CARBON ACTION

Proposal for an EU "Soil Monitoring Law"

FEEDBACK TO PUBLIC CONSULTATION

November 3, 2023

As a joint contribution of the Finnish Carbon Action platform and multistakeholder community, Baltic Sea Action Group, as the host of the platform, puts forth the following statement on the proposed "Soil Monitoring Law" as contained in 'COM(2023) 416 final' and its annexes. This feedback is mostly framed in the context of agricultural soils with some observations on forestry soils and focuses on how well the proposed approach and indicators respond to the set objectives.

BSAG's mission is to restore the ecological health of the Baltic Sea in the changing climate supporting a sustainable co-habitation of people and the wider ecosystem. For this aim, BSAG is hosting the Carbon Action multi-stakeholder co-creation platform which aims for regenerative food systems minimizing pressures on the environment and enhancing the maintenance of multiple ecosystem services.

Soil health is the basis of sustainable food systems. Healthy soils are keys also to the health of aquatic ecosystems as well as for climate action locally, regionally and globally.

Therefore, we strongly support the background assessment, justification and overall objectives of the Soil Strategy and the proposal for a Soil Monitoring Law as they recognize and stress the soils as vital ecosystems and habitats and providers of multiple ecosystem services.

EU action and intervention is essential in turning the negative trends in soil degradation, erosion and loss of soil productivity. In particular, EU action and regulation is needed in the structural and systemic conditions and drivers that have contributed, and continue to contribute to the negative trends concerning soil health across different land use and climatic contexts.

As an example, the loss of nutrients and organic matter from soils is the biggest contributor to eutrophication in marine and freshwater systems as well as loss of aquatic life and habitats. Nutrient losses are a phenomenon of the current unsustainable food system and nutrient cycles, including subsidies and the market which do not value soil health or encourage long term soil care. Nutrient losses are also an indicator of challenging soil conditions, challenging drainage conditions, uncoordinated land use on the catchment level, and are aggravated by extreme weather events, so some factors are beyond the control of an individual land manager/farmer and measures at a broader scale are needed.

Soils in Europe also contain vast amounts of legacy nutrients, in particular phosphorus, which is not readily available to plants and not accounted in soil fertility analyses. Nevertheless, this legacy phosphorus is at risk of being transported from the fields into waters, where it will, over time, aggravate eutrophication.

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This is to describe that soil health is very much a water protection issue, and this aspect will be emphasized with more frequent and accentuated extreme weather events brought upon us by climate change.

In a connected way, soil health is also a climate issue. And healthy soils are a condition to both prepare and adapt and to mitigate climate change. At best, there are multiple gains with water and biodiversity protection to gain. These should be the seen as the building blocks of sustainable agricultural, food and forestry systems. As the EU aims to increase soil carbon sequestration in the name of climate action, policy coherence and integration should maintain soil health as a priority and secure the multiple co-benefits for water protection, biodiversity and productivity.

The objectives of soil monitoring law, soil strategy and the connected EU policies and strategies (ref. to COM(2021) 699) should be accelerated and supported by EU level regulation which enables and promotes locally adapted sustainable and regenerative soil management.

With respect to the content of the proposed directive in its main part, we stress the following:

Chapter II

We express our concern about the universal 5-year intervals soil monitoring is proposed to be performed. Instead, the appropriate interval of soil health assessment should be set separately for different land uses. Moreover, a more systematic approach, with indicators adapted to monitoring of trends, instead of static states, would be preferred. This could include intermediary objectives, milestones, and reporting by 5 year intervals for the parameters for which national periodic monitoring is ongoing, available and justified.

The binary classification of healthy soil which requires passing scores for all indicators, the deficiencies of which we present below, risks to distort the result of how the soils actually support ecosystem services and what is the severity of the attributes that render the soil 'unhealthy'. In other words, classification strictly based on fulfilling indicators in annex I A and B category is clear, but distorts assessment of healthy soils and does not provide basis to support beneficial soil attributes not reflected in the indicators.

