

Finding the Common Ground: BREXIT and the Future for Agriculture, Ecology and Food

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Executive summary

This document is the outcome of a British Ecological Society workshop organised by the Agricultural Ecology Special Interest Group on 6 December 2017 with participants ranging from scientists to farming practitioners. There was broad agreement on what the evidence from science and practice has shown and the main issues that policy should address. The evidence was used to identify a headline goal for agriculture and the environment:

The goal for agriculture is to implement an agro-ecological approach to food production including biodiversity conservation. This should maintain land that is agriculturally productive, rich in wildlife, culturally rich and accessible for the enjoyment of wider society without compromising the ability of future generations to meet their own needs.

Within this headline goal, key requirements are to reduce negative externalities associated with current farming practices whilst simultaneously increasing positive externalities. In particular to:

- develop a national sustainable soils strategy;
- use Catchment Management Partnerships to further improve water quality with targets tailored to local needs, and mitigate flood risk by using natural solutions;
- reduce ammonia emissions to at least comply with Gothenburg Protocol targets and reduce greenhouse gas emissions at least in line with current legal requirements;
- increase farmland biodiversity and reverse the loss of priority habitats or species, including application of the Lawton Approach of 'better, bigger, more and joined', where appropriate.

We recommend that the new Government policies for a multi-functional farmed countryside, should be set out at a sub-national, landscape scale. This should provide a framework for delivery and accountability through the National Character Areas or a multiple of them. A number of policy priorities and interventions were identified. These included strong agreement with the approach, signalled by the Secretary of State, of redirecting support towards payment for public goods and ecosystem services. This must be based on both the Precautionary and the Polluter Pays principles. The need for increased training and advice, backed up by appropriate R&D, and facilitation of farmer-to-farmer interaction and co-operation, was recognised.

Detailed suggestions are made for the policy levers which might be used. These emphasise:

- an iterative approach to policy with room to experiment and for monitoring results to feed back into enhancements of management, and encouragement for local responsibility in the context of national targets;
- a scheme of public accountability, setting out the benefits being delivered;
- agri-environment schemes (or alternative instruments) including collaborative farmer-led alliances, with a single point of contact at agency level to engage with on a regular basis;
- developing trust-based relationships and self-enforcement, with a level of central auditing, forging a sense of partnership in delivering multifunctional landscapes, prioritising quality of delivery and long-term sustainability;
- an increased commitment to monitoring, filling gaps at a national scale, and regular review, with independent evaluation of the effectiveness of interventions;
- a Payment by Results approach wherever appropriate.

1 Introduction

This document summarises a workshop convened by the British Ecological Society's Agricultural Ecology Special Interest Group on the 6th December 2017. The participants (listed in the appendix) included individuals from research organisations, delivery agencies, non-governmental organisations, and farming representatives.

The British landscape is constantly changing and is subject to multiple competing interests. The status of nature in our countryside is a reflection of the complex interaction between society's needs and natural processes. From hydrology to archaeology and aesthetics to the production of food, land provides a wide range of multi-functional dis/benefits to society, that are sometimes in competition with each other, making it inherently difficult to design a management strategy. Recognising the importance of food production, at present our agricultural landscape is managed for a narrow set of objectives which have generated unnecessary trade-offs for nature and society, and decreased the long-term environmental sustainability of agriculture.

The aim of the workshop, summarised here, was to find consensus in the ecologically-informed community on future agro-ecological goals and policy priorities¹, and how they can be delivered when the UK exits the European Union.

2 What we know and don't know

Workshop delegates identified and discussed areas relating to agro-ecology, and whether there is sufficient evidence for each to inform policy.

2.1 Sufficient knowledge to design detailed policy

Existing work demonstrates positive interactions with these and sustainable, productive farming.

Biodiversity

Effects of current interventions on well-monitored species.

Farming Practice

Assuming that they are carried out in line with good practice, the following agricultural practices were identified as often promoting the goal of sustainable agriculture:

- Organic and integrated farming practices that seek to reduce inputs while maintaining approximately equivalent productivity/ economic return from the same land area²
- Mixed farming: arable + livestock
- Legume-based farming
- Agro-forestry

¹ Our focus is on agricultural land and so we have not addressed rewilding in its pure sense. However our proposals would result in extensification of some land management, increased cover of trees and scrub and substantially increased biodiversity.

