Policy Pathway Brief

Promoting Healthy Soils and Land

AGRICULTURE POLICY DIALOGUE

Foreign, Commonwealth & Development Office

WORLD BANK GROUP

Just Rural Transition

In brief

Agriculture and food systems are both drivers and victims of escalating climate and nature crises, in turn increasing the risks to healthy diets, livelihoods and economies. Public policies can set incentives for farming and market practices that further exacerbate these trends, but they can also play a role in reversing them. The global Agriculture Policy Dialogue on Transition to Sustainable Agriculture is a peer-to-peer platform to share experience, facilitate partnerships and catalyse policy leadership to accelerate the transition to sustainable agriculture and food systems that benefit people, prosperity and the planet.

Policy Pathway Briefs provide an overview of emerging experiences and lessons on policy approaches that contribute to this transition, covering a series of topics requested by Policy Dialogue members, to support peer leaning and knowledge exchange. The briefing notes are in no way exhaustive. The options facing governments will be context specific and look different across and within countries. The notes aim to act as a discussion starter and to facilitate exchanges between countries engaged in the Agriculture Policy Dialogue and with other global initiatives, drawing on the experiences presented by members and examples identified through further research.

This brief focuses on soil health, identifying policy instruments and actions for governments to provide incentives and support to farmers to protect and restore agricultural soils.[i]

Key messages

- Unsustainable agricultural practices have increased soil erosion and weakened other aspects of soil health, undermining soils' ability to sustain the productivity, diversity and environmental services of terrestrial ecosystems.
- There are clear financial and environmental benefits to protecting and enhancing soil health – and a range of tested practices to protect and restore soil health.
- However, there are few policies that directly incentivize farmers to take these actions in a sustained way, and several barriers and disincentives to doing so, including culture, habits or early training; financial constraints and opportunity costs; and lack of information on soil health.
- Governments can step in to incentivize large-scale adoption of sustainable soil and land management practices through:
    - Providing access to information and technical support to farmers to learn about and adopt new farming methods;
    - Supplying finance to enable farmers to transition to different agricultural practices, rewarding farmers for protecting and restoring soil health;
    - Establishing and enforcing regulatory standards on soil health; and
    - Monitoring soil characteristics by mapping and testing soils and making that information easily available to farmers and those supporting them.
- Engaging a range of affected stakeholders throughout the design and implementation of policies to improve soil health can ensure that proposals are feasible, take account of risk appetite and support equitable change to more sustainable practices that benefit everyone.

Background

The importance of healthy soils for people, climate and nature

Healthy soils provide the basis for food production and vital ecosystem services, including flood regulation, nutrient cycling and carbon sequestration. As such, soil health underpins goals of food and nutrition security, improving livelihoods, addressing climate change mitigation and adaptation, and enhancing biodiversity both above and below ground (Lal et al., 2021).

Understanding soil health

Healthy soil is soil that has the ability to "sustain the productivity, diversity and environmental services of terrestrial ecosystems" (FAO, 2020). Topsoil erosion is the most widespread form of soil and land degradation (Vågen and Winowiecki, 2019) and this is also the most widely used metric of soil health for global comparison, partly because it is the only one with at least basic estimates available with global coverage, by country and for multiple years.

Other indicators of soil health include the degree of preservation of above and below-ground biodiversity, nutrient balance (fertility), pollution, salinity, acidity, compaction and sealing, water regulation and soil organic carbon (SOC), all of which provide a set of ecosystem services.

The challenges facing soil health

It takes hundreds of years for topsoil to form and only a moment for it to be lost through erosion. Unsustainable agricultural practices[ii] have increased soil erosion: loss of topsoil from agricultural fields is estimated to be more than 100 times higher than the soil formation rate under conventional tillage systems (IPCC, 2019).

