red tape because of democratic accountability and governments tend to be short-termist because they work on election cycles. They don't, they've got a 30 year window and they say that's a really good thing, we're not tied in red tape. It kind of is the kind of dictatorial argument, right, but that's one argument, but they say we're not private business either so we're not interested in short-term profits, we are interested in throwing a load of money at this that private investment would never do because it's so risky and then hoping that that becomes catalytic is the word they use and it leverages change that is self-sustaining and then they pull out. So that's their model, so it's exactly what you were saying, it's not about we shouldn't look at democratic accountability, who voted for this and wanted it, it's how outcome driven, how much change did they create. So there's a self-confidence within that about the idea of change that they have being a virtuous and a helpful one.
DC-B:	So where do you think Bill and Melinda should put their money? Because they both have this stated idea that their kids will get nothing, they're the Andrew Carnegies of this century, right? Their model is we will give all of it away. So if there are downsides of them giving it away then what is the mechanism? Because they tried giving it to government organisations and it was a complete failure, the government just waste this money. They tried it through NGOs and the NGOs were terrible at getting the money onto the ground. So what's your proposed solution then? Because there is billions of dollars sitting in a bank account somewhere.
DN:	70 or 80 billion all to be given away within 25 years of the last one dying, so they've a sunset clause. They have...there is a philanthropic philosophy. It becomes really interesting and it goes back to Andrew Carnegie who is the sort of pioneer of these ideas. For me what's problematic which isn't to say what is normative and what should be done but let me just say what's problematic because it's easier, is that they come with their own set of biases and they are very, very open as a foundation that hey, you know, Bill and Melinda made their money in computers, you can't expect them not to be technology centric.
DC-B:	So we put them into the class of all things that exist that have their own set of biases. So that doesn't differentiate them from any other funding organisation.



DN:	No perhaps not, but because they have so much power that does differentiate them from other organisations, so there is a leveraging effect to the fact that they can say 'Right, in terms of health research we have got 30 billion to give away, come to us with proposals.' People tend to come with the kinds of proposals that they think the Gates Foundation will like, just like you would to some other grant organisation and the same with... So there is a fear that they are sort of dominating in terms of food research a particular kind of approach to problems which is very... I can tell you what the sort of Gates Foundation vision is, it's the kind of vision I was talking about and that those things are ultimately a positive sort of development. They believe that the first green revolution made mistakes but the social problems, what they call second-tier problems can be sort of dealt with by more advanced technology. It's kind of like the argument free marketers use around markets. The problem wasn't with the markets, it's not free enough. It's not the technology, we just have to invent new technology. My fear with them is that they have so much power by virtue of so much wealth.
DC-B:	So what would you do with it? Again what's the alternative? Are they supposed to give it to government to distribute? Are they supposed to give it to NGOs? I would say the worst of all possible worlds is it sits in a bank account somewhere earning interest and never gets used for any social purpose at all.
MF:	I totally see the reason behind your question, I would also argue that there is a question about where that value has come from because that value didn't come from necessarily paying living or above wages, it didn't necessarily come from making sure that the minds...that the components were coming from work particularly...
DN:	Gates made his money on IP.
MF:	It didn't come from you know sort of playing nice with the other people in the same market that they were in.
DC-B:	Okay, and that leads to one conclusion, they should give the money back.
MF:	The tax that has been or not been paid to many, many, many governments around the world on some of those [overspeaking 1:35:21].
DC-B:	So 75% of what flows into Bill Gates goes after taxes, much higher than any of the rest of us in this room pay. I'm not defending Bill Gates, I'm just wondering again [overspeaking 1:35:30].
MF:	But then it also is leading into a narrative about...
MP:	It's a relative question, not an absolute question. I think we're thinking of this in absolute terms and I think Doug isn't. So if we've got three models, if we've got private sector that's oligopolistic and only in it for its own self and can manipulate markets, we've got governments which are weak, short-term, preoccupied with elections and totally incompetent...
MF:	And then they have the elections.
MP:	...and we've got Bill and Melinda Gates Foundation and no one else.