² The impact of different agricultural schemes on biodiversity was recently the subject of a systematic map, which may prove a useful source of information for policy makers, see [Randall, N. P. and K. L. James \(2012\). Environmental Evidence 1\(1\): 4.](#)

- Precision farming
- Crop breeding
- Environmental land management practices. For well-studied groups such as farmland birds, the effects of various measures are known, e.g. wild bird seed mix, although not necessarily quantitatively or at landscape scales or in all regions.
- The use of earth observation, sensor and digital technology to guide farmer decision making and monitor sustainable implementation³
- Extensive livestock farming
- Move from “economically-efficient nutrient use” to “environmentally-efficient nutrient use”

Even when good practice is followed, agricultural production (both organic and conventional) results in negative externalities (e.g. losses of nitrate, phosphorus and sediment to water; and emissions of ammonia, methane and nitrous oxide to the air). Both systems use non-renewable resources, and good practice to address one challenge may require compromise with another. In some catchments for example, there is a choice to be made between very good water quality status and agricultural production (particularly for low nitrate concentrations in water and land-use dominated by arable production). We can't have both. We need to be mindful of exporting environmental impacts if we only grow a small proportion of our own food.

Negative externalities are made worse and positive externalities are lost when bad practice is followed.

Capacity building

While it is essential to identify the best on-farm practices and to recognise those farmers who already exhibit these standards, sustainable agriculture is only possible if there is a wide availability of well-informed farmers and land managers who have the knowledge, capacity and skills to access, to identify and to implement the recommended best practice. Capacity building areas that policy could currently address are:

- Effective farmer engagement (i.e. where the decisions on land management are made by a motivated and well-informed individual)
- High quality extension services and trusted advice from (independent) experts. This is especially important for lower-performance farms, where increasing economic pressure may limit access to good advisory services.
- Benchmarking – providing benchmarks are representative of current crop varieties and conditions etc.
- Financial incentives (including valuing natural capital)
- Demonstration plots and farms
- Business-led approaches

2.2 Work is in progress; support required to design detailed policy

Further work is required to understand where and when these will benefit sustainable, productive farming, or whether additional information is needed. Such work should be strongly supported to enable detailed policy to be written.

³ AgriTech was a key investment area in the [industrial strategy white](#) paper, and policy should be written to include, enhance and encourage technological monitoring for sustainability

Farming Practice

- Zero-till/no-till cropping systems.
- Hydroponics.
- Cover crops (in combination with other measures to build Soil Organic Matter (SOM)).
- Permaculture.
- Inter-cropping.
- Low-input stockless arable systems.
- Pasture-fed livestock.
- Biological Control and Bio-pesticides (as part of IPM/ICMM, but much more information needed).
- Genetically modified crops.
- Monitoring, pest forecasting and decision support systems.
- Improving and monitoring soil organic matter.
- Effects of existing and recent AES management on target and non-target features in practice.

Capacity Building/Compliance

- Farmer networks (i.e. farmer-to-farmer knowledge transfer. Effective in knowledge transfer, but can promote both good and bad practices equally).
- Integrated Pest/Crop Management (a lot more work needed to provide convincing, trustworthy advice to decision makers).
- Determining how mitigation strategies can be integrated into the agricultural landscape while maintaining production levels.
- Can voluntary schemes effectively replace enforced regulation? Are the engagement costs of regulation for effective management outweighed by the benefits in terms of certainty around implementation?

Renewable energy

Sustainable production systems may be more cost-effective if they can be combined with renewable energy production technologies such as:

- Renewable energy generation on farmland (wind turbines, solar energy).
- Waste-to-energy.
- Bio-fuels (heavily debated as a subject but there are areas that deserve consideration. For example, willow is highly relevant where combined with flood mitigation strategies and also has long-term benefits on soil health; whereas Maize grown for biogas causes substantial environmental damage, with little benefit for climate mitigation. See the government's own report [here](#) with current DEFRA/ policy relevant research programmes).

2.3 What doesn't work (or currently works but is not sustainable)

Existing work demonstrates neutral or negative interactions with these and sustainable, productive farming. Policy should be designed to discourage these.

- Pre-emptive pesticide application (i.e. where pesticides are not applied as part of an integrated pest or crop management strategies: leads to resistance and pollution, and also increased cost to farmers. However, pesticide applications used correctly can be part of a sustainable management plan).
- Direct payments and coupled subsidies which are not linked to delivery of public goods

- Over reliance on inputs (e.g. applying nutrients without considering supply from other sources). Fossil fuel reliance.
- Untargeted prescription-based schemes (e.g. telling farmers the things they need to do in order to get payments).
- Continuous intensive cropping.
- Monoculture cropping landscapes.
- A reliance on voluntary schemes without inbuilt monitoring.