Concerning policy coherence and enabling the acceleration of soil carbon sequestration, it is important to consider how soil health monitoring frameworks at the EU and MS levels correspond to the needs of different methods to set soil carbon baselines as a basis for incremental soil carbon sequestration and mechanisms to incentivize this.

Chapter III

Soil health management is a continuous process, even when considering only the great variability of soil conditions within a single plot, in which coarse universal criteria and definite threshold values poorly serve as management guidance. We would welcome that the criteria are established separately for different land-uses and adjusted to meet the specific objectives taking into account the desired functionalities of the soil in different land uses (agriculture, forestry, carbon sinks, biodiversity hot spots).

Favourable soil management practices have to established locally, context specific and, to a great extent, following adaptive management. This concerns, in particular, agricultural and forest soils which functions depend on an array of environmental variables. In management, in addition to 'what', it is imperative to consider 'how' the management practice is implemented, and to this aim, knowledge and advisory systems need to be developed and deployed. Here, the implementation of this directive should be open and flexible to site-specific management.

With respect to the descriptors and criteria for healthy soil condition (Annex I) we point attention to the specific aspects outlined below, arranged per selected aspect of soil degradation. Remarks on Annex II Methodologies as well as general comments are further below.

Part A:

Soil erosion

The proposal states to cover all types of erosion. We stress that the indicator and, in particular, the threshold value should also be specific to forms of erosion. In case of water erosion, even smaller amounts of lost land (< 2t/ha/y) have significant negative impacts on the aquatic environment. Not to underplay the importance to prevent erosion for the sake of the soil itself or e.g. agriculture. Although erosion in Finland is amongst the smallest in Europe, due to our clayey soils, the impacts in water ecosystems are severe (https://www.luke.fi/fi/tilastot/indikaattorit/maaseutuohjelman-indikaattorit/peltojen-vesieroosio). Therefore, we maintain that the proposed erosion threshold 2t/ha/y is too high for Finland as a universal limit value and does not take into account the negative impacts on the aquatic environment. The amount of nutrients lost from farmland and ending up in the Baltic Sea, driving eutrophication is an indicator that even smaller erosion rates do deplete soils of nutrients and organic matter.

Loss of soil organic carbon

The SOC/clay ratio is an indicator of soil structure. It is not optimal to monitor loss of SOC and induce remedial management action. Due to different soil types (within the dichotomous classification of mineral-organic soils) the indicator does not catch the characteristics or different soils in order to observe and help reverse the possible negative trends in SOC. Soils could have a negative trend in terms of SOC loss, but still score good or 'healthy' in this indicator. For instance, coarse mineral soils (found e.g. in Central and Eastern Finland) perform well per soc/clay ratio, but are losing carbon in significant amounts (Heikkinen et al. 2022). Hence indicator is not sufficiently adapted and moreover, it is not targeted to the objective of preventing loss of SOM. For references about the applicability of the indicator, see e.g. Poeplau and Don 2023, Prout et al 2020, Johannes et al 2017.

With respect to organic soils, the objective, indicators and values must recognize that in many Northern European countries, especially Finland, organic soils are also important for food production, in particular, from the climate resilience, food security, yield stability and local socio-economic perspectives. Furthermore, the indicator and limit values for organic soils should be established based on existing and ongoing inventories and assessments, taking the variable contexts into account, however, maintaining consistency with the IPCC classification.

Subsoil compaction

In agricultural soils, also subsoil compaction (as well as topsoil compaction) is a phenomenon which is affected by e.g. cropping and tillage practices and the type and the use of machinery. Often, compaction in top and subsoils do not develop in synchrony but may have opposing trends. In view of the phenomenon's link to arable farming, bulk density is a poor indicator for trends and effects of soil management unless linked with reference sites and information about management measures as well as other indicators. More importantly, subsoil compaction affects soil properties, functionality and e.g. the ability to allow increase in long term soil carbon sinks. For this aim, bulk density is an inadequate indicator for soil performance and functionality and the soils' potential to e.g. enhance carbon sequestration through root systems. Furthermore, it should be ensured that the soil type classification and values/ranges are universally applicable and harmonized across the EU, considering that currently there is significant variability in soil type classification in the EU.

