

National Soil Health Policy workshop 6th February 2020 UK CEH Lancaster

Purpose of the workshop

The overall aim of the workshop was to share future thinking with respect to soil protection policies across Scotland, Wales, England and Northern Ireland as we depart from the EU. A group of research organisation with expertise in national-scale soil data and analyses (UKCEH, BGS, Cranfield University, Forest Research and James Hutton Institute) wanted to explore how current research activities could support these initiatives going forward to ensure national policies are met whilst maintaining a UK-wide perspective and connection. There was also the potential for workshop to form the basis for a joint submission to the UKRI Strategic Priority Fund focussed on soils research needs of the policy community.

The workshop was attended by 29 participants from 15 organizations (see Annex A)

Selection of discussion topics

An initial series of topics for discussion had been proposed by the research community prior to the workshop. At the start of the workshop, the policy attendees were asked to prioritise these suggested topics and also to suggest additional topics, with the goal of selecting a limited number of topics that could be covered in useful detail during the one-day workshop.

Initial topics proposed for discussion

- Tracking change / monitoring
- Land Management Practices
- EU Soil Health and Food Mission Board update
- National Policies
- Net zero and climate change

Final topic priorities, selected by attendees, for the discussion agenda of the workshop

1) Tracking change and monitoring (why, how and who does it)

The following issues were raised: the need for a baseline and benchmarking; understanding direction of change and its relationship to soil improvement or degradation on a site basis; definition of soil health – is it agreed?; opportunity of using Natural Capital principles; opportunities for EO (Earth Observation) and new and future potential technologies; how to do soil biology at field and national scale – start or wait for methods coming through?; access to data and data analysis approaches; commonly agreed set of methods across the UK to feed into national programmes; relative importance of national vs farm based monitoring; interpretation of change / trigger points for action; potential value of “quick and dirty” measurements; credibility of measurements by different labs; monitoring on farm can be different to national scale monitoring – different purpose and potential of methods and technologies; how to move away from paper to a digital system for farmers recognising not all will welcome this and there are wifi / broadband access issues; how to have robust evidence-based measures of soil change for governments / stakeholders. (See EA report - Black et al. 2008 for a proposed new national soil monitoring network proposed by the collective monitoring community; Rawlins et al. 2017 for assessment of value of commercial lab data for national monitoring programmes; see Defra’s current guidance on soil sampling for fertiliser applications (RB209) which can also be used for sampling for other determinands:

<http://adlib.everysite.co.uk/adlib/defra/content.aspx?id=2RRVTHNXTS.88UEXK17ISSM6>).

2) National policies (what works and doesn’t work)

Opening discussions included issues related to: uncertainties and robustness of evidence; need for regulation but lack of evidence to support it; CAP incentives; metrics of success; national commitments and targets; more/better evidence to convince farmers to act; resilience of interventions to future climate change.

Following the opening discussions, the session focussed on current plans in the different nations for testing with respect to new payment schemes:

Wales (KW): Proposals are under-development for the new farmer payment scheme – Sustainable Farming Scheme. Currently these proposals relating to soil include; farmers coming into the new scheme are contracted; agency does soil testing professionally; and after 5 years agency does it again; farmer does it in years between to reconnect and gain better insight into changes and enable adaptive strategies; access to a proposed advisory service for farmers to receive advice and training on how to best produce environmental goods; farmers will need to evidence actions undertaken which lead to better air and water quality and show that soils are maintained or improving (N, P, K, C, pH and others being explored); baseline requirement (scale) – payment for actions which evidence shows should see soils improve; do more – pay more principle being explored; unsure how farm data will be delivered as yet but likely to build on existing good work of RPW and Glastir small grants; understand concerns of ensuring payments for maintaining good status.

England (Defra/EA) (HC/AM): There will be ELM scheme standards, however, exactly what these will look like is too early to tell. We are currently carrying out tests and trials to help inform the future scheme. Soil monitoring is needed and land managers could be incentivised to collect good data but an agreed set of measures not yet in place; clear that farmers should not be paid just to bring soils to a base standard; questions raised about uncertainty of farmer measurements; also concerning accessibility of data.

Scotland: Scottish Government is in the process of scoping out a project relating to soil health, the difference to soil quality and the relationship to soil type given different soils serve different purposes. An initial project is being commissioned after a very productive workshop with all the relative stakeholder i.e. SEPA, SNH, SG JHI, and other research organisations relating to measuring the vulnerability of Scottish soils to a changing climate.

Northern Ireland: No one from NI was present but understanding amongst the workshop attendees was that there is major interest in soils and GHG emissions in NI.

3) Climate change and soil carbon/health/resilience (questions and scenarios)

Definition of soil health: Soil health issues should include potential for GHG emissions (e.g. methane) as well as soil C. The 2018 Defra/Sustainable Soils Alliance Workshop (see report) focussed on soils and the Defra 25 Year plan and identified clear metrics which the community agreed on with respect to national monitoring and also farm level monitoring. See also Buenemann et al 2018 for most used global indicators.