2.4 What we don't know (and therefore requires primary research)

Primary research is required to understand the impact of these on sustainable, productive farming.

- Microbial activity, food webs and nutrient cycling operating in arable soils (organic and conventional).
- Relationship between grass, grass-clover and herbal ley management and the delivery of ecosystem services (water regulation, biodiversity, climate regulation, food production).
- Nitrate losses from rotational legumes.
- Gaseous emissions from soils under different rotations and tillage regimes.
- Optimum land use strategy to balance societal, economic and environmental needs (i.e. what our landscapes would ideally look like).
- The extent to which land sparing vs. land sharing is required and at what spatial scale (largely a challenge relating to the different dispersal ecologies of different species; solution is likely to be a combined approach).
- Which sorts of landscapes the public wants within each Natural Character Area.
- How to conserve peat soils in lowland landscapes.
- Critical knowledge gaps that are high priority for new research/ monitoring.
- Effects of farm size on biodiversity.
- Effectiveness of a cluster farm / facilitation fund approach? Difficult to monitor; particularly what mix of habitats / management interventions are required.
- The effectiveness of the National Environment Partnership (NEP) approach – Does it encourage uptake?
- The impact of peer-assisted learning.
- Impacts of any new management initiative at the scale and extent of implementation; many ideas have been tested and evaluated at small scales or in principle, but it is critical to understand what happens in practice.

3 Major issues that policy should address

- A. Limited interaction between public funding and sustainable farming.
- B. Separation of food production and the cost and wider value of food.
- C. Limited incentives for land managers to engage with societal ambitions for improved landscape biodiversity and productivity.
- D. Barriers to adoption of farming methods that have demonstrable environmental benefits (e.g. investment costs of knowledge transfer and/or new equipment).

- E. Lack of high quality long-term monitoring to underpin understanding of key ecological components by land managers (e.g. soil organic carbon, pest abundance, keystone spp. abundance etc.).

4 Headline goal

Point of common ground

There should be an agro-ecological approach to food production including biodiversity conservation.

Definition

The key point of common ground across the agricultural and environmental sector, as well as within our group, is that current and future-farming practices must be sustainable⁴. While this is a point of general agreement, the definition of sustainability in agriculture is less clear and more widely debated. The definition of *sustainable agriculture* that we propose, in line with the UN definition of sustainable development, is:

A farming industry that maintains land that is agriculturally productive, rich in wildlife, culturally rich and accessible for the enjoyment of wider society. The land should meet these needs in the present without compromising the ability of future generations to meet their own needs.

Within this headline goal, key requirements are to reduce the negative externalities associated with current farming practices (e.g. pollution) whilst simultaneously increasing the positive externalities (e.g. landscape quality). In particular, to:

- Restore *soil health* and develop a national sustainable soils strategy – reduce erosion, improve soil structure and increase or, where currently sufficient, maintain soil organic matter content at the field scale;
- Maintain and improve *water quality* by reducing pollution derived from farmland through supporting, maintaining and extending existing Catchment Management Partnerships. In addition, retain and improve on Water Framework Directive targets, and tailor these according to the needs of individual catchment/water bodies;
- Improve air quality by significantly reducing farm *ammonia* emissions (as a minimum), to comply with UNECE Gothenburg Protocol targets (Protocol to Abate Acidification, Eutrophication and Ground-level Ozone); AND reduce *greenhouse gas* emissions from agriculture at least in line with currently existing legal requirements;
- Mitigate *flood risk* – use natural solutions to slow the flow of water and reduce flood risk downstream;
- Reverse declines in, and increase populations of *farmland biodiversity*⁵ as well as ensuring no further loss of priority habitats with a renewed commitment to the Lawton Approach of ‘better, bigger, more and joined’.

⁴ In most of the briefing policy documents, the definition of sustainable farming does not include food security. This is left out of our definition because the cost of food in relation to the cost of living is largely driven by market forces beyond the policy scope of this document.