DN:	I'm not sure we have three different models because I would say that the business side of things is in fact in all of them. So look at governments, they are sort of revolving doors with business now, they look after business interests, particularly the United States would be the best example where they move in and out of company boardrooms and when they are re-elected they sit on...then we get scandals like Enron and we wonder how it happened. And the philanthropy...I mean Bill Gates' particular model because he is fundamentally an entrepreneur and a business person, so his model of philanthropy and giving, as he said move from the business of taking which is sort of business to the business of giving. The constant is this sort of focus on business solutions, market solutions to problems.



IH:	There is a fourth power source emerging that's actually in cities. As you said nation state type governments are increasingly weak and incompetent but cities are perforce having to take much bigger control over what happens, how they resource themselves, where they get the water supply from, where they get their energy from, where they get their food from. Some of the bigger cities now are actually mega powers compared to some of the governments and that's [inaudible 1:37:24] going to increase. Now what that does in terms of the sorts of issues you're talking about I think is interesting.
DN:	I'd worry it becomes a sort of zero-sum game, that you know who is the most powerful, who has the most political clout, who has the ears of the politicians gets to decide where resources get allocated.
IH:	Well you can see the sort of Italian city states of the 14th century model re-emerging which is not a very attractive proposition.
DN:	Yeah, you can. I mean biofuel policies would be exactly that, certainly at the moment, it makes perfect sense from the sort of rich, wealthy, affluent perspective, you want to diversify your energy base, you don't want to be as dependent on Middle Eastern oil, corn and soy is highly subsidised and cheap so if you can find ways of turning it into a more expensive commodity fuelling cars you value add from an agribusiness perspective. But my worry is that the sort of debates get played out but behind the scenes. There's powerful vested interests that dominate it, which is why I started talking about these issues as being...I mean the governance of food seems to me an exceptional issue, there are things that the market does really, really efficiently and effectively, but things that are absolutely necessary to life, health charter, food, mean that some sort of regulation, some sort of oversight, some sort of democratic accountability is necessary.
IH:	I think particularly when you recognise that being natural, water and food are subject to major vicissitudes which don't in the same way affect other sectors of the economy. That does suggest to me that you have to have some form of governance that allows smoothing out.
MR3:	But we've tried that. I mean in the past we've had global funds in our government that have worked...well worked for a while and then collapsed and cost lots of money and are not particularly helpful. Are we just saying then that we are stuffed? Can we not see some even direction and travel that you'd say 'Well okay, this is what we ought to be working to try and achieve'?
DN:	I'm not a pessimist about these things, I don't think we're...
MR3:	I'm highly optimistic, I'm not getting this at the moment. Tell me, tell me about your alternative.
DN:	I think if you look at it in historical terms it's kind of interesting. I'm sure you all know Karl Polanyi's book <i>The Great Transformation</i> where he spoke about how markets function and the great transformation was in the 19th century and he basically said, he called it a great transformation because up until that point we've always had markets but they serve social functions. So I can't build a house but I'm a good fisherman so I can catch fish, sell them in a market, get money to pay you to build my house. You know it serves a social function, very powerful, but in the 19th century you have the dis-embedding of market from society so that society just becomes a kind of adjunct to the market, the market regulates everything, it becomes subservient to market forces. But he said that cannot continue indefinitely because not everything can be completely marketised, you cannot completely marketise water, air, natural resources because it's the very basis that sustains biological life and you can go so far and then even the forces that were in favour of it have to reel back because they're undermining the basis of the economy, of social systems, ecosystems, pollution undermining ecosystems and so on. So that sort of ebbing and flowing happens, it naturally does. The financial crisis is a kind of example



	of that, you give free rein to financial institutions and then suddenly they become [inaudible 1:41:31], the banks are sort of nationalised and become part of the state sector again, they are subject to controls and we pay for it by the way, not the bank obviously.
MF:	But this is it, because the marketisation is still there in the privatisation of profit and the publicisation of risk.
DN:	That's the dominant trend.
MF:	So the ebbing and flowing, that hasn't ebbed yet. Yet.
DN:	Well I'll take some regulation over no regulation. So global commodity speculation was spoken about a few times and Charles is more sceptical than I am at its actual impact on price rises since 2007. What I've read suggests that it does have a significant impact. He demurred from that sort of view. But it certainly has some impact and he's absolutely right saying it has always served a sort of social function in that it was meant to protect farmers from sudden changes in prices, so hence the idea of hedging, they could bet on a future price and if prices went up they could sell and make a profit, if they went down they won on the bet and they lost on the commodity, that's what they were. But what's happening now isn't that kind of trading, it's betting on the trades themselves and that's the skewing thing.
