SUSTAINABLE SOILS ALLIANCE

30 September 2019

Response to the:
Environment, Food and Rural Affairs Net Zero inquiry

The Sustainable Soils Alliance (SSA) was launched in 2017 to address the current crisis in our soils. Its aim is to restore soils to health within one generation by seeing soil health elevated to where it belongs as a priority alongside clean air and clean water. The SSA is a non-profit organisation (CIC number 10802764).

Soil Carbon: Background:

- Soil Carbon sequestration from farming sits alongside forestry as the only two industries that can take carbon out of the atmosphere at any significant scale. UK soils store over 10 billion tonnes of carbon in the form of organic matter, but this figure is declining. UK arable soils are losing 0.4% (or 4‰) of carbon per year (11% loss over 25 years).
- Sequestering carbon in the soil was formalised into international climate change protocols in the UN's 2015 Lima-Paris Action Agenda. The commitments included several on agriculture, notably the aspirational "4 per 1,000" initiative, to which the UK is a signatory, which aims to increase the amount of carbon in agricultural soils, grassland and forest soils by 0.4% every year and to promote actions to globally increase soil carbon stocks.
- The November 2018 Climate Change Committee Report: Land use: Reducing emissions and preparing for climate change observed that improved farming practices such as better soil and livestock management have the potential to deliver up to 9MtCO2 of emissions reduction by 2050. It calls for new land use policy to promote transformational land uses and reward landowners for public goods that deliver climate mitigation and adaptation objectives.
- Last month the IPCC special report, Climate Change and Land, included soil carbon increase among the most significant climate actions in the land use sector.
- This month (September 2019) EU farming ministers met in Finland to discuss how to best support soil carbon sequestration through national measures and the EU's Common Agricultural Policy (CAP) and to consider whether these farming policy plans provide the right framework for improved soil carbon sequestration – with half an eye on CAP 2020 reforms.

1. How could 20% of UK agricultural land be repurposed to increase forest cover, restore peatlands, implement catchment-sensitive farming and enable agricultural diversification, whilst maintaining current levels of food production?

a. Are there other practical and economic ways for the agriculture sector to achieve net zero emissions?

- Yes. Increasing soil carbon can make both a practical and economic contribution to the agriculture sector achieving net zero emissions. Increasing soil organic carbon content does not require land-use change and does not create demand for more land conversion.
- Increasing soil carbon can not only maintain but increase levels of food production since soil that is rich in organic matter produces higher quality, more nutrient dense, produce. Soil carbon has other environmental and social benefits: water retention and infiltration, soil structure and aeration, resilience to drought /flooding, improved biodiversity habitat and a reduction in the risk of erosion.
- There is widespread scientific consensus around the farming practices that can protect and increase soil carbon. These include reduced or no-tillage, diversifying rotation, cover cropping/grass and legume leys and increased manure application.

- The policy framework promoting the adoption of these practices should combine land manager education, incentivisation, monitoring, regulations and enforcement. It should also recognise and reflect certain critical challenges unique to soil carbon, in particular:
    - *Variability:* The effectiveness of the practices listed above in increasing soil carbon stocks will vary depending on the location - crop, soil type, seasonal and climatic conditions across the country, and how management changes are applied. Arable soils have greater scope for increase than grasslands, because arable soils have lost a large proportion of fertile topsoil through intensive agriculture (11% loss over 25 years), but soil type is also a factor - scope for sequestration on sandy soils might be as low as 2-3%, versus 30-40% for regions with peaty soil.
    - *Permanence*: To be genuinely meaningful, sequestration needs to guarantee carbon is kept out of the atmosphere for the very long term (decades/centuries). This should be reflected in the design of any incentivisation measures, and the role of legal restrictions (e.g. conservation covenants, clauses in tenancy agreements) should be considered to guarantee longevity.
    - *Saturation:* Soils have a carrying capacity for carbon, (some scientists estimate between 20 and 50 years before global soils are saturated. Alongside sequestration, policy focus should be on measures aimed at keeping current terrestrial carbon stocks stable.
    - *Unintended* consequences: It is necessary to make sure that any practices to increase soil carbon do not cause net increases in other GHGs (nitrous oxide is the main concern). For example, increasing manure may increase carbon but can also increase N2O emissions or nitrate leaching.
    - *Measurement:* The routine, accurate measurement of soil carbon in agriculture is possible but it can be laborious and expensive - especially when deep soil carbon and seasonal fluctuations are taken into consideration. A variety of different methods and technologies exist for different soil carbon metrics with different levels of precision. Measuring soil carbon concentration (%) is relatively cheap and easy, compared with measuring soil carbon stocks which requires the assessment of bulk density. The technology chosen will reflect whether the user wants to use the information for general knowledge on soil status or for assessing carbon sequestration.