Soil Carbon: Soil organic C is meant here. Soil C is considered by soil scientists as the best single indicator of soil health (see 2018 Letter to the Times by 31 senior soil researchers). Soil C is also considered a measure of climate change mitigation, for which farmers think they can receive direct payments. Some expressed the view that these competing concepts (soil C for soil health vs soil C for climate mitigation) undervalue the soil health benefits and the values of restoring 'C-rich habitats' for biodiversity. Soil C change potential for climate mitigation is relatively small relative to other solutions/technologies for achieving Net Zero – and general agreement the focus should be on soil health.

Tree planting: New trees will need to be planted on agricultural land, including arable, to contribute to Net Zero (Climate Change Commission advice). On some soils tree planting will lead to increased soil C, (but not all – and some may decrease soil C) however Impacts of planting on soil structure also need to be considered. Soil C can be increased but not necessarily soil health. It's not just about CO₂ stored, but also about GHG (e.g. methane) changes/sources involved in forestry management and harvesting. Different tree species have different effects on soils. Tree species resilience to climate change is important but often overlooked for long-term planning.

Arable: Current estimates of soil C change in arable is 0.4% C lost each year. All national soil monitoring programmes agree that the concentration of soil C has declined in arable systems but, in Scotland, increased plough depth has meant that the overall stock of soil C has remained stable.

Organic-rich soils: Generally agreed we don't want to grow trees on peats, but what about organo-mineral soils (see 2011 Defra report)? What to plant in the uplands on organo-mineral soils? What are the benefits of trees embedded in the landscape as opposed to forests or plantations? There is clear evidence now tree species have different effects on soil C sequestration primarily through the tree biomass. Evidence to show that planting trees can increase soil C decomposition in organo-mineral soils but can the growth of trees lead to net C gains? Evidence is missing on how to embed trees in different land structures. Forests will become C-positive, but what about grasslands? The type of grasslands is important – don't just call it "grassland". Missing information about how much C is in the soil vs. how much it can be increased – perhaps the focus is wrong (see Poulton et al 2018; 2019 Welsh Gov Soil C Evidence report to support the new farmer payment scheme SFS in Wales).

Increasing the Soil C store: Increasing soil C is not necessarily feasible in all UK soils, but keeping the soil C we have is at least as important. This can be promoted by managing the land "properly". GHG emissions can be moderated or avoided by less intensive land management practice. In Scotland statutory land use strategy – ministers are committed to regional land use frameworks – farmers make the decisions of the right trees in the right place (under the climate change act) – more regional approach.

4) Coordination and communication (across countries & raising awareness about soils)

It was agreed there was a major opportunity at COP26 for the community to summarize the state of knowledge regarding soil carbon and links to management. It was noted the work commissioned by BEIS for the Land Use, Land Use Change and Forestry (LULUCF) GHG inventory found no evidence of a significant link for grassland management effects on soil C, thus grassland management/change is not in LULUCF. Messages regarding the role of soil C in health, biodiversity, climate mitigation need to be simplified but not misleading (e.g. the use of SOM, SOC and soil C without explanation). Other topics briefly touched on included: farmer engagement; science information farmers can use; soil scientists tend to focus on what we don't know and uncertainties rather than re-affirming the solid evidence base that is available.

Specific Strategic Priority Fund (SPF) submission: When linking science questions and policy needs the issues around soil science are often too detailed and too far from being operational for policy/governments. In addition, soils can lack the impact of other natural resources as people value water and air more as people don't breathe or drink it. There is also the issue of how soil changes over time scales that are important for ministers. However that policy thinking has to change to focus on long term and future generations to meet the UN SDGs (e.g. as in the Well Being of Future generations Act in Wales).

Topics raised to be considered for inclusion in a submission to SPF were:

- Interventions for soil health (tracking change, success, evidence); Evidence on impacts on land management practices (certainty of outcomes, theory of change); Climate change – priorities for soil health under climate change (cross cutting); Re-connect people with soils – public and land managers; Why are soils not managed/monitored/measured?; What are the points of entries to the communities who should be concerned with soils and the public in general?

5) Evidence and research needs

(Note: This not completed as there was insufficient time).

Next steps

A) All participants

There was agreement the workshop was very useful and face-to-face meeting was important.