Globally, soil erosion from cropland results in the loss of 17 billion tons of topsoil each year. This causes farmers to forgo the equivalent of USD 300 billion in agriculture production annually (Coalition of Action 4 Soil Health, undated), as productivity falls and farmers have to turn increasingly to mineral fertilizers to bolster yields.[iii] This has resulted in a triple cost of increased greenhouse gas emissions from agricultural production, reduced biodiversity of croplands and weakened resilience of agriculture to shocks and stresses, undermining food security and farmer livelihoods, and climate and nature goals.

While there are clear benefits to protecting and enhancing soil health – and concrete measures that farmers can take – there are few policies that directly incentivize farmers to take these actions in a sustained way, and several barriers and disincentives to doing so (Masikati et al., 2022):

- **Culture, habits or training** received at earlier stages of a farmer's career can cause farmers to see agro-chemicals as the main source of fertility and pest/disease control (Payton, 2016) or to continue particular practices that undermine soil health.
- **Financial constraints and opportunity costs**: farmers – focused on output and income – may not consider broader environmental services provision when choosing cultivation practices:
    - Financial costs and benefits of farming often do not include externalities that affect other people and activities. Government policy itself may create price distortions that indirectly incentivize practices that undermine soil health, such as fertilizer subsidies that lead to inefficient fertilizer application.
    - Even where changing practices can boost yields over the longer term, farmers need support to transition through a potential period of additional costs and fall

in yields that can occur in the short term (the “valley of transition”) and to manage risks. For some smallholders in low-income countries, the opportunity costs of investing money, labour, knowledge and other inputs to change their practices may be relatively high, and they put significantly more weight on short-term benefits compared to long-term benefits and sustainability.

- **Lack of information on soil health**: many farmers lack access to affordable and accurate data on the properties of their soils. This makes it difficult for them to understand and track the state of their soil health. This is particularly acute in low-income countries where famers may not have access to up-to-date soil maps. Even in high-income countries, information can be dispersed and soil testing can be expensive (de Bruyn et al., 2017).

Improving soil and land health

There is an urgent need to address these challenges in order to manage soils sustainably and restore the soil ecosystem. A range of well-proven and emerging technical solutions exist; however, without appropriate policy interventions, many of these technical solutions can lie unused.

Technical solutions

Farmers can undertake a range of practices to protect and retore soil health, with high potential to rebuild SOC, biodiversity and soil structure (Beillouin et al., 2023). These include (Lamanna, 2018; Pittelkow et al., 2015; Ogle et al., 2012) mulching, composting and reduced tillage; reducing soil compaction from machinery, particularly when soil is wet; covering bare soil with continuous plant cover and contouring sloping land; application of farmyard manure and/or compost; rotating crops and intercropping; and improving fertilizer use efficiency (see Box 1).

Several of these practices are often implemented together, e.g., reducing tillage, adding crop residue and diversifying the crop mix; anecdotal evidence supports this approach, although more field research needs to be done to assess how effective it is.

Policy solutions

Governments can incentivize large-scale adoption of sustainable soil and land management practices that benefit climate, nature and people through four areas of policy measures that can be translated into solutions tailored to different farms:[iv] 1. access to information and technical support to farmers to learn about and adopt new farming methods; 2. finance to enable farmers to transition to different agricultural practices; 3. regulatory standards on soil health; and 4. soil monitoring.

Technical support to farmers

Through funding public or third-party extension services, governments can provide farmers with training, advisory services and on-field measurements of soil health to enable them to adopt better practices. Extensive outreach and engagement activities – including peer-to-peer learning and neighbour demonstration effects – can nudge farmers towards changes in culture and habits, particularly if they are given information on why such changes could benefit them economically.

