FACCE-JPI Knowledge Network Planning Meeting

Developing a Sustainable Intensification Knowledge Network

3rd February 2015

The Royal Society
6-9 Carlton House Terrace
London, Greater London
SW1Y 5AG, United Kingdom

Agriculture Food Security and Climate Change

Report of the Meeting

1) Welcome and Introduction

Tim Benton - UK Champion for Global Food Security

Tim opened the day by welcoming participants and introducing the challenge of sustainable intensification. He reasoned that although on a global level there is a need for increased yield per unit area, yield increases aren't necessarily needed or desirable everywhere – in some places extensification of agriculture may be more appropriate. He argued that it is a mistake to focus on intensification of yields first with environmental issues being given only secondary consideration, the two have to be approached together. Tim also highlighted that resilience is becoming increasingly important. Agricultural resilience has in the past been partly based on the availability of additional land and inputs, but these are becoming increasingly scarce and expensive. We therefore need to consider how our systems can cope with future change.

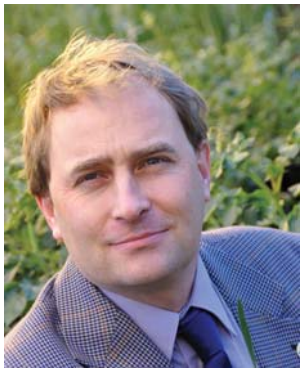
2) What is a knowledge network?

Huub Löffler - Wageningen UR

Huub provided a background to the Joint Programming Initiative and explained how national funding, which far exceeds EU funding, can be aligned through ERA-Nets (joint calls), joint vision & strategy, and joint management & governance. Huub then briefly introduced the vision for a Knowledge Network concept and explained how it differs from a Knowledge Hub. While a Knowledge Hub is based on a combination of new and existing activities and is a restricted scientific community comprising one consortium focussed on a specific goal, a Knowledge Network is expected to be a broad expert community with in the centre a Committee of National Science Leads and Funder Representatives and an informal web of nodes and interactions, formed by ongoing projects, programmes and various national and international science-policy-practice interactions. The general objectives are to facilitate collaboration across Europe, to increase return on investment of public R&D funding, to create synergy and avoid duplication, and to enable complex research.

3) Sustainable Intensification Platform in the UK

Stuart Knight - NIAB



Stuart spoke about the Sustainable Intensification Research Platform (SIP) funded by Defra. SIP brings together more than 30 collaborating organisations to work on three interlinked and transdisciplinary research projects investigating (i) integrated farm management, (ii) landscape-scale opportunities & risks for farming and the environment, and (iii) the influence of external drivers & actors on farming productivity & sustainability. Stuart explained that SIP will create three platforms: a physical network of study sites, an open access data platform, and a community of researchers & practitioners.

4. More with Less: the challenge for resource efficiency & food security

Martin van Ittersum – Wageningen UR

Martin argued that achieving sustainable intensification will require multi-scale analysis, with general protocols and metrics applied locally. Although globally we need to produce more with less, locally this might mean producing more with more, or the same with less. Martin described how the gaps between potential and actual yields differ globally, and highlighted work showing that although the gap between cultivar productivity and actual farm productivity is becoming ever smaller in some places, yield gains are stagnating in others. He then introduced the Global Yield Gap Atlas and explained how yield gap analysis can be used to benchmark, prioritise and assess R&D impact, target experimentation and identify extrapolation domains, and evaluate trade-offs. Martin then discussed how increased resource use efficiency might contribute to sustainable intensification, using the example of phosphorus (P). Finally, Martin explained how increases in P efficiency have been achieved within the Koeien & Kansen (Cows & Opportunities) project, which involves 16 pilot farms in The Netherlands and is linked through INTEREG to a broader network of study sites in Ireland, UK, Germany, Belgium, Luxembourg and France.

5. Presentations from some participants on national initiatives on Sustainable Intensification

Under this item, moderated by Dan McGonigle, the initiatives from three countries were presented: Spain, Denmark and New Zealand.

- **Sustainable Intensification: initiatives in Spain**
  M. Inés Mínguez – CEIGRAM-UPM

Inés explained how agricultural research in Spain is coordinated nationally by MINECO (Ministry of Economy and Competitiveness) and INIA (National Institute for Agriculture and Food Research & Technology). Other research programmes are coordinated at a regional level by the 17 autonomous regions together with INIA. Specific innovation programmes are also coordinated directly by the Ministry for Agriculture, Food & the Environment (MAGRAMA). FACCE-JPI initiatives could help to coordinate the research sponsored by the various public funders in Spain. Inés discussed the challenges of managing a sustainable farm business in the context of generally low, but highly variable rainfall and explained that adequate insurance against failed harvests is therefore an important component of a sustainable farm business. Priority areas of research in Spain include ICT in precision agriculture, deficit irrigation,

economic thresholds for pest control, minimum fertilizer application, energy efficiency and genetic improvement.