MF:	Betting on the bets.
DN:	It's betting on the bets and we need some sort of regulation of those sorts of things and that's what I call a kind of Polanyian embedding, I know it's awkward language, but a sort of reining in of this idea that the market is an invisible hand, it just gets on with things. It just gets on with things but not in the public interest.
MR3:	But just to toss in another pessimistic thought - I mean whatever the systems are they are much more complex than they used to be and they are, if you like, being run harder, run faster than they used to be which strikes me as a risk of being inherently unstable. Do you think that any form of social control is going to be sufficiently subtle and sufficiently rapid to actually overcome that inherent instability? My mental model of this is riding a bike downhill with no brakes, so long as you can keep pedalling faster and faster you will stay upright. Very small adjustments can be disastrous.
DN:	I suppose like the model of 3% compound growth which many [overspeaking 1:43:54] but where does that lead you to? The kind of scenario you describe.
	Look another way of looking at this and going back to the research questions that I was supposed to address but only did tangentially, I don't think we study enough what we might describe as successes, you know a kind of provisioning politics that worked or that was successful in terms of reducing the number of people who are malnourished and starving and there are many examples of that. Many Third World countries before the structural adjustment programmes for example and they involved things that are not particularly popular at the moment. So things like the government of India stockpiling, using strategic grain reserves which can be very helpful if market prices rise and you've got a grain reserve, you've got rice stockpiles, you can throw rice onto markets to depress local prices and so on. The agribusiness argument is that that doesn't encourage any foreign investment because as a foreign investor you're always afraid that you're going to make certain amount of profit but then the government will intercede and dampen prices to your cost. But there are a number of things that...
MF:	And the rest of us say 'Aha, sure.'
DN:	So we might have to ask hard questions about what is an acceptable rate of profit for businesses vis-a-vis their risk entering those markets. So looking at the history of provisioning politics what would be regarded as more successful sorts of social policies that led to a reduction in hunger. Because the figures have globally waxed and waned.



	2009 was the highest.
MF:	So the research then would be...so you would say some kind of comparative study of success stories across a piece.
DN:	Yeah, yeah, comparative study of provisioning politics. Ha-Joon Chang an economist in this University has sort of done this, he's said 'Well look this is how the World Bank says Third World countries should economically develop. This is how rich countries developed, they didn't develop like the World Bank says.' So why don't we study those policies and then say well it is...actually he's right, this is how they develop behind protectionist policies, blah, blah, blah, blah. They supported the agricultural sector and then moved to import substitution, industrialisation and so on and then maybe that's the policy rather than full-scale de-regulation and so on.
MF:	De-regulation over there.
MF:	Yeah, but you can only do a comparative [inaudible 1:46:30] I think, so what might be more successful...you know you have to work in normative terms but everything I said was critiquing what's happening, so it's very much against rather than for, but it is possible to do research that moves in that sort of space of normative judgements for. So not every Bill and Melinda Gates intervention will be bad just because of their rationality of getting involved.
IH:	It does strike me that a lot of the cases you're talking about at least in the short term involve very low levels of well human comfort, put it that way. I mean even if you look at the development of Western societies that depended on probably several centuries of really grinding the faces of the poor before you got to the point where the poor did slightly better out of it and the other cases you were talking about were the ones where, okay, you could stabilise, there's enough nutrition but no more. In aspirational terms that's certainly not where people are, whether those aspirations are right is a different issue, but there is a question there I think about the scale at which you can do some of these things.
DN:	That's a really important question.
MF:	Thank you.