Such services are best complemented with affordable access to soil health information to help inform farmers' choices:

- Under the **UK** government's Environmental Land Management Scheme, farmers can research the characteristics of their land using a private database (the Addland Professional map layers) that brings together existing government land information.
- **India's** Soil Health Card Scheme (Reddy, 2019) introduced in 2015, provides farmers with crop-specific fertilizer recommendations, based on soil testing, to enable more efficient fertilizer use that improves productivity and/or reduces costs.[v]

Transition finance

Funds for financing the transition to better soil health can come from several sources, including:

- **National government budgets**: governments could repurpose existing public support to agriculture to pay farmers for ecosystems services from soil health (Campbell, Bruce et al., forthcoming), rather than, e.g., subsidizing inorganic fertilizers or linking support to outputs or outcomes (see Policy Brief on Payments for Ecosystems Services for more details on opportunities and challenges).
    - **Canada** has introduced a new ecosystem services programme to incentivize conservation of grasslands and other systems and is assessing an approach to look at biodiversity and soil health together.
    - In **Malawi**, the government is reforming the Agricultural Inputs Program to reduce funding on inorganic fertilizer subsidies and discussions are ongoing on how to redirect finance to rewarding farmers for soil health outcomes.
- **Voluntary carbon (and biodiversity) markets**: soil carbon sequestration can become a potential income source for farmers through the use of verifiable, creditable carbon markets. However, while such credits may add money at the margins, they are not judged to provide sufficient incentive in themselves to lead to sustained behavioural change[vi] particularly as much of the credits' value can be absorbed in monitoring, reporting and verification and by credit intermediaries.

These approaches can also be combined, e.g., the **Netherlands** government is working with Rabobank on a carbon scheme and the best way to reward farmers for moving away from deep ploughing to reduce SOC loss.

Regulatory tools

While technical and financial support to farmers are key to changing soil management practices, these can be voluntary and may need to be complemented by regulations that set minimum soil standards and apply penalties for not meeting them (British Society of Soil Science, 2023). However, globally, few countries regulate and enforce soil use and protection in the common interest. Where such protections exist, they are normally embedded in other types of legislation – environmental, agricultural or spatial planning – and often without direct reference to soils (Peake and Robb, 2022). Nonetheless, some examples do exist:

- Farmers in the **European Union (EU)** receiving support from the Common Agricultural Policy must comply with EU standards on good agricultural and environmental condition of land, such as maintaining minimum soil cover and land management practices (European Commission, 2023).
- **New Zealand** was one of the first countries to pass soil-related laws and continues to take a leading role in some aspects of soil governance (Peake and Robb, 2022).

- **Australia** released its first National Soil Strategy in 2021, setting out how it will value, manage and improve its soil for the next 20 years (DAWE, 2021). From 2012 to 2023, the government established a Soil Advocate position in the Ministry of Foreign Affairs, which aimed to raise awareness on the role of healthy soils and provide leadership and advocacy across government for appropriate legal and regulatory frameworks to improve the sustainable management of soil (Department of Agriculture, Fisheries and Forestry, 2023).

Developing soil monitoring

Efforts to support farmers and hold them accountable for soil health outcomes need to be underpinned by effective systems to monitor practices and outcomes:

- Mapping soils – their characteristics and health – is an important starting point to identify locally-appropriate practices and achievable results.
- Advances in soil testing – including in the lab and via satellite imagery – have the potential to reduce costs and make more detailed soil information available for understanding and tracking soil health, although this varies, depending on the availability of open-source data, labour costs and the state of existing information.

Examples of emerging tools and data for soil monitoring include:

- In **Rwanda**, the Rwanda Agricultural Board aims to provide an open-access soil information system populated with data on basic soil properties, analysed using soil spectroscopy, an innovation to assess multiple soil properties simultaneously.
- The **Land Degradation Surveillance Network** (World Agroforestry, 2023) produces digital maps providing farm-level assessments, using remote sensing data, systematic field sampling and citizen data. These are then fed into an open-source Ecosystem Health Surveillance System.
- The **Ghana** Agriculture and Agribusiness Platform aims to centralize data and information with a digital platform on weather data, soil and fertility mapping, and a digital database recording farmers' cropping decisions.