⁵ It is a priority to deliver a definition of what constitutes farmland biodiversity – species /taxonomic groups / genetic diversity /habitat /conservation status and these to be specified at different spatial scales i.e topsoil and field-scale, farm-scale, landscape scale, regional scale

To achieve this headline goal of sustainable production and the specific sub-requirements we have identified a suite of policy levers and management-related actions. These include **Incentives, Regulation, Training and translation** and **Research and development**, as outlined below.

5 Priority management interventions and mechanisms

Incentives

- Progressively move government support towards payment for public goods and ecosystem services within sustainable agro-ecosystems.
- Review the minimum land holding size that is possible to administer for public funding.
- Provide both multi-annual and capital payments for implementing on-farm changes.

Regulation

- Apply the Precautionary Principle and Polluter Pays Principle where appropriate in developing regulations for farmland, recognising that the challenges posed by diffuse and historical pollution may mean that this is not a rule in all cases.
- To reduce pesticide and fertilizer use. Expand pesticide regulations to include impacts from chronic exposure, adjuvants, and pesticide cocktails in conjunction with regular impact & evaluation assessments and in parallel with grants and incentives.
- Develop and integrate smarter regulatory mechanisms for monitoring compliance including real-time data collection and remote sensing.
- Compulsory and appropriate soil and pest management planning and implementation at field and landscape scales.
- Effective regulation and capital grants to reduce ammonia emissions and nutrient losses to water across all farming sectors, including through more efficient and integrated nutrient management.
- Build on Farmer Rules for Water under the Water Framework Directive.
- Target farms where there are particular problems for tailored advice & grants/payments, and legal enforcement ('polluter pays') where appropriate Clear labelling of food showing provenance and system of production.
- Give the Groceries Code Adjudicator greater power to encourage retailers to invest in sustainable food production.

Training and translation

- Improved provision of and access to independent agricultural extension services that provide training and advice on policy compliance and business development as well as crop and land management, including approaches to environmental management and the integration of ecology.
- Cluster farm approach to facilitate farmer-to-farmer learning and co-operation
- Regional and crop specific demonstration sites and benchmarking tools for sustainable management practices.
- Integration of these elements into agricultural college courses and Continuing Professional Development for farmers and advisors.

Research and development

- Grants and loans for technology that delivers long-term sustainable benefits.

- Research councils to invest more in Applied Sciences, particularly in the development and extension of services, addressing known knowledge gaps around the effective practical application of management addressing established principles.

6 Policy levers

Recognising the complications of managing landscapes for multiple functions, we believe that an iterative approach to policy making should be at the heart of the policy process, with room to experiment, and learn from mistakes, in order to achieve a more sustainable long-term goal. Inherent to this would be a high level of local autonomy, coordinated at wider scales to deliver regional and national targets.

Policy Characteristics

- A clear national policy that encourages local responsibility and engagement should be designed as an iterative process that integrates multilateral feedback, communication and regular reviews.
- Landscape/catchment scale initiatives delivered through widespread engagement in agri-environment schemes (or alternative instruments supporting on-farm land management activity) including collaborative farmer-led alliances.
- Farmer behavioural change through a combination of better engagement and payment rates which are sufficiently attractive to change market-led behaviour, such as payments for lost earnings, outcome-based payments, or the generation of new markets.
- At the same time public investment needs a scheme of public accountability, simply setting out the benefits that are being delivered.
- The scheme would probably be voluntary at the local scale but the lack of alternative subsidies would be a strong encouragement for individual farmers to engage positively.
- There should be clear and personal points of contact for any given farmer/land manager to engage with on a regular basis.
- The delivery agency should seek to engage land managers and forge a sense of partnership in delivering multifunctional landscapes. This may be done through administrative policies that prioritise the quality of delivery and long-term sustainability of the scheme.
- Evaluation, enforcement and monitoring: schemes should be monitored and reviewed regularly, with independent, evidence-led decision making.
- Integration of existing long-term monitoring & filling monitoring gaps at a national scale (which will feed back into evaluation of the effectiveness of interventions).
- A baseline understanding of trust-based relationships that honours and expands upon the principle of earned recognition⁶, cluster farms and self-enforcement, in addition to independent monitoring. This should also incorporate lessons learnt from other countries and schemes to find systems that maximise benefits and trust between stakeholders.

⁶ Earned recognition is a Government initiative implemented in 2013 which 'reduces the administrative burden of regulation on those who have a strong track record of reliability and adherence to standards' (p. 4). https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/236270/pb14026-earned-recognition-plan-130830.pdf

- Funding for advice and training to help with delivery of environmental goods.
- Adopt a Payment by Results approach wherever appropriate.

