



ALL PARTY PARLIAMENTARY GROUP

Agroecology for Sustainable Food and Farming

BRIEFING PAPER

SOIL AND AGRICULTURE:

EDUCATION, TRAINING, RESEARCH AND ADVICE

**APPG on Agroecology for Sustainable Food and Farming:
Inquiry into soil health**



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The APPG on Agroecology for Sustainable Food and Farming conducted an inquiry into soil health and protection in 2015/16, with a particular focus on agriculture. Evidence was heard across three oral evidence sessions from the following expert witnesses:

Martin Rodgers (*National Farmers Union*)
Peter Melchett (*Soil Association*)
Prof. Andy Whitmore (*Rothamsted Research*)
Lord Deben (*Committee on Climate Change*)
Robert Askew (*land classification specialist*)
Prof. Steve McGrath (*Rothamsted Research*)
Georgina McAllister (*GardenAfrica*)
Vicki Hird (*War on Want*)
Prof. Mark Kibblewhite (*Emeritus professor, Cranfield University*)

Scheduled to appear but unable to on the day, the following also gave input to the inquiry:

Graham Harvey (*Agricultural journalist, author of The Carbon Fields*)
Prof. Tim Wheeler (*Department for International Development*)

The inquiry panel was drawn from members of the APPG and included the following who put questions to the witnesses:

Scott Mann MP
Simon Hoare MP
Jeremy Lefroy MP
Rebecca Pow MP
Daniel Zeichner MP
Baroness Miller of Chilthorne Domer
Baroness Young of Old Scone
Lord Cameron of Dillington

The report below is based on the evidence heard during the inquiry as well as additional information provided to the panel.

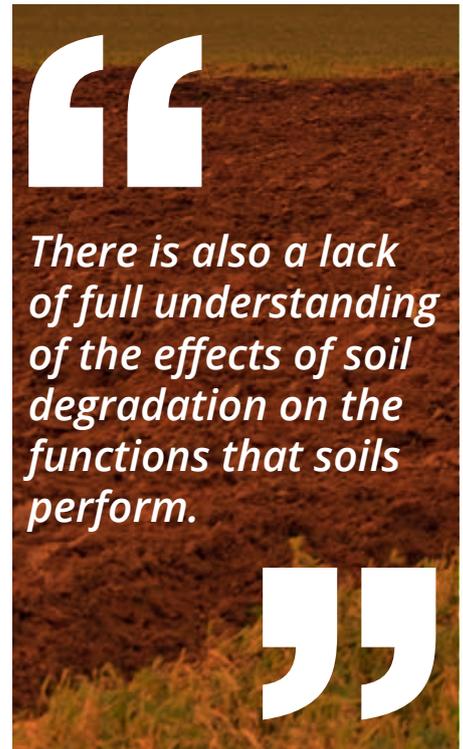
WHY SOIL KNOWLEDGE IS IMPORTANT

Any attempt to farm sustainably requires careful use and management of natural resources, including the soil, which will in practice be carried out largely by farmers and land managers. The decisions these actors make will be influenced by what knowledge farmers have of the soil and how to manage it. The APPG's inquiry heard from all witnesses about the importance of the quality of existing knowledge concerning soil and agriculture and whether and how this knowledge is transmitted to farmers and land managers.

This knowledge network includes a wide range of different actors, including farmers, advisers, researchers and developers, all of whom play a role in generating, communicating and using knowledge about soils.

STATE OF SOIL RESEARCH IN THE UK

For several years there has been a decrease in soil science research, even as the focus on other environmental factors, such as air and water quality, increased. The lack of soil scientists on the committees and panels that



determine what research projects are funded perpetuated this. The APPG inquiry heard from Professor Kibblewhite, however, that this has begun to change. Universities and research institutes have begun to focus more on soil, including increasing research funding and, just as important, coordinating the research and taking a more strategic view. The Soil Security Programme for example led by the Natural Environment Research Council (NERC), in partnership with the Biotechnology and Biological Sciences Research Council (BBSRC), Defra and the Scottish Government, hopes to encourage original research but also emphasise giving skills to a new generation of soil scientists and the importance of interdisciplinary research.¹ Another example is the STARS Centre for Doctoral Training is a consortium of eight organizations, comprising four UK universities and four UK research institutes, who are collaborating to support PhD studentships in soil science.²

But there are still crucial gaps in what we know about soils,³ many around the collation and interpretation of information on the national scale, for example detailed maps of soils or an understanding of the rate of soil degradation. There is also a lack of full understanding of the effects of soil degradation on the functions that soils perform.