Over Dinner Discussion	
JG:	<p>Summary of group 2: Georgina Mace</p> <p>So our conversation started with the idea of reducing consumption and reducing waste and Andrew was quick to talk about the fact that actually it's not about eliminating meat, protein from our diet but it's about actually substantially reducing and that actually if you do that by approximately 50% we can go a long way towards meeting our targets for sustainable food production on current land. Then we also talked a bit about multifunctional landscapes and how sustainable intensification fits into that and Georgina talked about the idea of again looking further than food, water and energy and we're going to need some areas that we devote entirely to food or devote entirely to conservation whereas some might be multifunctional. But crucially we established the idea of scale, so for instance if we were looking at the UK as a whole we might devote Scotland to provisioning services for water, we might think about East Anglia for producing food, but clearly there are some of us in East Anglia who want to be able to experience biodiversity and we also want [inaudible 0:02:08]. So thinking about the scales of the production of these beneficial services and then crucial to that is the idea of mapping our demand and our supply and from there going...if we can do that at multiple scales.</p> <p>Then we also discussed a bit about land ownership. How does land ownership fit with our ideas for incentivising change and changing land use? We discussed about whether EU subsidies are really working and again whether they could actually be used a) for a</p>



	<p>whole series of ecosystem service benefits, so not just food, not just biodiversity and whether we think about them in terms of flood prevention, carbon sequestration and there again ideas of scale come in. So things like carbon sequestration we can think about at the global scale, things like flood prevention we can think about at a local scale.</p>
	<p>Then the idea of land ownership also led us to thinking about farmers in particular and whether they see it and then we discussed them as falling into two different camps: firstly the custodians of the landscape and of the countryside versus those who are more interested in production and food in particular. Then we talked about whether those farmers who are interested in production whether you can reframe biodiversity stewardship as production, so setting them the problem of we need to produce wildlife on this piece of land and actually those farmers again [inaudible 0:04:15].</p>
	<p>Then we moved briefly onto how do we then...generally speaking we know roughly what our targets are and we just need to get the incentives right. We didn't delve too much into how we get those incentives right and there was a bit of discussion about the CAP reforms have been largely unsuccessful, or relatively unsuccessful, but those are changing again and the idea really... Yeah, so going back...so pay not just a farm, not just to be aimed generally at the environment but to give very specific targets for things like biodiversity.</p>
	<p>Then the conversation jumped a little bit and we started talking about different values for nature. One of the key things from Bateman <i>et al.</i> was the review of costs...or the review of benefits of recreation often exceed the value that we get from agricultural land. Then there were questions like do we understand these values enough? These are questions of whether we understand enough or whether we need to improve our communication of those values.</p>
	<p>Then lastly we finished with the idea that links back to the CAP, that legislation is really a very blunt instrument and that it's actually, if anything, it's becoming harder to use because the legislation is not implemented by experts.</p>
BV:	<p>Summary of Group 1: Charles Godfray</p> <p>I really don't have anything like the detailed notes that Jon has so I might be a little briefer.</p>
	<p>So I think we started out with Alison asking about what the positive narratives might be in...what can we say which is sort of more in the solution space rather than thinking about problems that we've been articulating and I think we turned that round in a more constructive and positive way.</p>
	<p>From there we moved very quickly to talking about population actually and about the fact that there are some interesting and under articulated issues around the positives in relation to population. The fact that the world has on the whole been becoming more prosperous over the last 50 years despite all of the challenges that we've been talking about. The fact that there is a demographic slowdown which is happening, we've probably passed the point of peak child if there's a term like that, there's a demographic momentum but it is slowing down and there are some positives to be taken away from the population debate. But also the commentary that actually the population issue continues to stay off the agenda of serious work in these fields - it's kind of the hidden thing that people don't like talking about. So we had that interesting conversation around a number of different demographic trends: what's happening to fertility, what's happening to longevity and mortality, what the implications of an ageing society are for the futures that we're talking about.</p>
	<p>I'm not quite sure how we made the transition but we then started moving onto agriculture as inevitably we would find our way to, we covered a lot of the things that Jon is talking about in relation to CAP and how a smarter use of...Susan who is not here called it the largest nationalised industry and how we could actually use the fact that</p>

	there are payments being made in order to actually refocus the attention of farming towards other public ends. We touched upon questions around scale in relation to the idea of self-sufficiency in relation to food. So is self-sufficiency something we should be talking about, what's the appropriate scale at which one should define the notion of self-sufficiency or should it be more a reliance on the ability of trade and markets to actually meet food demands where necessary?
	I mean we were beginning to talk about the milk industry and the dairy industry when we were called to dinner. Alison, Chris and others in my group, have I missed something significant?