Considerations for a future incentive scheme

- Available to all farmers:
 - Greater use of cover crops, diverse cropping rotations (including legumes) and grass leys (including grass-clover and herb-rich leys) in arable rotations (Integrated Crop Management).
 - Support maintenance of, or restore, mixed farming where this would create substantial public environmental and social goods.
 - Increasing soil organic carbon (aiming towards '4 per 1000').
 - Restoration/creation of on-farm features including ponds, small watercourses, small farmland wetlands, hedgerows, field margins, in-field trees, trees along watercourses, freshwater bodies (ponds etc).
 - Payments to support sharing of production land with environmental priorities, such as fallowing, conservation headlands and low-input crops followed by stubbles.
- Available on a targeted basis with strong support:
 - Restoration/creation of priority habitats (such as flower-rich meadows, wetlands, heathlands).
 - Measures to protect and increase target species (plants, fungi, invertebrates, herpetiles, birds, mammals).
- Flexibility, for example to accommodate sharing of land, resources and fodder/grazing rotations between arable and livestock farms in the same area.
- Relaxation of CAP rules on inputs on land not being cropped to allow farmers "to farm wildlife".

7 Generation of objectives and metrics

Key challenges

1. The appreciation, and prioritisation of diverse landscape 'functions'.
2. The development of an effective administrative system to ensure effective multi-functional landscape management.

Decision making unit – Natural Character Areas (NCA) map⁷, (land map for Wales).

Decision making scale - NCAs (or land maps in Wales) provide a basis for prioritising land-management options in each area. To manage NCAs effectively, a new administrative body may be needed to coordinate individual NCAs, ensuring regional and national multifunctional landscape priorities are appropriately understood and articulated. This new body could also act as the primary channel for communication between those bodies responsible for the wider socio-economic functions offered by landscapes such as health,

⁷ We recognise that there is no ideal administrative unit for managing landscapes, but have chosen NCAs as the best existing structure due to the bio-physical determination of their boundaries rather than purely administrative boundaries. We propose that the new administrative form outlined here to work with other potential administrative bodies, but recognise that while the achievement of effective multi-functional landscape management is incredibly valuable and will deliver substantial societal gains, the administrative route to achieving this needs further work. The members of this group are all very happy to be engaged with this

housing, etc. We have not attempted to determine the organisational arrangements of this multi-level governance regime (though employing Elinor Ostrom's polycentric governance approach would represent one pathway of designing this system), nonetheless, NCA priority outcomes will need to be expanded through working with other local/national agencies/local population/planning organisations (i.e. Local Enterprise Partnerships and Local Action Groups (LEPs/LAGs)), probably through the body described above. These should go beyond the "usual suspects" involved in land management to include groups like NHS Foundations and Trusts, education organisations and more urban-focused institutions to ensure the widest possible human wellbeing benefits. This could happen under the auspices of a modernised joint committee under local government act, linking local accountability (including elected representatives), or through the forthcoming Agriculture Bill, similarly to provisions in the CAP, which enable rural development funding via LEPs and LAGs. The BES Agricultural Ecology Group is happy to engage with other stakeholders and policy makers to help determine the final shape of these administrative bodies.

Metrics

Specific metrics will necessarily fall out of the particular targets that are prioritised. When setting targets and indicators, we need to adopt approaches that account for synergies and trade-offs in both biophysical and socio-economic terms. Adopting a social-ecological approach such as that outlined by Reyers et al., (2013)⁸ would provide an optimal means of achieving dynamic, integrated and systems-based metrics.

⁸ Reyers, B., Biggs, R., Cumming, G.S., Elmqvist, T., Hejnowicz, A.P. and Polasky, S., 2013. Getting the measure of ecosystem services: a social–ecological approach. *Frontiers in Ecology and the Environment*, 11(5), pp.268-273.

18 Appendix: Authors and workshop participants

The meeting was organised by:

Alfred Gathorne-Hardy, Barbara Smith, Claire Cresswell, Mark Ramsden and Stephen Peel on behalf of the Agricultural Ecology Special Interest Group of the British Ecological Society (BES).

All participants took an active part in breakout groups that produced the material that this report summarises. The report was principally collated by Barbara Smith, Stephen Peel and Alfred Gathorne-Hardy. Those who contributed substantially to writing the report are marked with an asterisk.

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