All-Party Parliamentary Group on Science and Technology in Agriculture

Notes of a Zoom Meeting held on Monday 13 September 2021

Hosted by NIAB, Cambridge

Whatever happened to Sustainable Intensification?

In attendance:

Members:
Viscount Ridley (Chair)
Lord Taylor of Holbeach
Owen Paterson MP
Earl of Devon
Lord Carrington

Stakeholders:
Rob Gladwin, BASF; Jon Williams, BASF; Liz Scott, NIAB; Milika Buurman, Elsoms Seeds; Joe Brennan, UK Flour Millers; Malcolm Bennett, Univ of Nottingham; Rosemary Collier, Univ of Warwick; Richard Harrison, NIAB; Prof Jonathan Jones, Sainsbury Laboratory; Emma Green, British Sugar; Ian Cox, Innovate UK; Sarah Middleton, BASF; Prof Jane Langdale, Univ of Oxford; Steve Brody, Genus; Simon Crawford, Burpee; David Watson, Bidwells; Susannah Bolton, AHDB; Nik Johnson, JSE Systems; Karen Holt, Regulatory Consultant; Graham Teakle, Univ of Warwick; Mike Bevan, John Innes Centre; Stuart Knight, NIAB; Alex Waugh, UK Flour Millers; Leticia Frazao, Brazilian Embassy; Mark Young, CIEL; India Grant-Wood, LEAF; Alan Tollervey, FCDO; Jane Smernicki, Agri-Epi Centre; Prof Helen Sang, Roslin Institute; Susan Twining, CLA; Fraser Black, CHAP; Saskia Hervey, Earlham Institute; Samantha Brooke, BSPB; Rachel Lambert, FCDO; Dr Julian South, MAGB; Daniel Kindred, ADAS; Peter Hesketh, Gatsby Foundation; Dr Helen Ferrier, NFU; Paul Freeman, Defra; Prof Johnathan Napier, RRes; Tim Mordan, Defra; Roger Sylvester-Bradley, ADAS; Prof Richard Napier, Univ of Warwick; Jim Orson, BCPC; Robin Wood, Elsoms Seeds; Cecily Gordon, CEH; Dr Frances Gawthrop, Tozers Seeds; Thomas Slattery, Agri-Epi Centre; Lisa Williams, Agri-Epi Centre; Sian Thomas, Fresh Produce Consortium; Jonathan Storkey, RRes; Prof Angela Karp, RRes; Paul Billings, Germinal; Jim Morton, Syngenta; Oliver Doubleday, NFU; Lindsay Chapman, CIEL; Peter Emmrich, UEA; James Clarke, ADAS; Ollie Szyszka, Defra; Hazel Doonan, AIC; Catherine Barrett, AIC; Heather Browne, Defra; Mia Cerfonteyn, Sainsbury Laboratory; Mark Buckingham, Bayer Crop Science; Chris Guest, LSPB; Michael Lee, Harper Adams; Elizabeth Magowan, AFBI NI; Helen Munday, IFST; Ali Capper, NFU; Jonathan Carruthers, RSB; George Rothschild, Intl Dev Consultant; James Wallace IARAgri; Daniel Pearsall, Group Co-ordinator.

1. Introduction

Viscount Ridley (MR) welcomed members, guest speakers and stakeholders and briefly introduced the session as an opportunity to hear the thoughts of leading scientists in the fields of crop science, agricultural economics, rural policy and conservation science on the current direction of UK farm policy development outside the CAP, and in particular the apparent shelving

by Government of the ‘sustainable intensification’ concept championed by Professor Sir John Beddington’s Foresight report on global food security 10 years ago. Indeed MR suggested that the Government’s policy focus on sustainable intensification had to some extent been replaced by ‘unsustainable extensification’ which raised serious questions about how we will be able to feed a growing population in a difficult world while at the same time saving nature.

2. Guest speakers

[Please note that all speakers’ slide presentations are available to download via the meetings section of the All-Party Group website at www.appg-agscience.org.uk]

Professor Sir David Baulcombe FRS, Royal Society Research Professor, University of Cambridge

David Baulcombe (DB) opened by explaining that his introduction to the concept of sustainable intensification was through a Royal Society working group looking at the potential of new biological technologies in crops and agriculture. Jules Pretty brought the term to the table to summarise the challenge of food production in the light of changing diets, climate change and population growth. The term also recognised that, notwithstanding the success of the green revolution and industrial agriculture in providing sufficient food until now, much of current practice in growing crops was depleting ecosystem services – and as such was not sustainable.