Tracking soil health in a comparative way at the local and global levels will require agreement on soil health indicators that capture the range of soil health characteristics across a wide range of soils, climates and production systems. Three have been proposed (Soil Health Institute, undated): **organic carbon concentration or SOC**;[vii] **carbon mineralization potential**;[viii] and **aggregate stability**,[ix] which acts as a proxy for **soil structure**. Including soil health indicators in the Global Biodiversity Framework and countries' Nationally Determined Contributions will also be key.

Process considerations

Policy Dialogue discussions acknowledge that a transition to low emission, climate resilient agriculture practices needs to centre on people and engage stakeholders at all stages. This recognizes that stakeholders have vested interests and may have a significant stake in existing agriculture production systems or stand to lose from changes in the short term. It is important to engage stakeholders in policy design, rather than imposing policy on them, to ensure that proposals are feasible, take account of risk appetite and support equitable change through the "valley of transition" to more sustainable practices that benefit everyone.

Key initiatives

Box 1. Examples of soil health initiatives

Coalition for Action on Soil Health (CA4SH): emerging from the UN Food Systems Summit in 2021**,** CA4SH aims to catalyse multi-stakeholder action to address food and nutrition insecurity, land degradation, biodiversity loss and climate change by investing in healthy soil ecosystems.

Global Soil Partnership: hosted by FAO, and established in December 2012, this aims to improve the governance and promote sustainable management of soils. It does this through: convening a wide range of stakeholders, including governments and land users to pool knowledge and collectively act through developing charters, guidelines and partnerships (e.g., the **Voluntary Guidelines for Sustainable Soil Management)**; providing technical knowledge on improving soil health; and building capacity for soil mapping and information systems.

Soil Investment Hub: organized by the World Business Council for Sustainable Development to be a resource for knowledge and expertise. The hub connects businesses to existing platforms, initiatives, and coalitions that can mobilize finance, engage with farmers and drive value chain collaboration.

4 per 1,000: an international initiative launched by France during COP 21 that aims to demonstrate that agriculture, and in particular agricultural soils, can play a crucial role in food security and climate change. It convenes voluntary public and private stakeholders (national governments, local and regional governments and authorities, companies, professional organizations, NGOs, research establishments, etc.) within the framework of the Lima-Paris Action Plan.

EU Soil Observatory: this regional initiative was launched in December 2020 to generate and disseminate harmonized EU-wide soil data and indicators in support of the European Green Deal, in particular the new Soil Strategy and the Mission on Soil Health and Food. It is developing an EU-wide soil monitoring system to assess progress towards soil-related targets, to support research and innovation and establish a European Soil Forum dedicated to a broad user base (citizens, farmers, land planners, scientists). It aims to develop a comprehensive dashboard containing indicators that present data on soil-related issues within and, in some cases, outside of the EU, e.g., soil erosion, soil carbon, pollutants and soil nutrients.

World Soil Day: held annually by FAO on 5 December to raise awareness of the importance of healthy soil and to advocate for the sustainable management of soil resources.

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Endnotes

[i] While not part of this Brief, soil health is also affected by mining, logging (deforestation), pollution, construction and other activities.

[ii] Such as continuous monocropping or leaving soil bare.

[iii] An under-reported but increasing issue is the presence of micro-plastics – less than 5 mm in size – in agricultural soil where plastic products are used to boost productivity, e.g., using nets to protect plants and extend cropping seasons. Soils contain larger quantities of microplastics than oceans and have the potential to be affect human health through consumption of agricultural products (FAO, 2021).

[iv] Interview with Dr. Leigh Winowiecki, CIFOR-ICRAF.

[v] The soil health card does not look at soil carbon.

[vi] Interviews with Bruce Campbell and Rattan Lal, October 2023

[vii] This reflects the soil's capacity for nutrient cycling and retention, and available water holding capacity.

[viii] Linked to the soil's ability to cycle carbon and nutrients.

[ix] Including resistance to wind and water erosion, and soil water infiltration and storage.

Please contact jrt@merid.org with any questions about this brief.