CG2:	There was a point which was made by Charles which was in response to I think us saying what are the big questions and what's tractable and what could we work on and Charles pointed out that if we didn't really understand about what was happening in our own local environment maybe we should be a bit cautious about lending the intellectual push to elsewhere in the world and it's probably quite receptive to that most of the time.
DC-B:	We got captured by being the Ken Livingstone debating society - the last three Marxists in England or in Arbury and proud of it by the way!
	Right. I say that only half in jest because a lot of our conversation revolved around what I would call political economy, the capture of the market, the capture of political institutions, the capture of fly tipping and David's contention that if Bill and Melinda Gates were to show up here with £10 million in a sack he would just send them walking. Did I get your position right on that?
DN:	I definitely didn't say that!
DC-B:	Okay, I thought there was a flavour of that. The conversation was very much around this issue of whether there actually were the mechanisms for making sure that there was a sort of social utility built into the way in which funding flowed, the way in which projects flowed and so forth and a contention that for all the power of the market and the good features of the market that there were distinct problems associated with the way in which large corporations, large philanthropic organisations and so forth were directing the flow of capital around this issue and that therefore if we couldn't solve that problem I'm not sure we would be able to solve the distributional problem. Then a lot of our discussion was also around therefore what was the narrative that supports this? Why do people believe that in fact there is this kind of free market operating that is delivering very optimal solutions for food and so forth and why do some people find it convenient to have that kind of narrative and is it the correct sort of narrative? If you had a different narrative would you find yourself moving in different areas? But that may just be my Ken Livingstone, Neil Kinnock Marxist...can I have a fist from anybody? Any remaining Marxists?
CG:	Who are the other Marxists?
DC-B:	Sorry?
CG:	You named three.
DC-B:	Yeah, I'm not going to commit anybody else, I'm not going to commit anybody else to it, you're all ashamed of it. I think that's pretty much what we covered, but David you had a sense of what was going on.
DN:	It's a good summary. I think we did return a few times to something Charles said quite briefly which is about the question of democratic accountability and if you have the four companies, the ABCD, and if you have the sort of distortions that 80 billion can create in terms of research agendas and if you have a revolving door between big business and government in the same way that big tobacco had for a long time and big pharma has and certainly there in big agri then it does create this sort of democratic deficit. I know I started off with Amartya Sen early on today but one of his more stylised contentions is



	<p>that there's never been a famine in a democratic society that has an open and free press and I think the sort of closing down the debate is something that we should worry about as intellectuals, or at least the deflecting of debate towards certain unhelpful arguments, whether it's about technology, Frankenfoods or golden rice, it's the sort of stylised thing when ownership questions get thrown away, the social uses of technology get thrown away, the winners and losers of technology get thrown away. So we should be opening up those debates in a sort of public way and bringing the public into these discussions.</p>
<p>BV:</p>	<p>Can I follow just that particular point about in a sense contention around democracy and the value of democracy? Because ironically he's making a comparison in that work between India and China and talking particularly about the fact that democratic India has not experienced a famine for something like 70 or 80 years but China had the great leap forward and there was kind of clearly significant starvation. But the critique of that in some ways is that also when you look statistically malnutrition in India is chronic, it has sub-Saharan African levels of malnutrition. So the question then is why is the free press willing to tolerate malnutrition stunting significant...at a scale which is sort of completely incommensurate with the level of development that India is currently experiencing. And what's different about that relative to death by starvation which clearly the country is avoiding. So what exactly is the power of the free press in terms of accountability and bringing issues and the idea that Sen is trying to propagate is that where you have a free press you will have more democratic accountability. Why is it more acceptable to tolerate malnutrition than starvation? So it kind of raises a really interesting question and the reason I'm raising it is not so much to sort of criticise Sen particularly but the bit that we didn't get round to talking about so far this evening is nutrition. So there's been a significant focus in food security debates on calorific intake and securing food security through essentially a focus on cereal production and that's where the whole green revolution focus has been and actually not looking at nutritionally balanced food intake. So the obesity crisis, the kind of crises of malnutrition are all part of what we would call food security but our focus is obsessively with production for the few cereals that people consume in terms of calorific intake. So actually when we talk about multifunctional landscapes I think supplementing that with nutritionally sensitive multifunctional landscapes might be an interesting way to think about it because when we think about nutritionally balanced food intake you start to open up the possibility of going beyond mono cropped agriculture and you start to think about diverse forms of food intake. So I'd love to hear people who know more about nutrition tell me what the nutrition story adds to what we've been talking about.</p>