Part B:

Excess nutrient content in soil

The proposed indicator for excess nutrients in soil is extractable phosphorus, determined by the P-Olsen method. It is not certain how well that method performs in different soil pH situations. As P-Olsen is performed in high pH, it's fit for acid soils (pH <8) is not straightforward, as there is inadequate information on how labile the P is in more acid soils. Instead, soil fertility test (including P, and also detecting soil types in the mineral-organic continuum), is commonly used in Finland, covering a majority of agricultural lands at approximately 5-year intervals. This is a tool to manage nutrient balances and reduce nutrient leaching through the agricultural legislation and subsidy framework, which is a more effective and beneficial mechanism to manage excess nutrients in agriculture. However, there are gaps with respect detecting the particle-bound phosphorus fraction, which is also relevant in long-term aiming towards comprehensive soil health and restoration of the soils' biological fertility potential. In establishing the indicator and target values, the overall phosphorus management framework implemented in the MS, for different land uses, should be considered and due flexibility and accuracy in setting the target values should be allowed.

Soil contamination

The approach to emphasize heavy metals at the EU level does not reflect the known, and still unknown risks to soil health from other elements and threats. Therefore, recognizing the difficulty in setting limit values and the demands regarding monitoring, we welcome reconsideration of the soil contamination indicators and monitoring framework, through including also organic pollutants, pharmaceutical residues, plastics and pathogens.

Reduction of soil capacity to retain water

Interpreting that, as an objective of soil health, soil water retention capacity targets water quantity control capacity at the catchment level, foreseen as a need to manage growing climate-change related risks. In our view, as imposed on the level of soil health management, the indicator for reduction of soil capacity to retain water measured from the soil sample is unrealistic and irrelevant at the intended scale (river basin). In agriculture, soil water holding capacity cannot be optimized to help mitigate floods at landscape/river basin level storing excess water during flow peaks, but rather to aim for optimal water balance for crop growth. River basin and landscape level water management should be secured with other measures, such as maintaining basic drainage networks, restoring the natural retention capacity in streams and wetlands and observing sustainable forestry, forest drainage and other land use measures starting upstream. Remote sensing tools for e.g. flood risk management should be deployed for river basin and catchment scale assessments. Furthermore, soils and river basins have diverse and variable characteristics and soil water retention capacity is attributed also to e.g. loss of organic matter, soil structure and compaction, therefore attributes that the farmer has a vested interest to manage on a plot scale. It is thus unclear how river basin scale objectives and measures work within the framework of this directive and its implementation, considering the aims regarding policy coherence and aiming at cost-efficiency in monitoring through combining different objectives.

Part C:

Understanding these do not affect soil health score (Article 9.1 of the directive-proposal), the inclusion of these indicators and their monitoring should be critically reconsidered, both considering their role and significance with respect to soil health, and, on the other hand, their function as guiding criteria.

Excess nutrient content in soil

The indicator for N, defined as total N, is not appropriate to describe excess nutrients in the soil. For instance, in Finland, 90% of soil nitrogen is in the organic form. Hence, total N does not tell anything about how much of the nitrogen is in excess. Also, in Finland, precipitation is greater than evaporation, so accumulation of N in the soil is not the problem, rather it's leaching with surface and subsoil runoff. 'Excess' has to be established from the relevant perspective. With regards to monitoring, it should also be systematically performed at a specific time of the year/growing season.

Acidification

pH as a key soil parameter affecting its functions and performance, and also illustrating a wide range of different soil types in different land uses in Europe, acidification should be related to natural situations, trends and the management should consider the measures already implemented in the MS to mitigate the impacts and risks connected to acid soils.

Topsoil compaction

In agriculture, similarly as with subsoil compaction, topsoil compaction, which may be more monitored than subsoil compaction (as is in the case of Finland), affects the soil's productivity for which many factors contribute. Thereby, the criteria and indicators should be set on the basis of existing national monitoring and management measures covering relevant parameters, preferably in way which induces holistic soil productivity management, taking into account also subsoil compaction and functions.