- The variabilities outlined above mean soil carbon's potential role in climate change mitigation both on-farm and at nationwide level is contested, and currently carries a risk of being both over-and under-estimated.
- Globally, a number of projects are underway looking to quantify the amount by which we can increase soil carbon storage to mitigate climate change. These include the research project LOCKED UP, funded by the Natural Environment Research Council (NERC) and led by the Centre for Ecology & Hydrology. This 4-year study aims to improve understanding of the processes of soil carbon formation, stabilisation and loss, and is due to be completed in 2023.
- The absence of clear, measurable data enabling the precise quantification of soil carbon's climate change impact will not be available in the near future. In the meantime this gap in our understanding should not be an obstacle to the wholehearted, nationwide adoption of soil management practices that promote carbon uptake by soils.
- We know enough to be confident that small increases in soil carbon over very large areas could significantly reduce net carbon dioxide emissions from agriculture and that soil carbon increase carries with it numerous environmental and productivity benefits over and above climate change mitigation.
- The soils where we have lost the most soil carbon because of historic farming practices have the greatest potential for sequestration. We are losing carbon from our arable soils so practices need to be introduced to stop the losses and protect existing stocks, as well as supporting practices to promote sequestration.

2. How important will the financial payments proposed under the Agriculture Bill be to incentivise actions to reduce, capture and store GHG emissions, and how should the payments system be designed?

- As currently proposed in the Agriculture Bill, 'soil health' cannot be incentivised under Environmental Land Management in and of itself, because it fails the test of a 'public good' – (non-excludable and non-rivalrous). However, it can be incentivised as an asset through which other public goods, including climate change mitigation, can be achieved.
- To that end, we support the conclusions of the Royal Society's 2018 Greenhouse Gas Removal report which called for reforms to the incentive or subsidy system to encourage changes of land practice, *particularly for soil carbon sequestration*.

- Any payment scheme should be designed around the challenges outlined above regarding timeframe, measurement methodology and other variables. At its heart should be a portfolio of pre-defined options (for example, reduced or no-tillage, diversifying rotation, cover cropping/grass and legume leys and increased manure application.
- Payments should be based on the following:
    - A realistic assessment of the carbon uptake potential of the soil in question
    - The fact that a tonne of carbon sequestered has the same societal value as a reduction in one tonne of carbon emissions. Soil C sequestration should be encouraged whenever it is cheaper than the least expensive measure currently being used to meet climate policy targets.
    - Climate change mitigation sits alongside other public goods (flood risk reduction, biodiversity protection) delivered by increased soil carbon
    - *Fairness:* farmers who have depleted carbon stocks in their soil through mismanagement should not be rewarded over and above those that have established high carbon stocks through soil-healthy practices
- The possibility of an international carbon market (including carbon taxes, carbon offsets and carbon credits) is gradually elevating the global economic importance of carbon measurement. Any publicly-funded incentivisation scheme should keep an eye on these developments and the emergence of private/commercial initiatives such as Indigo Agriculture, a Boston-based agritech start-up, which pays farmers to store carbon in soil (15$/tonne), and which is looking to establish operations in Europe.
- In time, these schemes may share with the public sector the financial burden of delivering healthy soils, but in the meantime are unproven in the market place and piecemeal. Until they are scalable, only public funding, accompanied by the required educational and regulatory framework can accelerate the widespread behaviour change needed to properly harness soil carbon's potential.