<p>CG:</p>	<p>Can I briefly respond to that? I think you're exactly right that nutrition has been the poor cousin to calorie deficits quite naturally, but I think to say it's been ignored would have been true a decade ago but the last 10 years has seen a huge focus on nutrition, including big programmes, SUNs, Scaling Up Nutrition, the First 1,000 Days, and so we have had almost the equivalent attention on nutrition but we haven't had traction that we have for example in India on calorie hunger. It seems that nutrition is a far harder nut to crack because there are so many complex social effects on that, involved with it. So I think you're right, much more attention needs to be paid...well a different attention needs to be paid to nutrition rather than more, we just don't seem to have the solutions there, whereas just providing people with however many calories a day is relatively simple compared with the multidimensional problem with nutrition.</p>
<p>PL:</p>	<p>So my question then is is this because it's a simple message to get across that you don't have enough calories, but a much more complicated message to get across that you're malnourished and is that the issue? Because I mean that's the kind of issue we see in other areas. We were saying earlier that Charlie gave a talk yesterday about how we talk about climate change in a very simplistic way about global temperature rise but actually the story is much more complicated than that. Is it just an attempt to simplify things or is it really what is the issue in some sense?</p>

CG:	I'm far from an expert on this but I would actually perhaps go back to saying and say that we may be looking at nutrition as too much a supply-side issue and it's actually much more of an issue with bringing people out of poverty, bringing them... Well actually Bhaskar that's I suppose not...nutrition in the middle classes in India have gone very well, it is the poorer classes that...
BV:	Except when they've started eating junk food and McDonald's, so they've got the other problem.
CG:	I think that's really interesting but one needs to keep those two separate.
BV:	Yeah, of course.
CG:	The country thus standing is that Mexico has now overtaken the States as having the greatest levels of obesity, longevity is beginning to go, life expectancy is beginning to go down in Mexico because of cardiovascular diseases and the progress they were making on poverty and hunger is beginning to reverse because the middle classes are sucking resources out of the health system into the diseases of affluence.
DN:	In some sense it's kind of worrying that the development trajectory if you present it in that way is sort of substituting the problems of over nutrition or the problems of malnutrition, the wrong kinds of calories for the problem of undernutrition. You know Mexico is a very interesting case study because it's of course the site of origin of the green revolution and if you go back to the 50s and 60s it was really about how do you take the Mexican experience and like a cookie cut it and sort of bring it around the world and particularly to Southeast Asia. But in some sense it is kind of helpful to lump the two issues together rather than disaggregate them because if you think about the crisis of malnourishment, over and undernutrition, there's a hell of a lot of the planet that's sick under the contemporary global governance structure. I wonder does it help to bring in some of the questions that Chris and I were briefly talking about which is sort of standardisation of food sources that we've seen with modernisation, only three crops dominate global trade, we are losing genetic diversity, the erosion of our genetic library in terms of plant germplasm and so on. For me it's quite a big worry, not just because we're consuming more calories of the same sort but that it seems to be the antithesis of resilience, it opens society up to all sorts of epidemiological challenges if we're growing the same kinds of crops in different places around the world.
CG2:	I think just following on from that there are two problems: one is this problem of homogeneity and why are we growing maize and seeking to improve new maize varieties in Africa rather than thinking about sorghum and millet and then associated with that is a question of culture or sometimes the founder effect that you begin to work on a particular area and there's been investment in that area and people continue then to work in it often for the wrong reasons.
	It also takes us through to thinking of what Georgina was saying which is what are the natural scales that we should be thinking of and we keep tossing out this question about scale but there are a huge number of different metrics that one might use and it comes back to thinking about protein versus carbohydrate, what sort of crops should we be growing in a mosaic or a matrix throughout a different region. It comes back then to what's the natural scale of that region in terms of supply for whatever we want. We could talk for a long time about these problems, particularly about thinking about overlaying these different levels of scale but what we really need...I think what we really need to do is to identify where is it working well, where are there some good examples and what can we understand from those and what can we gain about that sense of scale?
