

# Books & arts



Rock becomes visible as topsoil is eroded away.

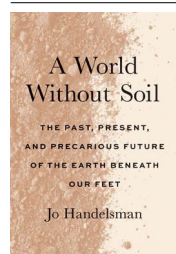
## A call for governments to save soil

To ensure food security, the world must stop letting fertile soil wash and blow away. **By Emma Marris**

**S**oil creates life from death. The production of more than 95% of the food we eat relies on soil, a heady mix of rock particles, decaying organic matter, roots, fungi and microorganisms. Yet this precious resource is eroding at a global average of 13.5 tonnes per hectare per year. Instead of nourishing crops, fertile topsoil is ending up in inconvenient places such as ditches, reservoirs and the ocean.

Microbiologist Jo Handelsman takes on the challenge of making readers care in *A World Without Soil*, aided by environmental

researcher Kayla Cohen. Their prologue takes the form of a letter about soil erosion that Handelsman wishes she had sent to US president



**A World Without Soil: The Past, Present, and Precarious Future of the Earth Beneath Our Feet**  
Jo Handelsman  
Yale Univ. Press (2021)

Barack Obama while working in the White House's Office of Science and Technology Policy in the mid-2010s. Alas, she did not understand the true gravity of the problem until the waning days of the administration. Her biggest regret? That she wasn't able to make soil management the federal priority she thinks it should be.

Soil can be created over time, as dead things break down and contribute energy and nutrients to an ecosystem based on the underlying rock. But it erodes 10–30 times faster than it is produced. Globally, erosion reduces annual crop yields by 0.3%. At that rate, 10% of production could be lost by 2050. In erosion hotspots such as Nigeria, 80% of the land has been degraded. In Iowa, up to 17% of land is almost devoid of topsoil. Almost more convincing than the many facts and figures is a colour photograph of a field in Iowa with so little topsoil that the pale, lifeless sandy rubble beneath pokes through.

### Age-old solutions

A sense of dread builds in the chapters that cover the basic science of soil as well as the causes and consequences of its erosion. The last part of the book brings a burst of enthusiasm, as the authors turn to possible solutions – many of them simple, and some millennia old. These involve improving holding capacity through planting diverse crops in rotation; increasing organic content with additions such as compost and biochar; reducing the erosional effects of water and wind by reshaping the land with contouring, terraces, windbreaks and the like; and ploughing as little as possible.

In a chapter on traditional soil-management techniques around the world, Handelsman and Cohen describe deep black “plaggen” soils on Scottish islands, made rich with cattle manure; rice terraces managed for 2,000 years by the Ifugao people in the Philippines; the milpa farming system of the Maya in Latin America, with its 25-year rotation of crops including trees; and compost made of seaweed, shells and plant material by the Māori in New Zealand. Each system yields rich agricultural productivity while maintaining deep banks of carbon-rich, fertile soil. “We know how to do this,” write Handelsman and Cohen.

Why, then, is fertile soil being allowed to wash and blow away? The answer, not surprisingly, rests in the shackles of global capitalism. Farming's profit margins are razor-thin, forcing producers to plant the highest-yielding variety of the highest-profit crop from field edge to field edge every season. Terracing, rotating crops and forgoing tilling enrich

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soil in the long run, but nibble into profits this year. And farmers can't pay their mortgages or lease equipment with the aroma of deep black topsoil.

Handelsman and Cohen urge the world to demand real change in how mainstream agricultural production is managed. "The burden of protecting soil cannot be relegated to indigenous people and environmental activists," they note. But their specific suggestions are a little underwhelming. They join the calls for international soil treaties, but given how poorly climate treaties have worked, I am cynical about the potential of such agreements. Countries seem likely to both under-promise and under-deliver unless there are costly penalties for failure. The same goes for the consumer-facing labels that the authors propose for food produced on farms that are working to improve their soil. Similar labels have not put a meaningful dent in climate change or other environmental problems – and many customers cannot afford to spend more on "soil-friendly" food.

### Top-down change

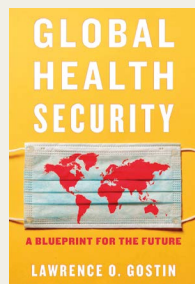
What farming needs is a top-down overhaul. Handelsman and Cohen gesture at this with proposed discounts on crop-insurance premiums for farmers who increase the carbon in their soil. More is needed. Governments must pay farmers to build soil. In the United States, farmers can apply for funding for anti-erosion improvements through the Environmental Quality Incentives Program, run by the Department of Agriculture. Funding announced this month will increase the amount of land planted with cover crops to 12 million hectares by 2030 – but even that would represent only some 7% of US cropland. It is not enough.