The group consulted widely and, in the resulting ‘Reaping the Benefits’ report, produced a set of recommendations about science, education and training, funding, regulation, IP and international links. DB indicated that while some of the recommendations coincided with measures that had since been implemented, he would focus on two specific aspects of the report which remained to be addressed – making it clear that he was speaking as an individual and not as a representative of any organisation.

The first was the report’s recommendation to exploit agroecology and interdisciplinarity in sustainable intensification - one of the flagship examples used was a companion cropping approach called push-pull used in African maize – based in part on the work of John Pickett then at Rothamsted.

In the context of these recommendations and UK agriculture, DB indicated that the emergence of the Defra sustainable intensification research platform was music to the ears of those involved in the report. The stated aim of the platform to develop a community of practice - with stronger links between scientists, farmers, economists, eco-services, policymakers and other environmental and agricultural stakeholders - was exactly what was needed.

Another stated aim of the platform was to enable access to the wealth of data collected within the SIP projects for use by researchers, policymakers and other interested parties. DB suggested that this data driven approach was exactly what was needed then, and it is needed even more now with increased capacity to generate data from landscapes, soils, environments etc.

Based on these lines of thinking, DB noted that the SIP was very coherent with the recommendations of the Reaping the Benefits report and he emphasised the importance of Defra following up on the SIP project.

A further recommendation in the Reaping the Benefits report concerned the importance of long-term approaches to high return targets in agriculture. In particular, the report highlighted the potential for improved photosynthetic efficiency in crops and, in the intervening ten years, DB noted that there has been astonishing progress on this topic using GM approaches. He singled out the groups led by Steve Long FRS at University of Illinois and Christine Raines at the

University of Essex as major contributors to this progress. DB observed that as a result of this work there was now a realistic prospect of using this research to increase yields in certain crops including rice.

DB emphasised that using genetic innovation in this way would not compromise sustainability, in fact it would significantly enhance sustainability viewed at the landscape scale.

He added that alongside enhanced photosynthetic efficiency, other long term goals were now emerging as achievable research objectives, including reduced fertiliser use through mycorrhizal symbiosis in crops, thanks to the efforts of Giles Oldroyd in Cambridge and others worldwide.

DB noted that these two examples both involved GM and that in recent years gene editing had also emerged as a technology with enormous potential to accelerate the delivery of traits such as improved disease resistance and the domestication and improvement of orphan crops to support more diverse and sustainable agricultural systems.

In highlighting these two recommendations, DB emphasised that the prospect of sustainable intensification would be enhanced by the approaches exemplified in the original SIP and by enabling scientific research and innovation to meet these grand challenges.

But he stressed the need to link up the farm and landscape scale work with the grand challenge projects – ensuring that innovations are transferred to varieties of crops and into agricultural systems that will make a difference. Sustainable intensification is not just agroecology or just molecular biology or data science – it is all of them but to make it happen the different communities of practice need to be connected more effectively than in the past, he said, indicating that a revived SIP could help achieve that goal.

Turning to the regulation of GM and gene editing technologies, DB noted that this was historically a problematic area with overly complicated and dysfunctional EU regulation of GM and the more recent ECJ ruling that gene editing should be regulated as GM.

DB observed that various parties have suggested that the current roadblock should be dealt with in different ways.

Some suggest that the roadblock is fine – it prevents any technology-based problems because GM and GE crops are effectively prohibited. But this approach also excludes potential benefits so that less sustainable practices – such as spraying against late blight in potato – must continue.

DB noted that others have suggested a root and branch overhaul of the UK regulatory process so that the assessment criteria are based on outcomes rather than process, and could be used to control environmental risks associated with GM, GE and conventional crops.

DB suggested that a third approach would be to refine the existing regulatory process for GMOs to ensure data requirements are rational and science-based. The blanket requirement for animal feeding trials in the existing protocols, for example, could be applied on a case-by-case where appropriate. Complex and far-reaching changes to the existing regulatory process would not be required.

DB added that complex changes to the regulatory process would also not be required to reduce the environmental impact associated with either conventional or indeed any other types of crops. Such impacts could be addressed by various incentive schemes deployed by Defra including ELMS.