- **Doubling agricultural biomass yield & halving environmental impacts**
  Uffe Jørgensen – Aarhus University

Uffe first briefly introduced major Danish initiatives on Sustainable Intensification: Future Cropping, BioResource, BioValue & BioBase. Uffe argued that incremental change will not deliver the sustainable intensification that we need – a fundamental redesigning of the agri-system is needed. Current production is not efficiently utilising potential productivity and is inherently damaging to the environment; research suggests it is better for the climate to use fossil diesel than biodiesel from rapeseed. Photosynthesis only utilises up to ~6% of solar energy and grain crops utilize only part of the growing season. Danish researchers are investigating ways of making better use of the growing season e.g. by harvesting grain crops while they are still green then reseeding with another crop. Total yields show that doubling dry matter yield may indeed be possible. Growing perennials such as grasses or SRC willow instead of grain annuals has been observed to result in a 70% reduction in nitrate leaching and a 60% reduction in pesticide use. Uffe stressed that the implementation of a radical new crop production paradigm is dependent on the development of novel biorefineries that can effectively process biomass into food, feed, fibre, oil, biogas, syngas and soil conditioners.

- **National Science Challenge: Our Land & Water**
  Richard McDowell – AgResearch

Richard began by explaining how New Zealand's economy is highly reliant on agriculture, with 70% of New Zealand's exports being produced by primary industries, but this needs to be balanced against the need to protect land and water resources. The target for 2024 is a 40% increase in economic returns from exports, with freshwater quality targets met in 90% of lowlands. The process for achieving this will include making existing land uses more efficient, exploring new land & water management options, accounting for spatio-temporal variability and defining metrics to measure & report the performance of the primary sector. Richard presented the New Zealand Sustainability Dashboard, a user-friendly online tool to facilitate sustainability assessment & reporting and meeting market and regulatory demands. The indicators factor in risk & opportunity, scientific rationale, response practicality and internal & external stakeholder importance attribution. Richard also introduced the MitAgator tool, which maps losses of nitrogen, phosphorous, *E. coli* & sediment and models mitigation scenarios.

6. Short introduction to OECD TempAg initiative

Peter Gregory - East Malling Research

Peter gave a brief introduction to a new OECD initiative – a Collaborative Research Network on Sustainable Temperate Agriculture (TempAg). This will be open to participation by all interested national governments as represented by a designated agency, institution or consortium that can contribute to its work. Its mission is to serve as an international research network for national governments involved in agriculture in temperate climates, represented by an agent. The network seeks to increase the impact and return on the investments that Members make in their national research programmes. The overarching scientific goal of the network is to deliver resilient agricultural production systems at multiple levels. This will include specific focus on: i) optimising Land Management to Produce Food and Other Ecosystem Services at the Landscape Level; and ii) sustainably Improving Food Productivity at the Farm/Enterprise Level. Three pilot activities are planned to investigate (i) how to develop conceptual frameworks for defining agricultural sustainability at multiple levels, (ii) how to design land-use systems that optimise synergies and ecosystem services and (iii) yield gaps and resource-use efficiency.

7. Developing a Sustainable Intensification Knowledge Network

Mike Roper - Defra

Mike recapped the outcomes of the 5th FACCE Mapping Meeting which identified a need for multidisciplinary, systems approaches to land management, diversification, new perspectives on breeding, novel farm management systems and development of common sustainable intensification metrics & methods for data sharing. Mike then outlined the aims of the Knowledge Network – to use public funds more efficiently, coordinate research to avoid duplication and align national programmes to tackle complex questions at a larger scale than individually possible. Mike emphasised that although the Knowledge Network might identify research gaps, it is not a new vehicle for joint calls for proposals. Mike presented the specific objectives of the Network – establishment of a network of multidisciplinary groups working on integrated approaches to SI, creation of a network of study farms, development of a typology of landscape classifications on which to test standard SI metrics, highlighting innovative farm & landscape management practices and identifying cases of best practice to influence policy development. Delegates were asked to consider what outcomes from the Network should be targeted to address those objectives. Mike concluded by presenting the proposed steps for establishing the Network as detailed in the briefing paper. These were subsequently discussed in the ensuing breakout sessions.

8. Breakout sessions

Introduction to session 1. Objectives of the Knowledge Network

Christine Bunthof - Wageningen UR

Christine introduced the break-out approach in which the participants were divided over three groups of 10-11 persons with a moderator and a rapporteur appointed for each group. Each group discussed the same questions and flip-overs were used for taking notes of the answers, suggestions and remarks. For this round the questions concerned the objectives for the Knowledge Network, the vision and basic principles, and the synergies with other networks and initiatives.

- Can all parties agree the proposed objectives? Should any further objectives be added?
- Can all parties support the vision/basic principles of the Network?
- Should particular focus be given to areas with few existing projects, or those areas where much work is ongoing?
- How can we best create synergies between the Network and national SI initiatives as well as other international initiatives?

