

Soil security: The missing piece in climate, food, and water agenda at COP30

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Received: October 1, 2025; Accepted: November 7, 2025; Published Online: November 8, 2025; <https://doi.org/10.59717/j.xinn-geo.2025.100169>

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Citation: Minasny B., McBratney A., Sharififar A., et al. (2025). Soil security: The missing piece in climate, food, and water agenda at COP30. *The Innovation Geoscience* 3:100169.

COP30 in Belém arrives a decade after the Paris Agreement, alongside clear global stocktake findings: current efforts are not yet sufficient to hold warming to 1.5°C unless action accelerates. Brazil's incoming COP Presidency has proposed a practical six-part "Action Agenda," including Transforming Agriculture and Food Systems, a promising turn toward implementation.

Yet, one critical foundation still isn't explicit: soil security—the idea that soils must maintain their capacity to deliver food and fibre, store carbon, regulate water, support biodiversity, and safeguard human health. In climate

forums, soil is often folded into broader categories like "land," "AFOLU" (Agriculture, Forestry, and Other Land Use), or generic agriculture tracks. That framing can obscure soil as a living system with measurable functions and services that deserve to be governed, resourced, and monitored in their own right (Figure 1).

Recent UNFCCC workstreams (e.g., Koronivia Joint Work in Agriculture) and initiatives like the COP28 Emirates Declaration elevated food systems, but soil still tends to be treated as a medium for growing crops rather than a multifunctional asset for climate mitigation, adaptation, water security,

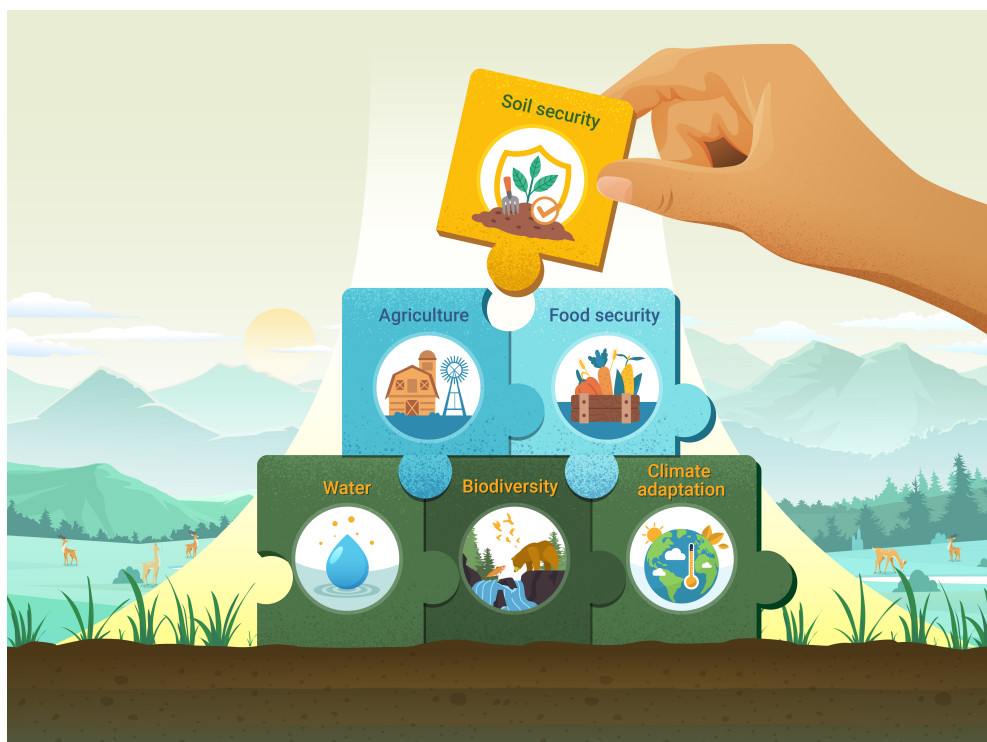


Figure 1. Soil security: the missing piece among other global existential challenges.

biodiversity, and nutrition. There is a lack of awareness of the opportunities that the soil security concept can represent, for example, there are no widely adopted targets for soil security dimensions that Parties can readily integrate into reporting mechanisms such as Nationally Determined Contributions (NDCs), Article 6 cooperation, or follow-through from the Global Stocktake. For example, in Australia, soil carbon in agricultural lands is part of NDC reporting under the *Land Use, Land Use Change and Forestry (LULUCF)*. The Australian National Soil Monitoring Program supports the measurement, monitoring, mapping, reporting and sharing of soil state and trend information to inform best management practices and decision making. Information that could be collected through the soil security dimensions (i.e., soil capacity, soil condition, soil capital, soil connectivity and soil codification) could feed into such NDCs. Other existing NDCs such as Brazil's could also benefit from a soil security assessment framework and

multi-functionality incorporation of soil into other existential challenges.

WHY “JUST LAND” IS NOT ENOUGH

Food and livelihoods. Around 95% of global food depends directly or indirectly on soil. When soils degrade, yields and nutrition drop, and farmer incomes suffer. An estimated one-third of the world's soils are already degraded,¹ and land degradation alone could reduce global food production by the 2040s and raise food prices, with the hardest impacts on smallholders and low-income consumers.

