Soil in the Indicator Framework for the 25 Year Plan
Policy Recommendations

The following Recommendations have been drafted by the Science Panel of the Sustainable Soils Alliance (SSA) and represent the SSA’s view on the key policy, practical and economic steps that the government needs to take to fulfil the aims of both the 25 Year Plan for the Environment and the government’s goal of achieving sustainably managed soils by 2030.

The Recommendations draw upon discussions that took place at a Workshop (09/10/18), *Developing the Indicator Framework for the 25 Year Plan*, organised by The SSA on behalf of Defra and attended by individuals and organisations with an interest in soil drawn from scientific, NGO, academic and business backgrounds. The workshop summary report is available upon request.

1. **Key recommendation: Headline Indicator**

We recommend that *Soil Health* be included among the Headline Indicators (thus bringing the number of Headline Indicators to 16). Failure to do so will lead to the continuing degradation of our soils and the inability therefore to meet the goals of the 25 YEP.

Soil is much more than just an agricultural or forestry ‘resource’, but a means of delivering many intrinsic environmental benefits. Including soil as a Headline Indicator would reflect and enforce the Plan’s own internal logic and structure.

The inclusion as a Headline Indicator will also enable soil to be considered within the four relevant land asset classes (Mountain, Moor and Heath; Woods; Farms; Towns and Cities). This would recognise that the intended direction of change can vary by the land use and services delivered (e.g. nitrogen increase could be positive for ‘Farms’ but negative for ‘Mountain, Moor and Heath’).

The Headline Indicator would be a composite indicator of ongoing trends in the four relevant asset classes, and we recommend that these be included in the final document as four separate System Indicators. This approach is taken for other Headline Indicators e.g. Biodiversity (Headlines 4, 5 and 9) which are themselves split into two or three System Indicators.

Thus we recommend that soil should appear as:

Headline Indicator 16 Soil Health made up of:
- H41 Healthy soil in Mountain Moors and Heath
- H42 Healthy soil in Woods
- H43 Healthy soil in Farms
- H44 Healthy soil in Towns and Cities

And thus be deleted from H29 in *Harvesting of Natural Resources*. 
2. Nationwide monitoring

We recommend that a national monitoring programme be created to underpin the 25 Year Environment Plan’s goals and the specific objective of achieving **sustainably managed soils by 2030**. The programme will be the key mechanism to verify progress towards this goal.

The Programme should be designed to report on changes in soil health by use, rather than type. It should be a five-year rolling programme executed across repeat sites so as to track trends rather than specific levels.

These trends should demonstrate a clear direction of travel with set objectives in mind e.g. reduce erosion, enhance carbon content, increase flood water storage etc.

3. Investment

We recommend that the financial investment committed to nationwide soil monitoring reflects soil’s considerable economic significance, demonstrable by its influence upon a number of negative environmental impacts such as flash flooding, greenhouse gas emissions, eutrophication, water quality and treatment costs etc. as well as its fundamental role in supporting national food security and agricultural productivity.

Parliament’s Environmental Audit Committee’s recent conservative estimate puts the current costs of damage to soils at £1.2-1.4 billion a year, with 80% of costs incurred ‘off-site’ and thus borne by society (Graves et al. 2015).

As an indicative yardstick of the investment needed, the government should use the costs associated with the monitoring and measurement of other important natural assets (water, air and biodiversity), and provide commensurate financial support.

Nationwide soil monitoring should provide the evidence base required to support Natural Capital accounts, providing an improved understanding of the public goods delivered by soils.

4. Measurement Indicators

Underlying the System and Headline Indicators, we recommend that a set of environmental indicators be agreed upon. For each Asset Class, a different mix/combination should be used to reflect the different pressures and concerns within, and so tell a coherent, revelatory and above all practical story of change in soil properties over time.

The following indicators should be used as having been clearly linked to delivery of goods and services and/or an issue of concern (e.g. erosion, climate change), as well as being practical for a national monitoring programme:

1. Soil organic carbon – (measured to 15 cm and 1 m depth on a soil volume basis), important for sequestration, nutrition and stability
2. Soil pH – important for biomass production and water quality
3. Bulk density – for soil structure and compaction
4. Soil N and P – important for production and risk to water quality
5. Soil sealing and erosion – determine loss of soil
6. Soil contaminants – provides levels of exposure and insight into emerging contaminants

Other indicators were identified as being in need of further development or are duplicated in other Headline Indicators e.g.

