

Earth's soil carbon reservoir poses massive risk to climate change mitigation

Currently, more carbon is locked up in just the first metre of the planet's soils than can be found in the atmosphere and all terrestrial plant life combined said Fijian president Jioji Konousi Konrote during his keynote address at the [Global Symposium on Soil Organic Carbon](#). Konkrote called for stronger management of this natural resource, warning of colossal negative impacts on the environment and human societies if the massive stores of carbon trapped in Earth's soils are released.



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Referring to international commitments to limit global temperature rise to below two degrees Celsius made under the 2015 Paris Climate Agreement, Konrote warned: "If we fail to maintain our soils as a carbon reservoir, I am afraid that these discussions and negotiations would have been in vain."

"We cannot afford to neglect a resource that could be our serious and viable ally against climate change," he added.

Fiji and other small island developing states are on the front lines in the battle against climate change. The government of Fiji is poised to assume the [presidency](#) of the next [Conference of Parties of the UN Climate Agreement](#) that will take place in Bonn, Germany, in November.

The foundation of global food security

FAO Director-General Jose Graziano da Silva in his remarks stressed that beyond their critical role as a carbon sink, healthy soils underpin multiple environmental processes upon which humankind depends and which are the foundation of global food security. "Soils with high organic carbon content are likely to be more fertile and productive, better able to purify water, and help to increase the resilience of livelihoods to the impacts of climate change," he noted.

This means that improving the health of the planet's soils and boosting their organic carbon content is critical to achieving several of the international development goals established by the [UN's 2030 agenda](#), especially the second goal of eradicating hunger and malnutrition, Graziano da Silva said.

A valuable, vulnerable resource

Carbon is sequestered underground after being "fixed" from the atmosphere via plants or organic residues and then incorporated into soils through largely natural processes. Soil carbon content consists of both living and dead components and can include both field stubble, as well as decayed materials from millennia ago.

This adds up to a vast reservoir of carbon, according to an FAO report being presented at the symposium.

But when soil is disturbed or degraded, trapped carbon and other greenhouse gasses resulting from decay are re-released back into the atmosphere. This means that the Earth's soil carbon reservoir could either release massive amounts of greenhouse gases into the atmosphere or sequester more of them, depending on the management decisions we make going forward, the report says.

“ Already, one-third of the planet's soils are degraded, leading to an enormous decrease in global soil organic carbon stocks and the release of up to 100 gigatonnes into the atmosphere. ”

Further damage to soil carbon stocks through poor soil management will hamper efforts to limit global temperature rises and avoid increased floods, droughts and other climate change impacts, warns [Soil Organic Carbon: The Hidden Potential](#). Meanwhile, rising temperatures and an increased frequency of extreme weather events will lead to additional losses of soil organic carbon, making improvement management even more urgent. Of particular concern are soils with high levels of organic content, like peatlands and temperature-vulnerable permafrost zones. These "hot spots" will likely become net sources of greenhouse gas emissions in the future, barring effective interventions.

The main greenhouse gases emitted by soil are carbon dioxide and methane; another is nitrous oxide, whose emission is increasingly being driven by human activity in the livestock sector.

Making the most of a massive carbon sink

There are many agricultural and land management practices that can preserve and boost soil organic carbon — not only mitigating global warming but offering multiple additional benefits.

Some studies suggest that the rehabilitation of agricultural and degraded lands could remove up to 51Gt of carbon from the atmosphere. Others estimate that adopting agricultural practices that conserve soil organic carbon can increase food production by 17.6 megatonnes per year.

Improving soil health will not only help raise local agricultural productivity but also significantly boost the resilience of farmers and agricultural communities. However, global adoption rates of sustainable soil management practices remain relatively low, due to financial, technical and institutional barriers as well as information and knowledge gaps.

Overcoming barriers

Recently endorsed [FAO Voluntary Guidelines for Sustainable Soil Management](#) can help address technical and institutional barriers and provide key information on how to go about reversing the negative trends of soil organic losses.

Aiming to build on that development, the symposium brought together the science, policy, and land-use community to build momentum behind preserving soil organic carbon and re-carbonizing degraded soils.

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