3. What support, skills, training and information will land managers need to adapt and thrive; and how should this be provided and funded?

- To enact carbon farming practices at scale, farmers and growers require access to straight-forward, practical, information. An essential precondition is that the agronomic advice that farmers receive is fully independent of those selling agrochemical and other inputs. This ensures that interests between advisor and farmer are more closely aligned with a view to optimising and reducing as much as possible the dependence of the farm system on synthetic inputs for fertility and crop protection
- We would draw the Committee's attention to the experience Soil Capital, a farm management firm which manages and advises farms on their transition to regenerative, carbon-sequestering practices across Europe and further afield. A key learning of theirs has been that it is perfectly possible to transition a large-scale farm to regenerative practices while improving profitability even from the first year, as long as that transition is approached with the right blend of agronomic and financial expertise and is not executed too aggressively.
- To effect this, a transition that gradually restores soil health and increases profitability through~~,~~ specialist advice is then needed on topics like input optimisation, compaction reduction, rotation planning including use of multi-species cover crops to keep soil covered, minimum and no till practices, inter-cropping techniques including agroforestry and the integration of livestock and arable systems.
- This specialist advice can be funded by farmers themselves out of the savings that are generated by a thoughtful approach to transition, but we must recognise that relying on such an approach ignores the many market, policy and social forces that serve to reinforce inertia around conventional approaches to farming and will therefore be slow and incremental. Having this advice funded by governments (on the basis of public goods created), buyers or finance providers (on the basis of commercial benefits created) will accelerate change

4. How could innovative technologies and farming practices help the agriculture sector achieve net zero? Are they currently commercially viable or is there a viable path to market for them?

- Emerging technologies and tools are making carbon sequestration and measurement easier to implement. However, many are unproven or as yet unstandardized. More research is needed into their efficacy and implementation if their potential is to be seized.

- For example, scientists are looking globally into ways of identifying and breeding crops with root systems that are more capable of creating organic soil matter or increase the time spent in the soil between seeding and harvest. No-till agriculture has become more popular in recent decades, while newer technologies are making it easier to implement, such as direct-seed tools.
- The development of ways to measure soil carbon using satellite and drone-based data collection may provide ways of measuring agricultural soil carbon accurately and at reasonable cost. In due course, computer modelling based on standardised agricultural practices, aided by remote sensing data collection will contribute to ensuring fair, consistent and comparable data is provided and with it a viable system of accounting processes and incentives
- Biochar (organic material that has been carbonised under controlled pyrolysis'in the presence of little or no oxygen to leave a solid residue) is recognised as a negative emissions technology that is viable, scaleable and available now. Biochar also improves the fertility of degraded soil by increasing moisture retention, improving nutrient efficiency and proving a permanent home for soil microbes around the roots of plants. More research into biochar's long-term potential is needed, as well as a clear appreciation of its broader environmental impact – e.g. source material must be traceable and certified, and not compete with other land used.

7. How can any reduction in UK-agricultural GHG emissions be achieved without 'offshoring' emissions to other countries via increases in the consumption of imported foods in the UK?

- The challenge of optimising soil carbon's potential is a global one, and given the economic and environmental opportunities at stake, it is vital that the UK collaborates where possible with international initiatives to ensure a coherent model for it. With that in mind, we urge the government to use the 2020 Glasgow Climate Change Summit as an opportunity to renew its commitment to the aspiration behind the UN "4 per 1,000" initiative, and so demonstrate global leadership.
- Imported products for agriculture are a source of significant GHG emissions, with soil depletion a critical but overlooked element of imported food's carbon footprint, and source of other social issues. The IPCC report refers to soil management among the initiatives with the most potential to make positive contributions to sustainable development, enhancement of ecosystem functions and services and other societal goals.