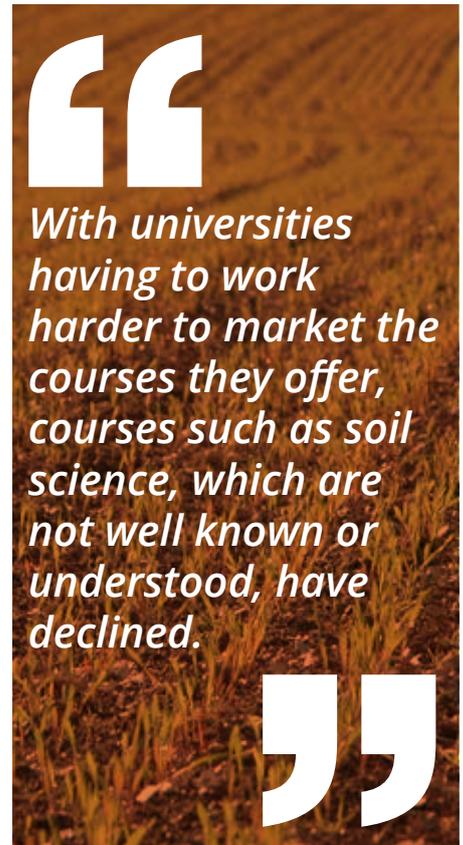
As well as these gaps in basic soil knowledge, soil research is not always fully integrated into other areas of research, such as agriculture, climate change and environmental management. This is both in terms of accounting for the impacts of future scenarios or technologies on the soil, and factoring in the impact of soil degradation or improvement on these future scenarios. For example whether better soil management could increase agricultural productivity or how far soil degradation contributes to carbon emissions.

HOW IS SOIL SCIENCE TRANSLATED INTO ADVICE FOR FARMERS AND LAND MANAGERS?

Witnesses explained that a recurrent problem is translating this research into practical applications and advice. In agriculture this is even harder than in other sectors because the industry is made up of a large number of independent actors. While there is a large amount of relevant information on soil available, the problem is that it is often hard to find and to interpret it for farmers, advisers and others.⁴ The lack of a formal structure or organisation dedicated to transferring knowledge between different actors is seen as a barrier to the efficient use of this knowledge.⁵

One problem identified during the APPG's inquiry by Robert Askew was the lack of specialist knowledge among certain professions, for example those involved in planning, farm technology development or environmental impact assessment lack training in soil science and how to deal specifically with soil issues. This is partly due to the lack of soil science courses below the postgraduate level, with no undergraduate degree devoted solely to soil science. With universities having to work harder to market the courses they offer, courses such as soil science, which are not well known or understood, have declined. While the increase in soil research may have a knock-on effect in encouraging more students to study it, this could be increased if policy makers and business both send the signals to students that soil is important.

Connected to this, and potentially a contributing factor to the lack of soil specialists, is the lack of more general awareness and knowledge about soils, which was raised by several witnesses including Lord Deben and Professor Kibblewhite. The problem is that those working in related areas,



such as agriculture or the environmental sector, are often not trained in the importance of soil, as it is given a low priority in agricultural or agronomy courses and within environmental science. This means that policymakers, farm businesses and advisers are less likely to consider soil as either a cause of problems or a potential solution. In part this is because they may find it harder to interpret or use the soil research that does exist.

ADVICE FOR FARMERS ON SOIL MANAGEMENT

The availability of independent advice for farmers has changed dramatically with the privatisation of the government advisory service (ADAS) in the 1990s and the trend towards commercial agronomists and advisers. This has created a model of farm advice and extension that relies almost exclusively on farmers being willing to pay for high quality advice on the premise that it will benefit their businesses. Professor Kibblewhite explained to the APPG that this model breaks down in the case of soils, due both to farmers not requesting or seeking out advice on soils, and advisers not being able to provide it when they do.

There are several reasons for this, including the fact that many of the most potentially beneficial interventions that farmers could make involve systems change at the whole farm level, which farmers perceive as risky.⁶ Farmers therefore demand a high level of certainty and evidence of the benefits of the change and reliable advice and guidance while implementing it. Both of these are often lacking, with evidence of a “lack of trusted independent advice, suggesting a requirement for more professional accreditation”.⁷ The fact that each farm has different soil qualities also means national research, advice and information may not always be relevant to all farms, something the NFU were keen to highlight. Instead the need for local knowledge is of paramount importance. For similar reasons, the ability of farmers, contractors and land managers to improve soil health may be constrained due to the size of modern farms. Traditionally, knowledge of the land and soil was a key component in decision making but detailed knowledge is harder to acquire on a very large scale.

