

# Global soils underpin life but future looks ‘bleak’, warns UN report

It takes thousands of years for soils to form, meaning protection is needed urgently, say scientists

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Fri 4 Dec 2020 09.00 GMT

Last modified on Fri 4 Dec 2020 09.06 GMT



Scientists describe soils as like the skin of the living world, vital but thin and fragile, and easily damaged by intensive farming, forest destruction, and pollution. Photograph: Zsolt Czeglédi/EPA

Global soils are the source of all life on land but their future looks “bleak” without action to halt degradation, according to the authors of a **UN report**.

A quarter of all the animal species on Earth live beneath our feet and provide the nutrients for all food. Soils also store as much carbon as all plants above ground and are therefore critical in tackling the **climate emergency**. But there also are major gaps in knowledge, according to the UN Food and Agriculture Organization’s (FAO) report, which is the first on the global state of biodiversity in soils.

The report was compiled by 300 scientists, who describe the worsening state of soils as at least as important as the climate crisis and destruction of the natural world above ground. Crucially, it takes thousands of years for soils to form, meaning urgent protection and restoration of the soils that remain is needed.

The scientists describe soils as like the skin of the living world, vital but thin and fragile, and easily damaged by intensive farming, forest destruction, pollution and global heating.

“Soil organisms play a crucial role in our everyday life by working to sustain life on Earth,” said Ronald Vargas, of the FAO and the secretary of the **Global Soil Partnership**.

Prof Richard Bardgett, of the University of Manchester, who was a lead author of the report, said: “There is a vast reservoir of biodiversity living in the soil that is out of sight and is generally out of mind. But few things matter more to humans because we rely on the soil to produce food. There’s now pretty strong evidence that a large proportion of the Earth’s surface has been degraded as a result of human activities.”



UK is 30-40 years away from 'eradication of soil fertility', warns Gove

Since the Industrial Revolution, about 135bn tonnes of soil has been lost from farmland, **according to Prof Rattan Lal**, the 2020 winner of the World Food prize.

People should be worried, said Bardgett. “If things carry on as they are, the outlook is bleak, unquestionably. But I think it’s not too late to introduce measures now.”

Prof Nico Eisenhauer, of Leipzig University, another lead author of the report, said: “It is a major issue that we are dependent on this thin layer that is sometimes just a couple of centimetres, sometimes several metres, but a very vulnerable, living skin.”



The world needs topsoil to grow 95% of its food – but it's rapidly disappearing

Soils simultaneously produce food, store carbon and purify water, he said, so they are “at least as important” as the climate and above-ground biodiversity crises. “If you’re losing the top soil through bad treatment and then erosion, then it takes thousands of years until the soil is produced again.”

Microbial species are essential for turning waste into nutrients, but Eisenhauer said an estimated 99% of them had yet to be studied by scientists. He also said that, by number, four out of every five animals on Earth are tiny soil worms called nematodes, yet only a tiny fraction of these species have been recorded.

In a foreword to the report, Qu Dongyu, the FAO head, and Elizabeth Maruma Mrema, the head of the UN convention on biological diversity, said: “Our wellbeing and the livelihoods of human societies are highly dependent on biodiversity [but while] there is increasing attention on the

importance of above-ground biodiversity, less attention is being paid to the biodiversity beneath our feet.”

The main causes of damage to soils are intensive agriculture, with excessive use of fertilisers, pesticides and antibiotics killing soil organisms and leaving it prone to erosion. The destruction of forests and natural habitats to create farmland also degrades soil, particularly affecting the symbiotic fungi that are important in helping trees and plants grow. Rising global temperatures, with increasing droughts and wildfires, are another factor, but scientists remain uncertain about how all the different drivers interact.

The most important action is to protect existing healthy soils from damage, the scientists said, while degraded soils can be restored by growing a diverse range of plants. Inoculating barren soil with healthy earth may also help it recover.

“Certainly there’s hope that we can make soils healthy again,” said Eisenhauer. “I think a lot depends on what we eat. Do we need to eat these massive amounts of cheap meat, for example? Can we rely more on plant-derived calories? I think this is a massive factor.” More than **80% of the world’s farmland** is used to raise and feed cattle and other livestock, but these provide only 18% of all calories consumed.