DB suggested that the advantage of this refinement approach was that it would be consistent with the Cartagena Protocol to which the UK is a signatory, it would be coherent with regulation

in other countries where an outcomes-based procedure is not used, it would not require complex new legislation, it would not introduce additional regulatory steps for conventionally bred crops and, importantly, it would be transparent in that it would not gloss over or push to one side people's genuinely held concerns about the process.

In conclusion, DB emphasised that sustainable intensification in UK crops and agriculture is achievable by reviving and updating the SIP, and by avoiding over-complication of any changes needed to the regulatory process for crops developed as living modified organisms according to the Cartagena protocol.

Professor Michael Winter OBE, Professor of Land Economy and Society, University of Exeter

Michael Winter (MW) introduced the concept of sustainable intensification as seeking to increase food production from existing farmland while minimising pressure on the environment, as a response to the challenges of increasing demand for food from a growing world population, in a world where land, water, energy and other inputs are in short supply, overexploited and used unsustainable. He added that any efforts to 'intensify' food production must be matched by a concerted focus on making it 'sustainable'. Failure to do so would undermine our capacity for future food production and would further damage the environment.

MW highlighted four different but interdependent components of sustainable intensification, as described in a 2016 article for the journal *Nature Plants*: agronomic efficiency – with a focus on closing yield gaps through improved crop varieties, precision farming etc; agronomic sustainability – with a focus on wider issues of land use and ecosystem services; global efficiency – with a focus on efficient land use and land sparing; and global sustainability – with a focus on nutrition and diet, food security and global justice.

MW described the Sustainable Intensification Research Programme (SIP), a £4.5m Defra investment over four years, as a community of practice involving most of the major research institutes and agricultural universities as well as other key players such a LEAF and the GWCT.

The project involved three linked workstreams: Farm Scale, led by NIAB; Landscape Scale, led by Exeter University; and Supply Chain, led by ADAS, working closely together and connected by multidisciplinary approaches in areas such natural and social sciences, and economics.

MW explained that the SIP programme was grounded in physical locations around the country representing landscapes which had already been extensively researched in recent years thanks to support from Defra and other funding agencies.

Through workshops with farmers, scientists and agronomists, the SIP sought to identify very early on the sorts of interventions which might be needed to deliver sustainable intensification, summarised as follows and ranging from the basic to the more hi-tech:

1. Grow crop varieties with increased tolerance to stress
2. Reduce tillage to minimum or no till
3. Incorporate cover crops, green manures and other sources of organic matter to improve soil structure
4. Improve animal nutrition to optimise productivity (and quality) and reduce the environmental footprint of livestock systems
5. Reseed pasture for improved sward nutrient value and / or diversity
6. Predict disease and pest outbreaks using weather and satellite data, and use this information to optimise inputs

7. Adopt precision farming: using the latest technology (e.g. GPS) to target delivery of inputs (water, seeds, pesticides, fertilisers, livestock manures)
8. Monitor and control on-farm energy use
9. Optimise the use of agriculturally marginal land to promote ecosystem services and support biodiversity
10. Provide training for farm staff on how to improve sustainability / environmental performance without compromising yields.

In terms of what the SIP had achieved, MW highlighted the mass of data brought together to inform discussion of the topic, as well as a range of tangible outputs such as SI metrics and an SI benchmarking site for farmers and their advisers; SI indicators used to assess the economic and environmental performance of commercial farms; an interactive Landscape Typology Tool to help prioritise SI outcomes and strategies in land-use decision making; as well as a survey of farmer collaboration.

However, MW expressed concern that very little of this work had been carried on or updated since the programme's completion, and it was very difficult to pin down precisely why the research policy spotlight had turned away from SI, and the community of practice built up through the SIP platform had been allowed to dissipate.

In considering why it mattered that the SIP platform had been shelved by Government, MW offered the following thoughts:

- Productivity matters because broadacre farming remains crucial to feeding the nation;
- The 'yield gap' remains, as does highly variable farm performance;
- Underlying global food security is no less precarious than it was 10 years ago;
- We cannot divert large areas of land to nature recovery, carbon storage, energy etc, and ignore the need to produce food.