A major additional barrier to the uptake of sustainable soil management practices, identified by Professor Whitmore, Professor Kibblewhite and the Soil Association, was the existence of competing financial incentives. Farmers are encouraged, by both retailers and government, to produce high volumes of food for the lowest possible cost. The resulting economic pressures mean many cannot afford to think in the long term. Unfortunately the benefits of good soil management often take years, or even generations, to be realised, while the costs in terms of paying for professional advice, are immediate. This means that even though research details the long term financial risks of poor soil management, farmers may still not feel able to act. In part this is because the financial benefits, for example information about the value of good soil management to gross margins, may not be clearly presented to farmers. The fact that up to 80% of the costs associated with soil degradation are borne not by the farmer but the public creates an additional disincentive to pay to prevent them. If these externalities are captured, then this may offer an opportunity to give farmers further financial incentives to improve soil health.



SOLUTIONS AND GOOD PRACTICE

Despite the difficulty of providing good advice to farmers, there are positive examples to draw on, one of which was set out by Professor Kibblewhite. In the absence of a national, public advisory body, the best option may be networks of farmers, encouraging them to learn from each other, helped by the creation of “beacon” farms from the most progressive ones who others may follow. Such collaborative working is seen in the Catchment Sensitive Farming programme, which brings farmers and advisers from specific catchment areas together to discuss how they could solve the problems facing them. Independent assessments have shown that the programme has had a positive effect, though it is now facing cuts and job losses, including the loss of some of the on-the-ground advisers. Another example given by the Soil Association is the Innovative Farmers’ “field labs” programme, which allows groups of farmers who are interested in addressing particular issues or problems to work with a scientific researcher to trial different solutions on their farms.

It is important to show farmers evidence that what they are being advised to do works. This used to be done by demonstration farms, which served to translate scientific research into locally appropriate practical advice that farmers could observe and repeat. Farmer discussion groups and workshops can help to achieve this, for example the NFU ran a series of workshops and discussions, and published case studies, in 2015 to show how improved soil can bring benefits to farmers.

The NFU also underlined, in evidence to the APPG, the importance of strong relationships between advisers and farmers and of repeated visits from advisers and repeated interactions between neighbouring farmers. This is the most effective way to bring about changes in practice given the fact that farming is made up of multiple individual and independent actors, all of whom need to change in order to produce change at the regional or national level.



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POLICY RECOMMENDATIONS

- **Increase the prominence and availability of soil knowledge throughout the education system**

Embed soil understanding in agricultural colleges; ensure soil science is given a high priority within more general environmental courses and include courses at a lower level, e.g. A Level. Increase public awareness of the many important functions that soil performs. This would have the dual benefit of increasing the flow of soil specialists and ensuring that policymakers, farmers and environmentalists, and others, pay closer attention to the role of soil in achieving their aims.

- **Better dissemination of good management practices**

Through more cohesive and inclusive systems of knowledge sharing. Include clear evidence of what works, including the financial costs and benefits as well as any additional costs or savings not borne by the land user. Ensure information and original research is readily available, accessible and interpretable by farmers and advisers. The last 10 years has seen a progressive increase in soil research, especially soil biology, but this now needs to be translated into practical applications at the farm level.

- **Building and preserving networks**

Farmers engage very positively in network approaches (e.g. Catchment Sensitive Farming), that over time can create credible, trusted advisors. This needs to be sustained over long periods of time to be most effective.

¹ <http://www.nerc.ac.uk/research/funded/programmes/soilsecurity/news/ao-fellowshipawards/>

² <http://www.starsoil.org.uk>

³ <http://publications.naturalengland.org.uk/publication/6432069183864832>

⁴ Defra, 2005, <http://www.envirobase.info/cgi-bin/searchdetail.pl?grn=RES3914>

⁵ Kibblewhite, M. 2010. Gap Analysis on the Future Requirements of Soil and Water Management in England Cranfield University. Report commissioned by Royal Agricultural Society of England. URL: http://www.rase.org.uk/pdfs/Soils_gap_analysis_final_report.pdf

⁶ <http://publications.naturalengland.org.uk/publication/2748107>

⁷ Kibblewhite, M. 2010, Op Cit



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