We need to change how we think of farming. We have already begun to move towards a model in which farmers are less independent businesspeople growing and selling food, and more government-supported land stewards managing a complex mix of food production, soil fertility, wildlife habitat and more. Around the world, many farmers depend on subsidies, drought relief and payments from piecemeal schemes to conserve soil and nature. Such programmes – currently small-scale, ad hoc fixes for a broken system – should be the core of the agricultural sector.

Our land, our fresh water, our biodiversity and our soil are too precious to be destroyed by the market price of commodity grains and other foodstuffs. We must invest deeply and thoughtfully in our farmers so that they can invest deeply and thoughtfully in the land, becoming holistic landscape-management professionals. This is the future of farming.

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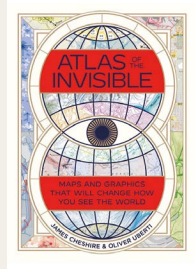
## Books in brief



### Global Health Security

Lawrence O. Gostin *Harvard Univ. Press* (2021)

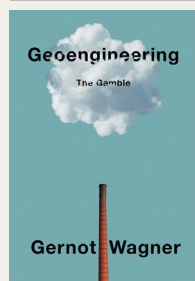
"No one is safe from infectious diseases unless everyone is safe," says World Health Organization adviser Lawrence Gostin. Discouraged but inspired by COVID-19, his wide-ranging study analyses the science and politics of past and present global disease, with hypothetical exercises about a new influenza, bioterrorism and cholera. He recommends steps to reduce pandemic risk, such as increasing surveillance of animal pathogens and their movement. Above all, he calls for a "new politics", free from nationalistic populism.



### Atlas of the Invisible

James Cheshire & Oliver Uberti *Particular* (2021)

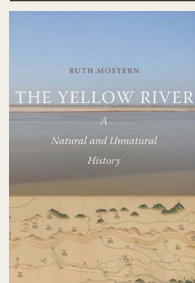
A circular map of Earth looking down on the North Pole shows 400 fibre-optic cables laid on the ocean floor between 1989 and 2020, providing access to the Internet. It is one of many maps in this intriguing, if sometimes perplexing, book by former *National Geographic* design editor Oliver Uberti and cartographer James Cheshire. They describe the volume as an "ode to the unseen": a world invisible through text and numbers alone, ranging from the development of genius to aircraft carbon dioxide emissions.



### Geoengineering

Gernot Wagner *Polity* (2021)

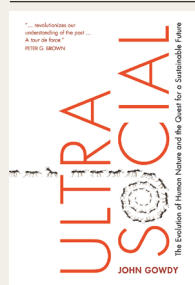
Without solar geoengineering to deal with climate change, will Earth inevitably become inhabitable? The hugely controversial, if probably inexpensive, proposal – to cool the planet by using aerosols or other methods to reflect away some of the Sun's radiation – defines economist Gernot Wagner's thought-provoking study. Two decades ago, he considered the idea "nuts". He still does, but today he advocates extensive new research and thinks we have to take the "gamble", despite the risks. The issue is now "not if, but when".



### The Yellow River

Ruth Mostern *Yale Univ. Press* (2021)

China's Yellow River is "the most sediment-laden river in the world", writes environmental historian Ruth Mostern in her survey of three millennia, based on an innovative historical geographic-information system. The river's name refers to the endless yellow sediment flowing from its upper plateau; its other epithet, "China's Sorrow", evokes the frequent course changes and floods in its lower reaches. It has been subject to nearly perpetual construction and repair projects from imperial times to now, amid ongoing uncertainty.



### Ultrasocial

John Gowdy *Cambridge Univ. Press* (2021)

Modern human society, like that of ants and termites, is dedicated to producing economic surplus. It is "ultrasocial", says economist John Gowdy: so "complex, stratified and interconnected" that humans seem part of a "self-regulating superorganism". To avoid climate-change catastrophe, he argues, we must live like hunter-gatherers – social in small groups, sustainable and egalitarian. But in attributing modern ills to the invention of agriculture, private property, cities and hierarchies, he oversimplifies history. **Andrew Robinson**