In conclusion, MW issued a stark warning against the agroecology counter-narrative. While recognising DB's use of the term agroecology in its scientific sense, MW said people should be in no doubt that the term agroecology had been effectively hi-jacked to mean farming according to organic principles, with a head of steam in some quarters lobbying for agroecology to replace mainstream agriculture. While organic farming remained a legitimate option, the notion that farming and food production in this country could transition wholesale to agroecology was based on some very heroic assumptions about reducing food waste and radically changing diets, simply because organic systems are based on much lower yields. MW emphasised that the whole point of SI was to maintain and improve yields while at the same time delivering positive environmental outcomes. While he would be the first to support dietary change for both health and climate change reasons, policy built on assumptions of such dramatic dietary change could seriously jeopardise our future food security.

Professor Paul Wilson, Professor of Agricultural Economics, University of Nottingham
Paul Wilson (PW) introduced the metrics and sustainability indicator work carried out as part of the SIP, led by researchers at the Universities of Nottingham and Cambridge. Since the concept of sustainable intensification sought to bring together multiple objectives – economic, agronomic, environment, social etc – this inevitably resulted in significant complexity from a data collection and management perspective.

PW explained that while measuring every component of SI data relating to a specific field or farm would be a hugely complex undertaking, the approach taken within the SIP was to measure some things and augment from other known data, so reducing the burden for farmers inputting data while at the same time providing a valid and objective comparison between a farm, a field

or a hectare, to allow benchmarking between peers and identify areas for change to improve performance in terms of sustainable intensification.

PW explained that the augmentation approach was based on the wealth of data already available through the Farm Business Survey for England, conducted annually by the University of Nottingham as part of a consortium of six universities, and supported by equivalent UK-wide and EU-wide farm business data. Other data used included SIP partner models such as Farmscoper and IPCC Tier 1 coefficients which, taken together, enabled the development of key indicators of environmental performance, so allowing benchmarking and comparison between different fields or farms.

PW underlined the crucial importance of deciding on the unit of measurement, or functional unit, when it comes to understanding the impact of food production on the environment. Often the measurement historically used has been impact per hectare, but he considered that this approach is misguided because what is more relevant, for example from a GHG perspective, is the impact per kg of food produced, or per calorie or bioavailable calorie of food produced. From a nitrate leaching point of view, which has a more localised impact, perhaps a per hectare or per landscape unit would be more appropriate, and from a biodiversity perspective maybe per farm would be the sensible measure.

PW explained that using these known, internationally accepted data sources and approaches, the SIP team developed a benchmarking site drawing on the team's extensive experience of running the Farm Business Survey.

The SI benchmarking site at www.benchmarkmyfarm.co.uk allows farmers or groups of farmers to assess their performance in terms of key sustainable intensification indicators, to compare performance with other farmers operating in a similar situation, and to identify opportunities for improvement. It also provides a secure route for farmers or groups of farmers to share data.

PW outlined the headline metrics of the SIP benchmarking site at farm-gate level covering performance in terms of carbon (related to output), ecology (features and techniques), land use (diversity index), fertiliser use (related to output) and social (mainly opportunities for interaction).

PW highlighted a novel aspect of the SIP benchmarking site which allows farmers to select which farms they want to benchmark against or compare themselves with – based on a minimum sample of 25 similar farms selected from 2000 farms in the Farm Business Survey dataset. He suggested that this method avoids simplistic farm classifications by comparing like with like, whether in terms of location, farm business type, input use, cropping, stocking etc.

PW then provided a visual guide to help farmers using the benchmarking site to enter data and find the closet matches for comparison purposes in terms of the key metrics of carbon, NPK use, land use diversity etc, and even allowing further refinement of each metric – ie understanding the relative contribution of each, ie for carbon how emissions were distributed according to fuel use, N fertiliser use, other input use, electricity use, grazing livestock etc.

In conclusion, PW suggested that there are still multiple opportunities to use the SIP benchmarking site, with the opportunity for peer benchmarking as a novel and valuable concept to promote continuous performance enhancement. He noted that there was always room for improvement in terms of data quality and validity, and he reiterated again that the Unit of Measurement or Functional Unit selected for each parameter or metric is absolutely crucial to deliver a valid and meaningful assessment of Sustainable Intensification at farm level.

PW considered that it would be a tragedy if the work carried out to date was simply left to wither away. His team had kept it going to date with some modest investment, but there was an urgent need for additional investment and publicity around the benchmarking site to deliver its potential in terms of driving improved performance in sustainable, efficient food production. From a

research funding perspective, this also highlighted the need for better legacy planning in terms of major research projects of this kind.