	I'll just add one other...I'll introduce if I may...I introduced the idea of public good plant breeding which is something I've tried hard over the years to reintroduce or to encourage the government to reintroduce in this country. But it's not simplistic and I think back to



	<p>the international research institutes for maize, for rice and a number of other crops and what's happening there I think...well I know, is that you identify several genes that you think are going to be important and then you get an increase in yield, maybe resistance to particular pests but everybody wants it and there is a push then to provide that. There is a simple ethic that you should be providing that to anywhere in the world that is willing to take it. That solves a problem in the short term but if you think about this in the longer term you are squandering those genes, if you think about disease that will be overcome, but if you were to release them in, again, a more buffered way in relation to the sorts of ideas that Georgina was referring to, you would feed people for longer. It's a hard ethic.</p>
	<p>Again with Gates funnelling a lot of research work, very rigid orientated in the sense that we'll identify the gene and what we're finding is yes, you identify one gene and that's being released for resistance to whatever it might be, successful but overcome, if you waited just a little bit longer some people would go without food in that terrible intervening period but more people would be fed if you cascaded more genes into whatever you are releasing. So there are big ethical questions about dealing with release of these things even in the public good.</p>
RM:	<p>I'd like to support Chris. I think the pendulum has swung far too far away from investing in public good in breeding. The CG system which is the organisation which the major international crop, the wheat and the rice centres, but is really quite under resourced and has problems with its own governance. The world has changed, in [inaudible 0:26:51] in Brazil, China are now much bigger players and it's terribly fragmented and there's not enough discussion.</p>
	<p>I would defend the three major crops though, I mean there's been a sort of millennia of breeding on them and sorghum and cassava and millet they are not the great thing to...they are nutritionally poorly balanced and things. Ironically we could make them better but that would require genetic engineering which has its own issues of susceptibility. Resilience is important but one can have resilience in different ways, one can have resilience in different crops or one can have resilience as Chris has described on the shelf. So I want to defend those major carbohydrate sources but you're exactly right that one needs to have the alternative, the vegetables and things like that which international vegetable research organisations [inaudible 0:27:47].</p>
CG2:	<p>So we did throw out a challenge I guess - where is the system working well? I don't have the answer.</p>
DN:	<p>According to Paul Collier Brazil.</p>
CG:	<p>Well Brazil is a very interesting case because there are parts of Brazil which are farmed industrially, but there are parts of Brazil such as Santa Catarina province where essentially it's not quite peasant agriculture but small family units have become phenomenally successful and phenomenally productive and sufficiently so that, normally characterised as evil big business, but the Syngentas and the bios and things are successfully investing in money there. I think what happened in Brazil, originally under the right wing government but then followed up by Lula, was a long period of consistent investment in agriculture and the rural economy and the biggest problem they have now is they don't have the ports to export it.</p>
CG2:	<p>Plus their two new ministers, one for the environment and one for agriculture who are climate change deniers and also very much running contrary...</p>
SO:	<p>It depends a little bit what you mean by the system in that question and whether you mean where is it working well in terms of location, geographical location, or where is it working well in terms of social segment. So to be very parochial around this table, if you took the educated middle class you'd probably find that their nutrition was extremely good and that's another example of segmentation. So at our last meeting Theresa Marteau had some very interesting things to say about those sorts of divisions. I don't</p>



	know whether we should always be looking at different locations in the globe or where it's working well in terms of different systems or different other kinds of segmentation of who is on the receiving end of the nutrition.
	I saw recently one of the most interesting and most disturbing maps I've seen for a very long time which was a map of human biomass, it's a very disturbing map. I only saw it once and I don't know where it was...I'd quite like to see it again.
CG2:	What was most disgusting about it beyond what we'd expect I guess?
SO:	Well I suppose it was such a stark confirmation of what one might expect, but it was very, very striking in that respect.
RM:	The correlation between average weight and voting intentions in the States, in America, is 9.7.
SO:	Which also goes with belief in climate change, if you get multiple regression.
MP:	But in the sense that throws up the other problem in all this that even if we can find where it is working well now, those are temporary phenomenon, [inaudible 0:31:34] the predictions that we've been talking about of something like 80% [inaudible 0:31:50], that's going to completely change the way in which this can all operate anyway. Sorry, I'm on a hobbyhorse here, but the dynamic of how these rapidly growing new cities actually govern their own supply I think is going to be quite an important [inaudible 0:32:09].