- All Agreed to meet once a year – lunch to lunch
 - Day 1 afternoon – sharing current priorities and issues
 - Day 2 morning – specific topic identified by email
- Additional organisations to invite:
 - Natural England & NI government (invited here but could not attend)
 - Specific Universities for expert topics for Day 2 morning session
 - A limited number of Early Career researchers to be invited alone (1/organisation)
- All to note: World Congress of Soil Science in 2022 (Glasgow22) - <https://www.soils.org.uk/wcss2022>

B) Policy agencies and governments

- Explore mechanism for regular communicating/exchanging ideas (Skype meetings ½ yearly?)
- Consider need to revise previous soil thresholds (see Merrington et al. 2006)
- Consider the value of a central database for farmer data when tested by professional labs
- Consider the need for Government-led labs with licensing

C) Soils Research Community

- Draft and submit a “research idea” NERC for the UKRI Strategic Priorities
 - *Submission to NERC completed Monday, 10 February, 2020 (see attached pdf)*
- Provide important relevant documents to workshop participants *The items above are being sent using a file transfer system – see following email:*
 - 2019 DEFRA – Sustainable Soil Alliance 25 Year Plan workshop – Report and Recommendations.
 - 2019 Evidence report Welsh Government for soil carbon to inform the new farmer payment scheme in Wales – the Sustainable Farm Scheme (SFS).
 - 2018 Journal (Soil Biol Biochem): Buenemann et al 2018 – Soil quality indicators, a critical global review.
 - 2017 Letter from 29 scientists in Times supporting use of soil organic matter to support subsidy payments.
 - 2017 Journal (Global Change Biology): Poulton et al 2018 – Limitations to achieving 4 per mille
 - 2017 Journal (Eur Jour Soil Sci): Rawlins et al. 2017 – Farm management data and their value for contributing to national soil monitoring.
 - 2011 Defra report - Bol et al. 2011 - Organo-mineral soils and their response to management.
 - 2011 Defra - RB209 Fertiliser Manual Appendix 3 Sampling for soil pH, P, K, Mg and Na <http://adlib.everysite.co.uk/adlib/defra/content.aspx?id=2RRVTHNXTS.88UEXK17ISSM6>
 - 2008 EA report - Black et al. 2008 – Development of a new national soil monitoring network by the monitoring community.
 - 2006 SNIFFER report – Emmett et al. 2006 - National Soil Monitoring Network: Review and assessment study. Final Report, SNIFFER, Project LQ09.
 - 2006 EA report - Merrington et al. 2006 – Identification of thresholds for soil indicators
- Establish central location for sharing key documents
 - *UKCEH exploring appropriate websites*
- Research Community members to update UKCEH on bilateral actions which follow from the workshop. This is for reporting to UKRI/NERC.
 - *The Soil Community Workshops are financially supported by the NERC National Capability UKSCAPE SOC-D project*

National Soil Health Policy workshop, 6th February 2020 UK CEH Lancaster

Annex A: Attendees, affiliations and self-introduced specialities

Policy Community - Wales

Keith Watts (KW) – Welsh Gov. – replacement of CAP
Ian Rugg (IR) – Welsh Gov. – soil policy team, land classification
James Cook (JC) – Welsh Gov. – WG soils programme

Policy Community - England

Anna Mikis (AM) - Defra – Science advisor, land use team, soil monitoring delivery
Harriet Cooper (HC) – Defra – Policy advisor, soil health
Tracie Evans (TE) – Defra – Natural Science Strategy - ELM
Tom Smith (TS) – Defra – Monitoring & Evaluation, ELM
Jasmine Burr--Hersey (JB) - Defra – Compaction, remediation, environmental analysis 25-year plan
Laura Velasquez (LV) - Defra – Land management team, SOC sequestration
Jessica Bellarby (JB) – EA – Biodiversity team, ELM
Mat Davis (MD) - EA – Soil scientist by training, soil protection and materials to land
Jim O'Neill (JO) – Forestry Commission – Forests, reintegration of land management, soil health and farmers

Policy Community - Scotland

Heather McCabe (HM) - Scottish Gov. – Soils and climate emergency
Karen Dobbie (KD) – SEPA – Soils and climate change and nutrient cycling, water quality, droughts
Kerstin Kinnaird (KK) – Scottish Forestry – Climate change, land use, forest policy soil protection
Amy Nicholson (AN) – Scottish Forestry – Climate change plan in Scotland, soils
Patricia Bruneau (PB) – Scottish National Heritage – Soil health and climate change
Sarah Govan (SG) - ClimateXChange – Knowledge exchange manager

Research Community

Bridget Emmett (BAE) – UKCEH – Head of Soils and Land use
David Robinson (DAR) - UKCEH – Soil monitoring lead
Amanda Thomson (AmT) – UKCEH/BEIS – Lead UK LULUCF inventory
Elena Vanguelova (EV) – Forest Research – Leader soil sustainability research, biogeochemistry
Frank Ashwood (FA) – Forest Research - Ecologist
Andy Tye (AT) – British Geological Survey – Soils and landscape team, soil moisture
Jim Harris (JH) – Cranfield University – Systems ecology
Jack Hannam (JaH) – Cranfield University – Field survey data
Allan Lilly (AL) - James Hutton Institute – Lead on Scottish Government funded soils database, risk maps
Alessandro Gimona (AG) - James Hutton Institute – Climate & land use change, digital soil mapping

UKRI/NERC

Simon Kerley (SK) – NERC/UKRI – Head of Terrestrial Sciences

Observers/Organizers

Jack Cosby (BJC) – observer UKCEH
Jeannette Whitaker (JW) – observer UKCEH
Sabine Reinsch (SR) – organizer/observer UKCEH