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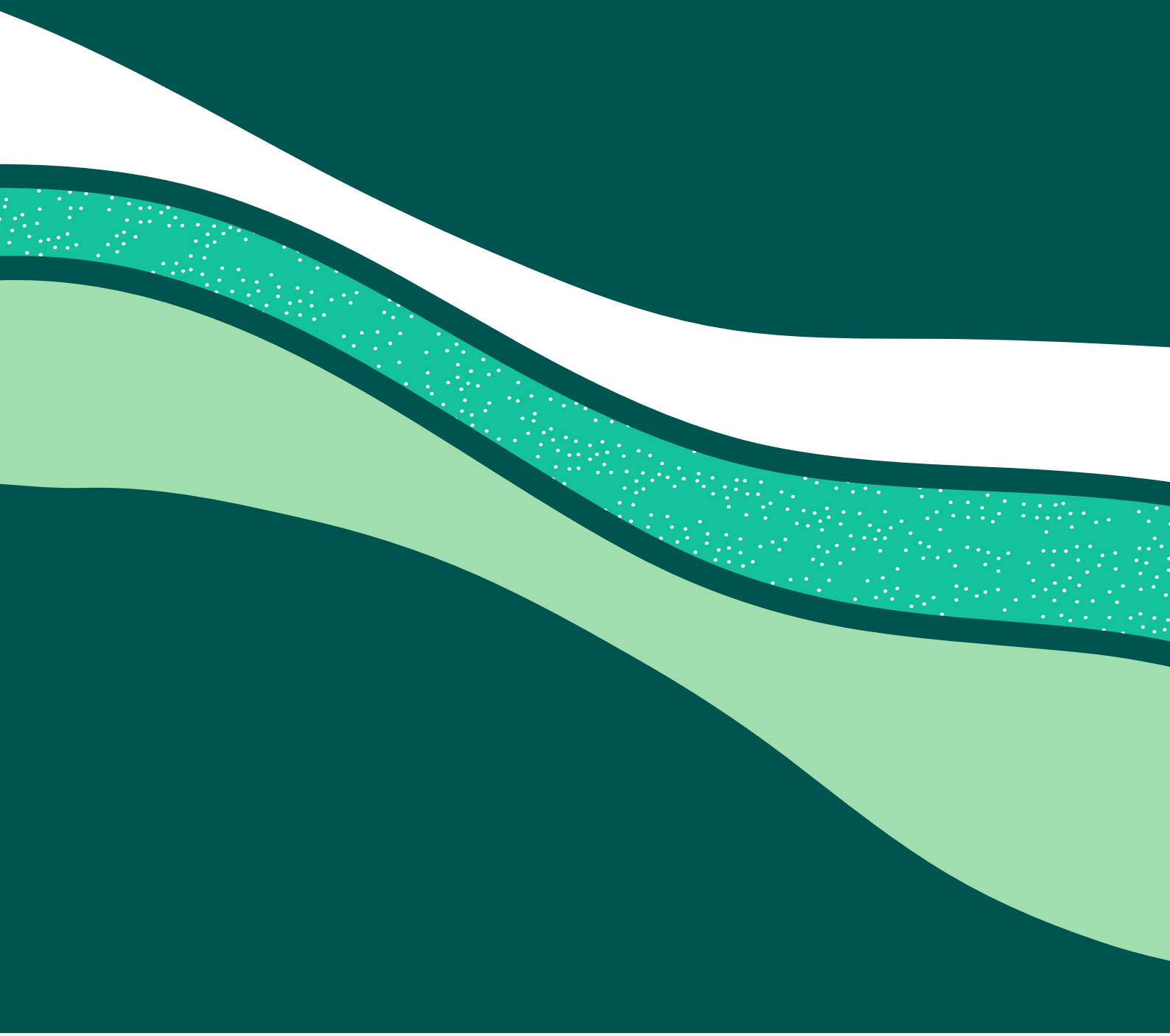

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