CG2:	I guess being motivated...what was motivating my questions was again looking for tractability. How do we move from what are present obsessions and intellectually pleasing to thinking about what's tractable? It's easy to think about the big questions but what are the next levels of the tractable solutions and that...well 10 million is hardly worth getting out of bed for...
DN:	I certainly didn't say that!
CG2:	But it is...I think it is sometimes useful in discussions, it does come down to some [inaudible 0:33:08] doesn't it? You can think of it in two ways: if you had 10 million or 100 million and you were going to put a group together to advise how that should be spent or indeed how it shouldn't be spent in terms of filling the gaps what would you do? Another thought experiment is...because it usually is a thought experiment above 100 million, but it needn't be if you think about some of these questions that we've been looking at. The other one is who are the influencers? So you think about where are the exemplars of what you think is working well, how do you scale it up, but who would you have to influence in order to move this on? Words are cheap, it's easy to say this but I think it crystallises the mind a little bit more as to the search for tractability.
BV:	It's very interesting that one example of where things might be working reasonably well after a long pause was a hesitant Brazil, which if you look at its policies over the last 15 years have been a complete departure from the new liberal consensus of the last 30 years. So what Brazil has done in terms of social protection, what Brazil is doing in terms of redistributive policies flies in the face of the logic of our times. So if the only example you could think of was one which actually bucks the trend completely, I think there's something really interesting there.
CG:	On the same theme China is an outstanding success on the narrow food side. What it's done in 40 years in ending a quite horrific [inaudible 0:35:03] politically induced famine, what's there, and again that's a very different political system.
BV:	And Charles I was expecting people to jump in with China as an example when Chris asked his questions and interestingly until you just mentioned it nobody did. So you know they are the kind of varying social and political context within which transition happens and change happens that people clearly wouldn't then celebrate. Just as an

	experiment the fact that people kind of hesitated a lot and then someone tentatively said maybe Brazil is quite instructive.
CG2:	We have to remember the confidence with which somebody speaks is inversely proportionate to the number of experts present.
BV:	Absolutely. I was going to say, I don't know...I won't go any further on that one.
CG:	So what would the Chinese people say if you asked them or the Brazilians? Would they give the same answer?
MF:	Which ones?
CG:	Well we're asking in much more aggregate terms than that, I'm thinking more specifics.
MF:	Which ones? That was your point.
KS:	I mean just talking a little bit from the experience of peripheral China you can say a lot depends on whom you ask in the sense that a lot depends on the narrative that people are kind of embodying and you will have some people who very much hang on the success of the statistics and saying 'Okay, we've done an amazing miracle in lifting so many people out of poverty.' But you would have enough people who would point to the cost of that and for some people it was actually quite high costs. [inaudible 0:37:01] I have the feeling the question of scale and granularity of the way in which we capture what is happening out there is really important because... I was just trying to think when we were talking about the numbers, the calories and so on, and I go for the experience of walking up a Himalayan valley and you realise that people who are living close to roads often tend to be worse...you know, present worse nutritional kind of physical characteristics than people who live further away, it's quite interesting. I think that it has something to do with the way in which for example people in remote areas do actually beat the rice by hand preserving many more of the nutrients than the rice that would come in in trucks, usually very low quality which would be used as kind of cheap rice to feed everybody. So you really see a difference in body build and the way people look and also a lot of junk food around along these roads, so it's not only junk food for the middle class, you see also junk food actually coming into the lower classes as something that can be exported to very remote corners. So I think a lot of malnutrition is really along this kind of geography and from this point of view I think a lot has really to do with scale, locality and granularity of the problem. But I say this, I think this makes it all much more intractable than anything else.
CG2:	I'll say two other things then: one is of course it's important to look at where it's working badly, particularly in relation to the broader question of ecosystem services and there are examples like India where there's been huge reliance on irrigation and now the aquifers just cannot cope, it's a huge instability. That's probably easy to do but it's when you move along the spectrum, not just thinking about the extreme cases, but thinking about other cases. The other way perhaps to think about it is if one were a government what would be the drivers for governments in different eco-types. You want to feed your people but how do you want to feed them? Looking from that perspective what is working well? It's a different perspective from perhaps what we usually use, well what we natural scientists usually use.
END OF AUDIO	