Climate mitigation. Soils store two to three times more carbon than the atmosphere ($\approx 2,450$ Pg in the top meter). Poor management can flip soils from a carbon sink to a source, undermining Paris goals.² Soils also act as thermal reservoirs, absorbing and releasing heat in ways that affect local climate and resilience.³

Water security. Soil is the largest freshwater reservoir in terrestrial ecosystems, buffering floods and droughts. When soils compact and lose organic matter, landscapes lose this natural “green infrastructure,” making climate shocks more severe.

Nutrients and ecosystem services. Soils are the primary reservoir and regulator of nutrients essential to plants and people, storing the vast majority of terrestrial nitrogen and phosphorus. This natural recycling has immense ecological and economic value.⁴

Biodiversity. As much as 59% of species may live in soils, making them the planet's most biodiverse habitat. Degrading soil erodes life below ground and weakens ecosystem services above it.⁵

The result of treating soil as an afterthought: fragmented programs, weak measurement, reporting, and verification (MRV), and thin investment. Even with recent attention to food systems, only a small fraction of climate finance reaches agriculture—and even less flows to soil stewardship on farms, partly due to MRV and permanence challenges.

THREE PRACTICAL MOVES FOR COP30

Recognise soil as a living system—make soil security a COP objective

Formally recognise soil security as a cross-cutting objective within the Agriculture & Food Systems axis. Soil security can be measured across five dimensions—Capacity, Condition, Capital, Connectivity, and Codification—framing soil not as inert substrate but as Earth's living skin, underpinning food, water, biodiversity, and climate stability. This aligns with established science and recent convenings in the soil community, and it gives Parties a clear governance hook for translating soil functions into COP outcomes (NDCs, Global Stocktake responses, Global Goal on Adaptation, and Article 6 cooperation).

Adopt measurable and comparable soil indicators with credible MRV

Commit to robust indicators and MRV package that Parties can plug into transparency frameworks and NDC updates. Build on existing science and platforms (e.g., FAO Global Soil Partnership; Global Soil Organic Carbon MRV; Koronivia learnings; national programs). With common metrics, soils can be valued not only for production, but also for their climate and biodiversity credits, transforming a vital ecological function into an investable and monitorable asset for mitigation and adaptation.

Align soil management with climate finance and policy instruments

Launch a COP workstream on soil-aligned finance that:

- (1) Incentivises proven practices (e.g., residue retention, cover crops, diversified rotations, agroforestry, reduced tillage, organic amendments);
- (2) Links payouts to soil indicators and MRV (so finance rewards verified outcomes);
- (3) Integrates soil into NDCs, Article 6 cooperation, and Article 2.1(c) (aligning finance flows with climate goals).

Building on COP28's momentum around food systems, the current financing gap can be bridged by establishing explicit channels for soil stewardship within mechanisms such as the Green Climate Fund, Global Environment Facility, Adaptation Fund, and blended finance vehicles. At present, climate finance overwhelmingly prioritises energy and forests; integrating clear indicators and policy hooks for soils can unlock responsible and durable investment at scale. Crucially, soil carbon sequestration should not be treated merely as an offset, but as a pathway to build multifunctionality, enhancing productivity, resilience, and biodiversity simultaneously.

A PRACTICAL DELIVERABLE FOR COP

COP could help institutionalise soil more effectively through the following:

1. Recognise soil security as a cross-cutting objective within the Agriculture and Food Systems agenda;
2. Advancing science-based and transparent indicators to strengthen Parties' NDC implementation and Global Stocktake processes;
3. Mobilising soil-linked finance frameworks that connect verified outcomes with concessional funding and Article 6 opportunities.

Collectively, these measures would elevate soil from a peripheral concern to a central pillar of sustainability, converting a system that interlinks climate, food, water, and biodiversity into an operational pathway for Paris-aligned mitigation and adaptive resilience.

Future COP themes should include soil security dimensions and quantitative assessments using standardised methods and frameworks. Such approaches need to consider soil multifunctionality and soil services. Soil roles need to be identified across different themes such as the role of soil in water security, biodiversity, food security and climate regulation. In addition to policy, soil science research and uncertainties reduction are imperative to underpin climate stability.

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FUNDING AND ACKNOWLEDGMENTS

We gratefully acknowledge the support of the Australian Research Council Laureate Fellowship (FL210100054) on Soil Security project entitled ‘A Calculable Approach to Securing Australia's Soil’. Aroua, the Soil Security Think Tank, was created and supported via the Australian Research Council Laureate Program and the philanthropic donations from Nick Fairfax and Macdoch Australia PTY Ltd. The funders had no role in study design, data collection and analysis, decision to publish, or preparation of the manuscript.

AUTHOR CONTRIBUTIONS

All authors contributed to the manuscript and approved the final version.

DECLARATION OF INTERESTS

Budiman Minasny is an Editorial Board member of The Innovation Geoscience and was blinded from reviewing or making final decisions on the manuscript. Peer review was handled independently of this member and their research group. The other authors declare no conflicts of interest.