Loss of soil biodiversity

The lack of indicators, if even proxies, for soil microbiology and soil biodiversity is a critical gap in this proposal. While serving as an indicator of microbiological activity, soil basal respiration is not an indicator of soil *biodiversity*. In order to complete an EU level standard for all aspects of soil health (physical, chemical, biological), the directive should also regulate on a common mandatory indicator respective to different land uses. A potential indicator could be developed based on DNA-analysis (metabarcoding), which could be performed in connection with soil fertility sampling. An approach could also allow interchangeability with microbial biomass analysis (and consequent indicators and limit values) depending on MS practice and land use management framework. We reiterate, that the directive should include and safeguard soil biodiversity in order to induce positive development trend with respect to soil health.

Annex II

Methodologies

We would like to point out that, as discussed above, MS apply different methods to analyse phosphorus from soil samples which are selected by MS conditions or by purpose. In further work, it should be confirmed that this method is attributed to the objective of this criteria and whether interchangeability with conversion methods with other methods possibly adopted for general use in MS is allowed. For instance, soil P analyses should take into account the effect of pH and the manipulated & natural pH of the soils sampled.

Further, we welcome that metrics and methodologies, including sampling practices etc to assess soil properties are defined specific to soil type, ensuring also continuity and comparability with methods and datasets in the MS.

Monitoring should be optimized to detect trends – therefore sampling points should be systematized, also to minimize the variability in soil characteristics which in e.g. arable land is high even within the same plot.

With respect sustainable soil management principles (Annex III) we note, that management, supported by relevant and qualified science and advisory, is decisive for meeting the objectives of soil strategy. EU level intervention should be carefully tailored and targeted to tackle drivers of the identified soil risks, but be sufficiently smartly designed to lever momentum for local scale management action. Hence, we maintain that **the soil monitoring law would promote qualified site-specific management in different land uses and environmental conditions.**

Complementary remarks by topic

Forestry

The directive should ensure applicability to forest soils in all type of use, across Europe, targeting main soil health risks and the contexts in which these appear, considering the diverse values of forests and the longer management cycles in forestry, compared to e.g. agriculture. Forests cover the largest share of land in Finland compared to any other European country. The soil health indicators and monitoring program has to be fit and relevant for forestry land, which the current proposal and the monitoring framework do not reflect. Monitoring intervals should be adapted to land use types. In forestry, for instance, the interval is in decades, certainly not 5 years. Furthermore, countries with significant forest cover have long term monitoring datasets which should be prioritized as a basis for the indicators and future monitoring frameworks.

Climate change

European environment, pedo-climatic regions and soil functions and performance are constantly undergoing shifts and changes due to climate change. This directive should have carefully tailored mechanisms and safeguards from the perspective of MS and others subjected to this directive against exogenous factors affecting the monitored values, such as climate change -induced accelerated loss of carbon dioxide.

Existing frameworks for the management of natural resources and nature capital in the Member States

Observing trends in soil health and turning negative trends positive should be one of the main values added of this directive. Building on historical data and monitoring programmes is also important for cost-efficiency and consistency with soil, natural resource and ecosystem service management frameworks in MS. Therefore, this directive and its indicators should recognize the long-term data series of the MS, build on these and ensure harmonization and compatibility of the EU Soil Monitoring Law with relevant existing frameworks and programmes at MS level.

Soil functions and benefits

Ensuring sustainability of the multiple soil functions and the ecosystem services seems to be under-emphasizes in this proposal and under-represented in the indicators. These functions should be considered from a wide societal sustainability perspective and design the metrics in a way that they can support and be linked with mechanisms to support soil health by surrounding regulatory contexts, as well as tools that can be adopted in the market and e.g. the finance and insurance sectors.

Soil health is one of the fundaments of life on earth. We hope joint European tools to guard that are developed jointly to reinforce stakeholders' buy-in and empowerment in sustainable soil management.

Helsinki, Finland

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for BSAG, Carbon Action and the STN MULTA Consortium

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Any errors and omissions in the text are the sole responsibility of the undersigned.

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Literature

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