

## March: From local to global



### Aims

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

### Witnesses

**Toby Gardner**, a Research Fellow at the Stockholm Environment Institute joined **Barbara Stocking**, the Principle of Murray Edwards College and **Tim Wheeler**, the Deputy Chief Scientific Adviser at the UK Department for International Development (DFID) and Professor of Crop Science at the University of Reading.

### Research gaps

All the witnesses agreed that despite the ever increasing influence of global dynamics, local dynamics matter and can have a profound influence on large-scale processes, yet they are often ignored.

In her introduction, Barbara first focused on Kate Rayworth's 'doughnut' economic model where every person has the resources they need to meet their human rights, while collectively living within the ecological means of our planet. Kate joined the Parallel Forum over Skype to discuss this model with them in more detail. Barbara then turned **to measures of growth and called for more research into finding alternatives to GDP** and argued that the poorest people will be affected the most by changes in climate so need to be our focus.

Toby's introduction drew on Chapin et al's three approaches to sustainability - managing risks, building resilience to change, and achieving transformation. He argued that **researchers should in mind the adage "think global act local"- the fact that we live in an increasingly interconnected world means that acting locally can influence global conditions whether or not we are "thinking globally"**. Using examples from his work in Brazil, he added that ricocheting effects across scales are overturning common assumptions – such as fast local dynamics shaped by slowly changing global drivers – and these need to be increasingly recognised and accounted for in our work.

In his introduction, identified a number of evidence gaps related to: **the utilisation of food, access to it and the stability of production and supply chains and how to scale this information and apply it to help people make decisions at a local level**. Turning to the next generation of research questions, he highlighted the need to bring together different types of data – social, biophysical and economic – when modelling the impacts of climate change on food security.

### Wicked problems and questions generated by the open discussion included:

- When talking about climate change or even sustainability, **how do we move from saying 'This is somebody's fault' to 'this is happening, how are we going to solve these issues?'**
- Reducing consumption has been a recurring theme this year and Barbara added to this the concept of de-growth where those who currently consume a lot, consume less. Many discussions focus on specific actions that individuals can make, for example eating less meat and using less energy to heat our homes, but **how do we put principles like this into practice on a large enough scale to make a tangible difference?**
- **We only really touched on the role of power**, for example power relationships between different actors and the nexus of power and food in relation to consumption and enforcement. Toby argued that the models needed to disentangle power relationships are alien to those who model deforestation, for example, and visa-versa. How can we overcome these huge intellectual and methodological barriers?
- Does **building resilience to physical, economic and social shocks into societies** also imply some degree of greater insulation between countries (or sectors) within the global system?
- **How do you answer some of the big questions about food security** and encompass biophysical, economic and social behavioural aspects of it, without propagating all of the errors and uncertainties amongst each of those components?
- **Often scientists working at different scales have different ontologies or world views** i.e. solving global hunger vs. food sovereignty – how can we reconcile these views?

**Witnesses**

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

**Dr Toby Gardner**

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



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

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

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

**Dame Barbara Stocking**

Dame Barbara Stocking became the 5th President of Murray Edwards College, founded as New Hall, in July 2014. Prior to taking up her post, Barbara was Chief Executive of Oxfam GB from May 2001 until February 2013. During this time she led major humanitarian responses including the Horn of Africa and the West Africa food crises, as well as the Haiti earthquake, Pakistan floods, and Tsunami. On campaigning, Barbara led Oxfam's work on Make Poverty History, and more recently their work on climate change and the current Grow campaign on food justice in a resource constrained world. Barbara regularly spoke at major global meetings; for example at the UN, in New York and Rome, and at the World Economic Forum in Davos.



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

**Professor Tim Wheeler**

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



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

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

### Setting the scene

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

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

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

### Background papers

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

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

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

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

### Parallel Forum (24<sup>th</sup> February)

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

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

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

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

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

## Word Cloud

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



## Key points

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

Toby Gardner

- Despite the ever increasing influence of global dynamics, local dynamics matter and can have a profound influence on large-scale processes, yet they are often ignored
- Bear in mind the adage “think global act local”- the fact that we live in an increasingly interconnected world means that acting locally can influence global conditions whether or not we are “thinking globally”
- Toby’s introduction focused on challenges for sustainable resource use in a changing world, and he drew on Chapin et al’s three approaches to sustainability - managing risks, building resilience to change, and achieving transformation
- Ricocheting effects across scales are overturning common assumptions – such as fast local dynamics shaped by slowly changing global drivers – that need to be increasingly recognised and accounted for in our work.
- A clear emerging theme is that solving the problem is not really about needing to produce more food, but to make better use of the food we already produce.