Professor Andrew Balmford FRS, Professor of Conservation Science, University of Cambridge

Introducing himself as an ecologist and conservation scientist, Andrew Balmford (AB) explained that he would aim to summarise the work his group and others have been doing to examine the critical importance of sustainable intensification in agriculture from the perspective of wild biodiversity – in other words free-ranging populations of animals and plants; and in terms of mitigating climate change.

AB indicated that farming imposes the heaviest environmental impacts of any human activity. Best estimates are that it is responsible for up to one-third of all anthropogenic GHG emissions; and that the conversion of natural habitats to farming, and the subsequent intensification of land use, are between them by far the greatest reason why species are becoming threatened with extinction.

Given that demand for agricultural products is set to rise steeply throughout this half century, his research set out to understand what can be done to limit those impacts?

On the demand side AB noted that there is much to be done to cut food waste – predominantly at the *producer* level in less developed countries, and at retailer and consumer levels in richer ones. He suggested there was also a widely recognised need, in richer societies, to reduce the footprint of what we *do* eat by consuming less, in particular less ruminant meat and less dairy.

But on the supply side, in relation to wildlife and the climate, AB explained that two possible solutions occupy two ends of a spectrum. One end of this continuum can be described as land sharing. Here, to reduce the negative effects of agriculture, chemical inputs to farming are reduced, on-farm habitat features like hedgerows and ponds are retained or restored, and as a result there is more wildlife and often more *carbon* stored within the farm.

However, AB indicated that these restrictions also typically reduce farm yields, or food production per unit area, so that to produce the same amount of food, more area is needed under farmland.

In response to that problem, others have argued instead for land *sparing* – sustainably increasing farm yields as much as possible, so that any particular demand can be met on *less* farmed area, leaving more unfarmed land area to set aside elsewhere in the region for the retention or restoration of Carbon-dense natural habitats where wildlife can thrive.

AB emphasised that sparing requires **both** sustainable ways of increasing yields AND additional policies for safeguarding natural habitats elsewhere too.

Working out which approach – or any intermediate – is the best way to protect wild biodiversity in a given place requires painstaking fieldwork quantifying how large numbers of species respond to a range of farm practices.

But AB noted that data for over 2500 species and many different systems shows that, with remarkable consistency, most species fare badly under *any* sort of farming but would fare *least* badly – and indeed climate change *mitigation* would be *greatest* - under a land *sparing* approach of high-yield production coupled with habitat protection elsewhere within the region.

He added that what we know so far for the UK turns out to be slightly different, but not much. Here researchers have looked at large numbers of sharing and sparing scenarios for two

regions, and quantified the outcomes not just of wildlife and GHG emissions but also for nutrient pollution from N and P, and for outdoor recreation.

AB described data relating to how these outcomes change using a first case study in The Fens, which showed that positive outcomes for biodiversity are maximised by increasing yields and setting aside natural habitats substantially more than at present. The same message was replicated for a second region, Salisbury Plain, which showed again that averaged outcomes would be maximised by much higher-yielding production with more land assigned to nature than at present.

AB noted that the precise outcomes also depend on where exactly within the regions land might be set aside for nature. The two case studies chosen focused on sparing to maximise peat retention in The Fens; and to maximise groundwater quality on Salisbury Plain.

He added that in some situations, a better outcome than a simple approach of having two land use compartments – one for nature, and one for high-yield production – could be achieved through three-compartment sparing.

This involves assigning some of the land freed-up from high-yield production to a third land-use – to very *low*-yielding farming carefully tailored to meet the needs of species that seem to thrive in traditional agriculture. This would mean producing most of our food at higher yields than at present, but also meeting the needs of specific aspects of farmland biodiversity - not just *natural habitat*-specialists but also the sorts of species we sometimes see in Europe which seem to depend on low-yielding, unprofitable farmland.

AB added that the three-compartment approach has added allure of offering something for everyone, and indeed was strongly endorsed in the recent National Food Strategy report.

But AB cautioned that the devil will be in the detail of implementing such a policy. At present, apart from the two case study regions, not enough is known about what combinations of areas and yields across these compartments will be best for biodiversity and other outcomes.

But AB was confident that increasing yields on a large proportion of farmland would be key to limiting the impacts of agriculture on biodiversity and the climate. But realising the potentially enormous gains from land sparing in the UK and elsewhere would require explicit policies or market incentives and regulations to ensure that *potentially* spared natural habitats are indeed freed-up for nature.

AB then turned to the related issue of supporting – and before that identifying – farm practices that can *raise* yields in ways that also limit the other environmental impacts of agriculture; so delivering systems that can give us sustainable yield increases.

