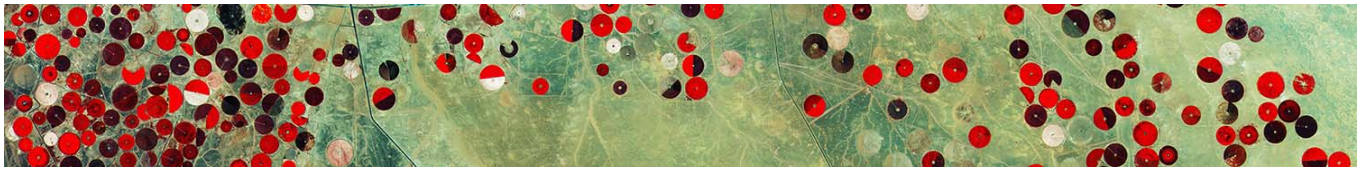
The Cambridge Forum for Sustainability and the Environment

Risk, resilience and response: Food and water supplies

21st October 2015: Taking a global view



Aims

As the first in the series, we laid the foundations for the rest of the term by raising questions related to ways in which new technologies could be applied to look at environmental risks and resilience, data ownership, open data sources, and the need to scale data in both time and in space to provide the information that policy makers and businesses need to make decisions.

Witnesses

Professor Alan O'Niell, Emeritus Professor of Meteorology at the University of Reading and the founding Director of the NERC National Centre for Earth Observation, joined **Dr Mukesh Kumar**, a Research Associate in the International Manufacturing group at the Institute for Manufacturing and **Steve Peedell**, a Senior Scientific Officer in the Land Resource Management Unit at the Joint Research Centre.

Research gaps

In his introduction, Steve highlighted research gaps related to the **collection and processing of data to measure resilience, risk and vulnerability**. Although satellite images can provide comprehensive information on a global scale, there are many very important questions related to ground-truthing those data and bringing them together with economic, social and biological information to build up a comprehensive picture. Focusing on protected areas, he argued that there is a need to look beyond the area-based Aichi targets to concentrate on the effectiveness and vulnerability of protected areas, now and in the long term.

Mukesh focused on three areas of resilience in food chains: crop failure, product failure and supply chain failure. When discussing questions of scale during the round table, he argued that **there is an inherent danger that both assessments of resilience and risk are both used to make short term focused decisions when long term vision is needed** to increase the resilience of a system (e.g. water use in agriculture). Danny Ralph agreed that resilience in the short term and the long term requires different ways of thinking and different approaches to both asking and answering the same questions.

Alan opened by saying that the most interesting questions we can ask relate to **the new kinds of datasets that are available and the ability they give us to ask data-driven questions** and to carry out 'uncontrolled' experiments. He argued that we are in a transformative time where a constellation of satellites are generating massive, openly available datasets, very rapidly and on a global scale. There are also new datasets that can be applied to questions related to land use, resources and food. For example, phone tracking data can be used to look at congestion in cities and to track the movements of illegal loggers or hunters in tropical forests. Often commercial or privately funded, there is a risk that people will be charged to use them in the future.

Wicked problems and questions generated by the open discussion included:

- It was agreed that ultimately, **it is not the data in itself that holds value, but the information it contains**
- Danny Ralph argued that *"As researchers, part of our job is to equip others to do their job better"*. Bearing this in mind, **what kinds of questions should we be asking?** Should questions drive our search for data or do should the data available drive the questions we ask?
- **'Big data' doesn't just refer to data volume, it is also becoming increasingly complex and heterogeneous**, and is being drawn from a wide variety of sources which presents challenges in itself.
- **How do we collect and analyze data given the pace of change?** Turning raw data into information products to feed into policy processes and create responsive policies is particularly challenging. How can we trace the signature of certain information through to policy decisions?
- **How will we meet the next generation of reporting challenges** presented by the Sustainable Development Goals and other national, regional and international level agreements?
- How can we **move from tracking historical trends into identifying emerging risks and project past information forwards into the future?**
- We touched briefly on **data security, especially when using open data**. Could trusted secure systems encourage people to allow their data to be used in ways that would otherwise not be acceptable?

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Witnesses

Steve Peedell	Senior Scientific Officer in the Land Resource Management Unit at the Joint Research Centre (JRC) of the European Commission (based in Ispra, Italy)
Dr Mukesh Kumar	Research Associate in the International Manufacturing group at the Institute for Manufacturing, University of Cambridge
Professor Alan O'Neill	Emeritus Professor of Meteorology and former Director of Research in the School of Mathematical and Physical Sciences at the University of Reading, and currently a visiting professor in the Cavendish Laboratory and a visiting fellow at Clare Hall

Biographies

Steve Peedell

Steven Peedell is a multi-lingual specialist in geospatial information technology with 25 years experience working with maps and mapping technology, the last 18 of which have been at the Joint Research Centre (JRC) in Italy.

He has an MSc in Natural Resource Management from the University of Leicester in the UK. Prior to 2005 he was very much involved in technical developments supporting EU environmental legislation (Natura2000, Water Framework Directive), and then led a research team working on development and implementation of specifications for a European Spatial Data Infrastructure (INSPIRE).

He joined the Land Resource Management Unit 2009 where he focuses on projects in the African, Caribbean, Pacific (ACP) regions and developing spatial databases, catalogues and interoperable web services for geoinformation. He is also the JRC project leader of the Biodiversity and Protected Areas Management Programme (BIOPAMA) which aims to address threats to biodiversity in African, Caribbean and Pacific (ACP) countries, while reducing poverty in communities in and around protected areas.

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Dr Mukesh Kumar

Mukesh Kumar is leading research in the areas of risk and resilience in international manufacturing and supply networks. Mukesh's main research and practice interests are in the areas of risk and resilience in emerging and developed industrial systems. He has developed risk management processes for global manufacturing investment decisions and supply networks. Before joining the University of Cambridge, Mukesh's previous roles were in the financial sector as a senior analyst and corporate finance consultant. He holds a PhD from the University of Cambridge in the area of Manufacturing Investment Risk.

He is currently working on various projects related to supply chain risk and resilience and involved in masters' thesis supervisions and teaching (DTC cohorts, teaching involvement in ISMM, MET and CPSL courses / seminars for industrial executive). Additionally, he is member of the CUED PostDoc- academic committee and the faculty board.

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Professor Alan O'Neill

Alan O'Neill's early research career when employed at the Met Office was in the area of large-scale dynamics of the stratosphere and its relevance to the formation of the ozone hole. On moving to the University of Reading, he ran large national collaborative programmes in climate science and, as founding Director of NERC's National Centre for Earth Observation, collaborative programmes on the use of satellites in environmental science. He has been heavily involved in developing strategies for Earth Observation from space both nationally and with the European Space Agency, the latter in his capacity as chair (till end 2014) of its Earth Sciences Advisory Committee.

One of his prime objectives while at the Cavendish, and soon to be in its new Maxwell Centre, is to build capability in the use of satellite data and "big data" analytical methods (e.g. machine learning) for diverse applications in the environmental and climate sectors, in particular in the area of agri-food and sustainable production. He aims to do this in collaboration with external partners in both the public and private sectors.

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Profiles of everyone who came to the meeting can be found here

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