- The concept of de-growth and the complexity of the debate about growth in terms of simultaneously accepting the need for conventional growth in less developed countries while challenging the conventional concept of growth in developed countries and recognising that growth as measured by GDP has increased in recent years
- Understanding systems, for example, there may be deforestation in Brazil, this may be offset by what is happening in neighbouring areas.
- The accelerated speed with which physical and economic (and social?) shocks are transmitted and their widened spatial extent.

While the national scale is often the default decision-making level, decision-making on a local level is often innovative and agile.

### **Introductions by the witnesses**

#### **Toby Gardner (his own notes from the session)**

##### **”From global to local: challenges for sustainable resource use in a changing world”**

Focus of series reflects concerns around biodiversity conservation, global food security and bioenergy. The fate and trajectory of all three of these concerns, for better or worse, is inextricably linked to land-use.

In a rapidly changing world, increasingly referred to as the dawn of the Anthropocene, humans are exerting profound changes on how landscapes are shaped in three main ways

- Spatial scale (no corner untouched)
- Speed (the great acceleration)
- Connectedness

It is on this third dimension, of connectedness, that I would like to focus my opening remarks, and suggest that it is here that many of the greatest knowledge gaps still lie, and it is here that we can find some of the most fruitful and rewarding areas of investigation for future research

We have learnt a lot about the specific environmental impacts and social implications of individual land-uses at the local level. And we have also learnt a lot about strategic priorities for food security and biodiversity at the global level – ably demonstrated in the context of climate change and food security by Tim’s excellent review paper shared as background material to this discussion

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

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

#### **At the global level**

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

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

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

### **At the regional level**

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

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

Success of deforestation falling in Amazon offset by

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

### **And at the local level**

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

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

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

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

### **And then zooming out**

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

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

### **And to wrap up**

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

Possible add-ons depending on time

- Many regions of the world stand at a cross-roads
- The consequence of which is giving ever more prominence to meso-scale solutions.
- Something we are trying to do in P2CS. UN Declaration on Forests as a starting point; but what does this mean for distributed responsibilities across global supply chains, not just on producers but to

unpack levels of engagement and attribute a more nuanced distribution of responsibilities, but also motivations, perceptions of risk and capacities to act. And to try to intelligently combine both supply and demand side options as part of a hybrid model of assessing and delivering a more sustainable system of land and resource use globally.

### **Additional reminders for discussion**

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

And for dialogue. Often scientists working at different scales have different ontologies or world views i.e. solving global hunger vs. food sovereignty. They are not incompatible, but the area in between is unexplored and grey and difficult to publish in. No top ranking journal wants a paper that says : hang on this is complicated we need to open up a debate or discussion here. It's all about clear results. And global is sexier, let's face it.

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

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

#### **Food production and vulnerability to climate change**

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

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

Waste is an important aspect not discussed in the earlier session

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

#### **Measuring economic growth and degrowth**

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

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

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

#### **The scale and the speed of change**

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

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

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

#### **How do we respond?**

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

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

### **The next generation of research questions**

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

### **The Parallel Forum**

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

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

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

[Notes to come]

### **Group 1: Skype conversation with Toby Gardner**

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

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

The Forum explored challenges in developing environmental policies at a local level, and how those policies scale to higher levels. Dr. Gardner's research indicates that 'limiting deforestation,' 'expanding protected areas,' and 'expanding responsibly managed agricultural land' are several among many aims that must be accomplished for sustainable development to occur in the Brazilian Amazon (Gardner 2015). Forum participants noted local consequences can be persuasive for local action, but often, policy decisions are made at a higher level, making some policies difficult to implement. While the national scale is often the default decision-making level, decision-making on a local level is often innovative and agile. An example of local innovation occurred in the Paragominas region of the Amazon when a local farmers union decided to register their land and commit to zero deforestation (Gardner 2015). Dr. Gardner and the Forum also noted the importance of developing local approaches that are not "one-size-fits-all" and regional scale policies that could work to link local policies (Gardner 2013).

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

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

### **Interviewing Professor Tim Wheeler**

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



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

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

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

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