AB suggested that a useful way of identifying what looks promising or otherwise is to plot out the environmental costs of different ways of producing the same product by expressing all the costs – externalities like the amount of pollution or the emissions, or the amount of land used – per tonne of production.

Many studies instead present costs per unit area, but AB insisted that this approach systematically under-estimates the amount of pollution created by low-yielding systems that take up more land. Instead he argued that <u>all</u> costs need to be measured per unit product.

AB noted that there could be trade-offs between different types of farming systems, but there was not enough data to reach very clear or consistent conclusions. Overall, however, the data available indicate that the externality costs of high-yielding (= low land-cost) systems are *not* necessarily *higher* than for lower-yielding systems which we might perhaps conceive of as being more environmentally friendly.

In conclusion, AB suggested that policy development needs to be guided by the data, not by preconceptions. And perhaps even more importantly, this information may help us identify promising current and future farming systems for driving up yields sustainably, and so providing more badly-needed space on the landscape for biodiversity and for carbon storage.

3. Questions & discussion

The following key points arose during discussion:

Asked why it appeared so challenging to get powerful conservation and environmental groups such as RSPB and WWF to promote sustainable intensification and land-sharing - including the three-compartment model - AB indicated his view that it revolved around a genuine fear that by doing so agro-industry would take over and it would not be delivered sustainably, and also that if food is produced more efficiently, a concern that new uses would be found for that output, whether food exports to other countries or non-food uses such as plastics from potato starch.

PW acknowledged the importance of soils in sequestering and storing carbon, and that soil health was a common point of interest between SI and agroecology. This was not currently an area covered by the SIP benchmarking site but with opportunities to augment existing data could be included in future.

In terms of the practical innovations required to deliver Sustainable Intensification, DB highlighted the critical importance of improved disease resistance in crops and integrating new genetic approaches to achieve that. PW added that in terms of the variable SI performance observed on farm, seeking independent technical advice on fertiliser applications – rather than relying on no advice or on advice provided by the supplier of the fertiliser – appeared to be a significant differentiating factor.

Asked about the Government's public support for the Sustainable Food Trust's Global Farm Metric and its whole farm – ie area-based approach – to measuring on-farm sustainability, PW said an area-based approach was not the right approach in principle and needed some reference point in terms of the food produced to have any relevance. He said the Government's support for a simple area-based approach was not the right way to go. MW indicated his agreement.

Asked how SI differs from regenerative agriculture, MW indicated that SI had a body of science behind it and its objectives were very explicit, whereas regenerative agriculture as a concept appeared to mean different things to different people, depending on the context.

PW highlighted the importance of Key Performance Indicators and understanding which farming practices were linked with improved performance to gain a better insight into what constituted best practice for a particular farm or farming system.

Asked about increasing concern over nutritional vs. physical yield and whether this affected the land-sharing/land-sparing balance, AB agreed that it is an important distinction but did not affect the underlying principle that nature and wild biodiversity need space, and that higher yielding systems of farming provide the best way to free up that space, whether measured in terms of physical output, farm profits, or calories produced.

In terms of policies to deliver a land-sparing approach, MW indicated that it must be led by the data and decision-support tools relating to specific locations, along the lines of the Landscape Typology Tool developed as part of the SIP. AB added that a landscape-scale or regional approach – rather than at an individual farm level – would be needed to deliver the greatest benefit for nature and biodiversity.

PW considered that the baseline data was not in place to assess the effectiveness of ELMS projects and the new policy direction that entailed. MW added that the planned local nature recovery strategy, if properly implemented, could provide a statutory framework to support and steer the development of ELMS, alongside wider policy imperatives for biodiversity net gain. DB also highlighted the recent Dasgupta Report and its call to put an economic value on policy objectives such as nature recovery and biodiversity.

Asked about the balance between the different components of the three-compartment approach, AB indicated that in the regions studied it was not equally split, with the larger share required for high-yield food production but still significant chunks of land reserved for nature and low yield agriculture. He expressed concern that decisions must be informed by data, highlighting the parallel ‘triad’ approach in the US forestry sector which resulted in disagreements and divisions between the different constituents. MW added that it would not be a static issue, but dynamic and responsive to changing national and global conditions.

Concluding the session, MR thanked guest speakers and attendees for their contribution to a highly informative and thought-provoking meeting.