- Soil biota: this should be covered in Headline 8 as functional species; earthworms were useful for farmers but would not be practical for national monitoring due to seasonal and specific site conditions. Methods to characterise the soil microbiome (e.g. environmental DNA assessments) are not yet well enough established to be recommended for monitoring currently.
- Soil structure: Visual soil assessment methods need further development to be sufficiently statistically consistent to measure meaningful change in soil health

In any national programme of soil sampling and analysis, procedures should be agreed and adhered to, to optimise detection of change and ensure the evidence is robust. Ideally, the methods should be easily followed and applied more widely by those interested in healthy soils, enabling benchmarking to national monitoring, and the generation of complementary datasets.

For monitoring by Defra and the wider community, there is no need to reinvent the wheel, since past monitoring programmes have clear methods and also provide a proposed combined approach going forward (EA, 2008). There are also clear guidelines for farmers undertaking soil sampling e.g. RB209 (Defra, 2010, AHDB, 2017) developed for fertiliser guidance and nutrient management.

Similarly, there is considerable work already available on maximum thresholds (e.g. Environment Agency report, 2008). Where these are not available or there is uncertainty, this is no justification for inaction as there is strong consensus in the community for when direction of change over time is undesirable e.g. increase in contaminants; loss of organic matter; increase in compaction.

5. Links with other sectors

We recommend that, where practicable, steps be taken to link nationwide soil health monitoring with work undertaken on farm and by other high-impact industries in order to make maximum use of data available, aggregate results, promote and disseminate best practice, and drive a common purpose in soil conservation and restoration.

These efforts should however take account of both legal (e.g. GDPR, intellectual property) and practical limitations.

Where possible, nationwide monitoring should be used as a platform to link in and engage other sectors and industries to provide specific socio-economic benefits. For example, using organic and mineral ‘waste’ materials will rebuild soils’ structure, which helps the water industry store water in the catchment as part of soft flood management schemes, whilst also helping to retain agrichemicals on the field through reduced soil erosion and diffuse pollution.
The reference to ‘waste’ as a resource in the 25 Year Plan is highly relevant to soil. For the circular economy to work, we recommend that government policy reflects the various markets for organic ‘waste’, which if not returned to the soil can contribute to long term soil carbon deficits, especially where there is competition for these organic inputs/materials from the energy sector.

This linking of waste, energy and land use is an exemplar of breaking the siloed environmental thinking that the 25 Year Plan for the Environment looks to achieve.

6. Access data already available

To ensure soil survey information is more widely available and used, IPR and GDPR issues need to be resolved to improve access. One exemplar of making soils data more available is the UK Soil Observatory (http://www.ukso.org/home.html) which hosts data and maps from seven organisations across the UK and now has more than 450 users per day accessing data, maps and downloading soil monitoring apps.

7. Archive

We recommend that the government continues to invest in and to encourage the use of national soil archives e.g. National Reference Centre of soil samples from the National Soil Inventory (Soil Survey of England and Wales) held at Cranfield and the dried and frozen archive held by Centre for Ecology and Hydrology (Countryside Survey) so that we can test soils retrospectively, especially for emerging contaminants and long term trends in soil properties.

8. Rate of change

We recommend that the government takes an informed approach to the rate of change in soil, the implications of this and how this might be communicated to both public and political audiences.

Specifically, we emphasise that soils are as diverse and complex as other Headline Indicators (e.g. ‘biodiversity’). Past work has demonstrated that, with sufficient investment, both positive and negative changes can be measured in soils in a manner that is adequately robust and transparent to provide evidence of policy failures or successes over the timeframe required. The aim is to provoke the interest and imagination of the general public and drive engagement with soil conservation and restoration.

9. Terminology

We recommend that the terminology used for the Headline Indicator be changed from ‘Soil Health’ to ‘Healthy Soils’. This reflects the stratified approach across four asset classes outlined and is consistent with the concept of ‘Healthy Seas’, referred to elsewhere in the 25 Year Plan.
The Sustainable Soils Alliance Science Panel:

- Professor Chris Collins, Reading University
  Professor of Environmental Chemistry, Coordinator of the NERC Soil Security Programme

- Professor Bridget Emmett, Centre for Ecology and Hydrology
  Science Area Head, Soils and Land Use

- Professor Jane Rickson, Cranfield University, Soil and Agrifood Institute
  Professor of Soil Erosion and Conservation

- Dr Elizabeth Stockdale, NIAB
  Head of Farming Systems

- Professor Jonathan Leake, University of Sheffield
  Professor of Animal and Plant Sciences

- Professor Iain Fraser, University of Kent
  Professor of Agri-Environmental Economics

- Professor Karen Johnson, University of Durham
  Professor of Environmental Engineering

References

AHDB. 2017 Nutrient Management Guide (RB209),