After 40 minutes of small group discussion, the participants reconvened for plenary feedback.

Introduction to the session 2. Selection criteria & modus operandi for National Leads

Steve Aston - Defra

Steve introduced questions for the second session.

- Do all parties agree with proposed selection criteria? Should anything be added?
- How can we ensure that the Network adequately reflects and addresses the interdisciplinary nature of SI?
- How many candidates should each country select?
- What should the terms of reference for National Leads be? (responsibilities, modes of working, accountability, length of service *etc.*)
- Suggestions for how Thematic & Agro-climatic Zone Coordinators might be selected
- Do all parties agree with the proposed steps for establishing the Network?

After 40 minutes of small group discussion, the participants reconvened for plenary feedback.

Main outcomes of the break-out sessions

- Sustainable Intensification is a complex matter. Agreement that the definition used in the foresight rapport 'The Future of Food and Farming (2011)' of the Government Office for Science, London is a good definition to use in the frame of the FACCE KNSI.
- It was noted that for upscaling and extrapolation a typology of farms and a typology of landscapes was needed.
- Countries will need to allocate some time (i.e. in cash or in kind funding) for the KNSI to function.
- Agreement on general outline as sketched in the background paper.

9. Conclusions & Next Steps

Huub recapitulated the general recognition of the importance to align research performance, programming and funding. The Knowledge Network is an instrument-under-development with the aim to realise a form of alignment; one in which the research funders are at the heart. Research councils are a very important level indeed in the chain from programming to performance. They need to be fed by scientists. The question is how to organise. The lively discussion of today marked the importance of the right balance and interaction model for the Network bringing together funders and science from a set of European countries from different agro climatic zones and having different agricultural knowledge systems. The selection of National Science Leads as well as appointing funder representatives can only be done after the national funders have decided to join in the FACCE Knowledge Network, and have worked out how to select a Science Lead and a Funders representative, and how to fund them. Science Leads could be recruited through a broad open call followed by selection on set criteria, a limited call within a set of preferred programmes or organisations, or directly linking the task to a national role already established. Funds needed depend on agreement between countries on the minimal level of involvement, the matching of tasks with responsibilities already foreseen in national programmes, and tasks to be taken up. The boundaries of what is in and what is out of the scope of Sustainable Intensification are to be detailed further within the Network. In the frame of this action, the goal is to go for integrative approaches of sustainable intensification. Linking to existing (governance) structures and initiatives will help to build a cost-efficient yet effective network. These include the FACCE advisory boards, the MACSUR project, as well as e.g. the OECD TempAg research network.

Huub thanked the participants for their invaluable input to the development of the Knowledge Network and summed up the following steps. Within a week the presentations will be distributed, a report will be written later. The outcomes will be presented to the Governing Board, and upon positive decisions on taking next steps, a proposal for establishing the FACCE Knowledge Network on Sustainable Intensification will be drawn.

Participants

Aston, Steve	Defra	UK
Benton, Tim	University of Leeds	UK
Bhim Bahadur, Ghaley	University of Copenhagen	DK
Bunthof, Christine	Wageningen UR	NL
Bura, Manju	BBSRC	UK
Collins, Mike	Defra	UK
Crammond, Dale	Department of Agriculture, Food & the Marine	IR
Dedieu, Benoit	INRA	FR
Ewert, Frank	University of Bonn / FACCE SAB	DE
Fliervoet, Louis	Ministry of Economic Affairs	NL
Gil, José Maria	IRTA	ES
Gregory, Peter	East Malling Research	UK
Hulin, Adele	ADAS	UK
Järvenpää, Markku	Natural Resources Institute Finland (LUKE)	FI
Jørgensen, Uffe	Aarhus University	DK
Kelly, Raymond	Teagasc	IR
Knight, Stuart	National Institute of Agricultural Botany	UK
Lange, Stefan	Thünen Institute	DE
Los, Martijn	NWO	NL
Löffler, Huub	Wageningen UR	NL
McDowell, Richard	AgResearch	NZ
McCallum, Bruce	Ministry of Business, Innovation and Employment	NZ
McGonigle, Dan	Defra	UK
McKhann, Heather	INRA	FR
Mínguez, Inés	Technical University of Madrid	ES
Padel, Susanne	Organic Research Centre- Elm Farm	UK
Pastori, Gabriela	BBSRC	UK
Peltonen, Mikko	Ministry of Agriculture and Forestry	FI
Rathod, Sonny	BBSRC	UK
Roper, Mike	Defra	UK
Soussana, Jean-François	INRA / FACCE SAB	FR
Van Ittersum, Martin	Wageningen UR	NL
Whitmore, Andy	Rothamsted Research	UK
Wrixon, Patrick	EISA / FACCE StAB	UK