In 2014 the FAO’s Maria-Helena Semedo said that if the rate of degradation continued then all of the **world’s topsoil could be gone within 60 years**.

While much remains to be discovered about soil biodiversity and how to help it thrive, Eisenhauer said the new report collating for the first time what is known was

important. “Raising awareness is a first critical step, bringing soil more into the public and political discussions. Most of the decisions about, for example, protected areas are not based on soils.”

## Land degradation threatens human wellbeing, major report warns

This article is more than 2 years old

**More than 3.2bn people are already affected and the problem will worsen without rapid action, driving migration and conflict**



Soil erosion in Tanzania. Fertile soil is being lost around the world at a rate of 24bn tonnes a year. Photograph: Carey Marks/Plymouth University

***Jonathan Watts in Medellín***

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Mon 26 Mar 2018 14.30 BST

Land degradation is undermining the wellbeing of two-fifths of humanity, raising the risks of migration and conflict, according to the most comprehensive global assessment of the problem to date.

The UN-backed report underscores the urgent need for consumers, companies and governments to rein in excessive consumption – particularly of beef – and for farmers to draw back from conversions of forests and wetlands, according to the authors.

With more than 3.2 billion people affected, this is already one of the world's biggest environmental problems and it will worsen without rapid remedial action, according to Robert Scholes, co-chair of the assessment by the Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services (IPBES). "As the land base decreases and populations rise, this problem will get greater and harder to solve," he said.

The **IPBES study**, launched in Medellín on Monday after approval by 129 national governments and three years of work by more than 100 scientists, aims to provide a global knowledge base about a threat that is less well-known than climate change and biodiversity loss, but closely connected to both and already having a major economic and social impact.

The growing sense of alarm was apparent last year **when scientists warned fertile soil was being lost** at the rate of 24bn tonnes a year, largely due to unsustainable agricultural practices.



Cattle shelter from the sun under a small tree in Mato Grosso, Brazil. Photograph: Rodrigo Baleia

The new assessment goes further by looking at vegetation loss, forest clearance, wetland drainage, grassland conversion, urban sprawl and pollution, as well as how these changes affect human health, wealth and happiness.

Drawing on more than 3,000 scientific, government, indigenous and local knowledge sources, the authors estimate land degradation costs more than 10% of annual global GDP in lost ecosystem services such as carbon sequestration and agricultural productivity. They say it can raise the risks of flooding, landslides and diseases such as Ebola and the Marburg virus.

There are also geopolitical implications. The authors cite evidence of a strong association between land degradation, migration and instability. In dryland regions, years of extremely low rainfall have been associated with an up to 45% rise in violent conflict. Depending on the actions taken by governments to address climate change and the decline in soil quality, the authors estimate between 50 to 700 million people could be driven from their homes by 2050. The worst affected areas are likely to be the dry fringes of southern Iraq, Afghanistan, sub-Saharan Africa and southern Asia.



To counter this, the authors call for coordination among ministries to encourage sustainable production and for the elimination of agricultural subsidies that promote land degradation. They urge consumers to reduce waste and be more thoughtful about what they eat. Vegetables have a much lower impact on land than beef. Farmers are encouraged to raise productivity rather than clear more land. Companies and governments are advised to accelerate efforts to rehabilitate land. There have been several successful projects on China's Loess plateau, in the Sahel and in South Africa.

The economic case for land restoration is strong, according to the report, which says benefits (such as jobs and business spending) are 10 times higher than costs, and up to three times higher than price of inaction. But in most regions, remedial work is overdue. National governments are not living up to a global commitment to neutral land degradation by 2030.

Participants compared the rundown of land to the 2008 financial crisis. "Back then, people borrowed more money than they could repay. Now we are borrowing from nature at a rate that is many times higher than the world can sustain. The day of reckoning will come," said Christian Steel, director of Sabima, a Norwegian biodiversity NGO. In Europe, he said, the industrialisation of forest and agriculture is degrading the land. "We are also importing more food and, by doing so, displacing the impact of our consumption. We are fooling ourselves. Disaster doesn't hit suddenly like in a Hollywood movie. It is already happening gradually."

Action has been held back by a lack of awareness of the problem and the often wide gulf between consumers and producers. The report notes that many of those who benefit from over-exploitation of natural resources are among the least affected by the direct negative impacts of land degradation and therefore have the least incentive to take action.

"This is extremely urgent," said another of the co-chairs, Luca Montanarella. "If we don't change lifestyles, consumption habits and the way we use land, then sooner or later we are going to destroy this planet. Looking for another one is not an option."



A 10-square-kilometre expanse of toxic waste on the edge of the Gobi desert, inner Mongolia. Photograph: Frederic J. Brown/AFP/Getty Images

The land degradation assessment is the latest in a recent suite of global studies that highlight the deterioration of humanity's home. In 2016, IPBES **highlighted the demise of the planet's pollinators**, which are vital for agricultural production. On Friday, it **released a global biodiversity study** that warned human destruction of nature is rapidly eroding provision of food, water and security to billions of people.

Separately, the United Nations last week **released a global water study** that forecast more than half of the human population could struggle to secure supplies for drinking, cooking and sanitation for at least one month a year by 2050 as a result of pollution, climate change and rising demand.

## Third of Earth's soil is acutely degraded due to agriculture

This article is more than 3 years old

**Fertile soil is being lost at rate of 24bn tonnes a year through intensive farming as demand for food increases, says UN-backed study**



Soil erosion in Maasai heartlands, Tanzania, is due to climate change and land management decisions. Photograph: Carey Marks/Plymouth University

## **Jonathan Watts**

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Tue 12 Sep 2017 18.18 BST

A third of the planet's land is severely degraded and fertile soil is being lost at the rate of 24bn tonnes a year, according to a new United Nations-backed study that calls for a shift away from destructively intensive agriculture.

The alarming decline, which is forecast to continue as demand for food and productive land increases, will add to the risks of conflicts such as those seen in **Sudan** and Chad unless remedial actions are implemented, warns the institution behind the report.

“As the ready supply of healthy and productive land dries up and the population grows, competition is intensifying for land within countries and globally,” said Monique Barbut, executive secretary of the UN Convention to Combat Desertification (UNCCD) at the launch of **the Global Land Outlook**.

“To minimise the losses, the outlook suggests it is in all our interests to step back and rethink how we are managing the pressures and the competition.”

The Global Land Outlook is billed as the most comprehensive study of its type, **mapping** the interlinked impacts of urbanisation, climate change, erosion and forest loss. But the biggest factor is the expansion of industrial farming.

Heavy tilling, multiple harvests and abundant use of agrochemicals have increased yields at the expense of long-term sustainability. In the past 20 years, agricultural production has increased threefold and the amount of irrigated land has doubled, notes a paper in the outlook by the Joint Research Centre (JRC) of the European commission. Over time, however, this diminishes fertility and can lead to abandonment of land and ultimately desertification.

The JRC noted that decreasing productivity can be observed on 20% of the world’s cropland, 16% of forest land, 19% of grassland, and 27% of rangeland.

“Industrial agriculture is good at feeding populations but it is not sustainable. It’s like an extractive industry, said Louise Baker, external relations head of the UN body. She said the fact that a third of land is now degraded should prompt more urgent action to address the problem.

“It’s quite a scary number when you consider rates of population growth, but this is not the end of the line. If governments make smart choices the situation can improve,” Baker said, noting the positive progress made by countries like Ethiopia, which has rehabilitated 7m hectares (17m acres).

The impacts vary enormously from region to region. Worst affected is sub-Saharan **Africa**, but poor land management in Europe also accounts for an estimated 970m tonnes of soil loss from erosion each year with impacts not just on food production but biodiversity, carbon loss and disaster resilience. High levels of food consumption in wealthy countries such as the UK are also a major driver of soil degradation overseas.

The paper was launched at a meeting of the UNCCD in Ordos, China, where signatory nations are submitting voluntary targets to try to reduce degradation and rehabilitate more land. On Monday, Brazil and India were the latest countries to outline their plan to reach “land degradation neutrality”.

However, the study notes that pressures will continue to grow. In a series of **forecasts** on land use for 2050, the authors note that sub-Saharan Africa, south Asia, the Middle East and north Africa will face the greatest challenges unless the world sees lower levels of meat consumption, better land regulation and improved farming efficiency.