



AGRICULTURE CRISIS

Soil: Secret Weapon

Text Satya S. Tripathi

◆◆◆ *Restoring our soils through natural farming could be a potent weapon to stave off a catastrophic climate breakdown.*

SOIL. MANY OF US pay little attention to it, especially when living in urban areas.

But soil is not just dirt, sand, or mud. To build a climate-resilient and sustainable planet, we must get reacquainted with the soil, a natural resource that is critical to the survival of millions of species, including humans. This precious resource is in danger, and we are to blame.

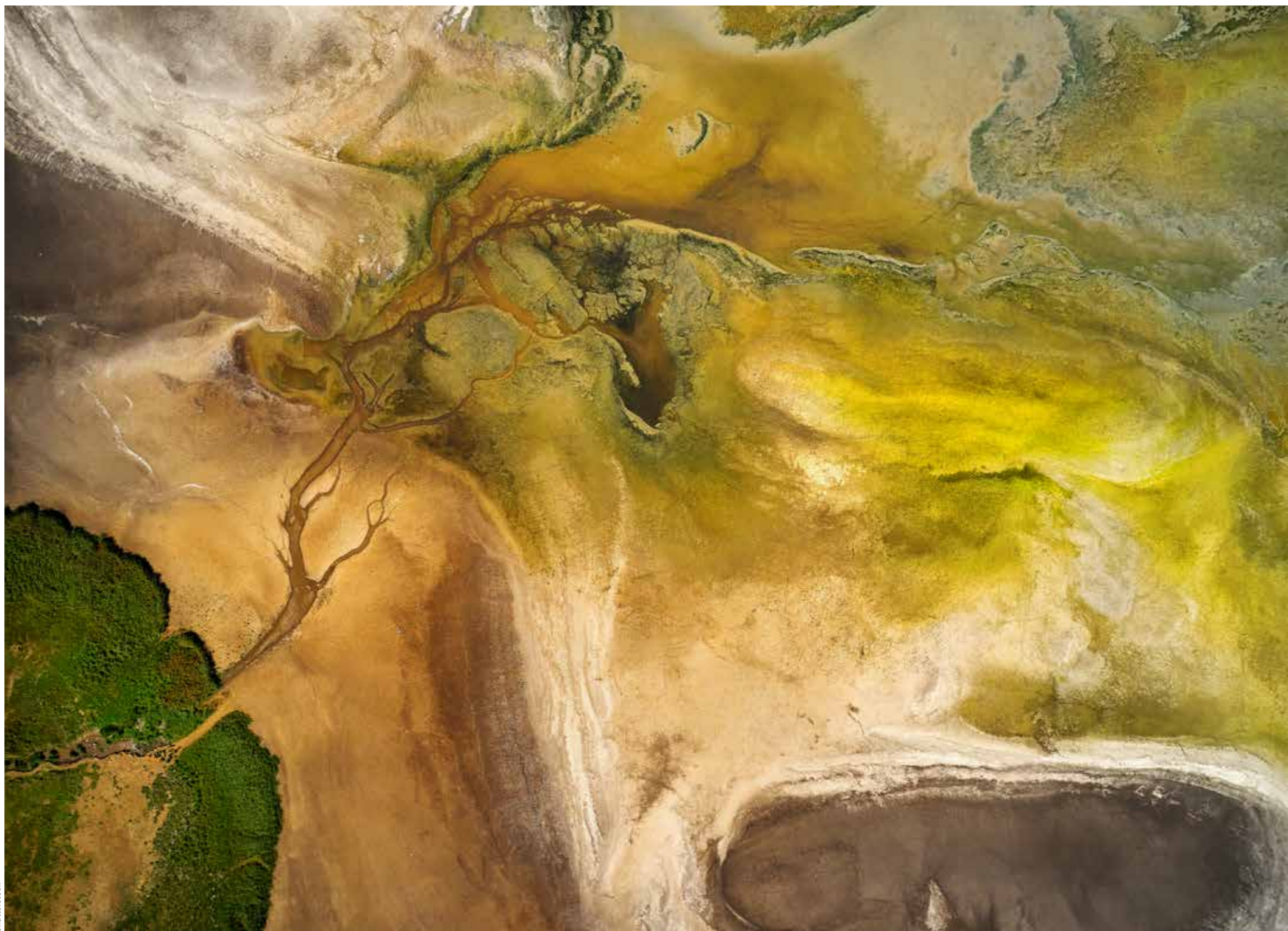
Globally, an area of soil about the size of Costa Rica is lost every year. In the past 40 years, 33 percent of the Earth's soils have been lost due to erosion or pollution. In previous regional soil assessments, it was estimated that human-induced soil degradation in Asia accounted for 31 percent of arable land, the highest share of any of the global regions.

The degradation of soil health has largely occurred due to climate change, industrial agriculture, and deforestation. Climate change ushers in extreme drought and flooding, which washes away topsoils or makes soils dry, saline, and infertile. Industrial agriculture has led to the erosion of soil structures as well, with continuous ploughing of fields, crop planting, harvesting, and the use of chemical fertilisers preventing soils from recovering.

According to the UN Food and Agricultural Organization (FAO), deforestation has been identified as the most dominant cause of soil degradation in Asia: Trees help knit landscapes together, and the removal of such trees changes the soil's structure and abilities, which is detrimental to its health.

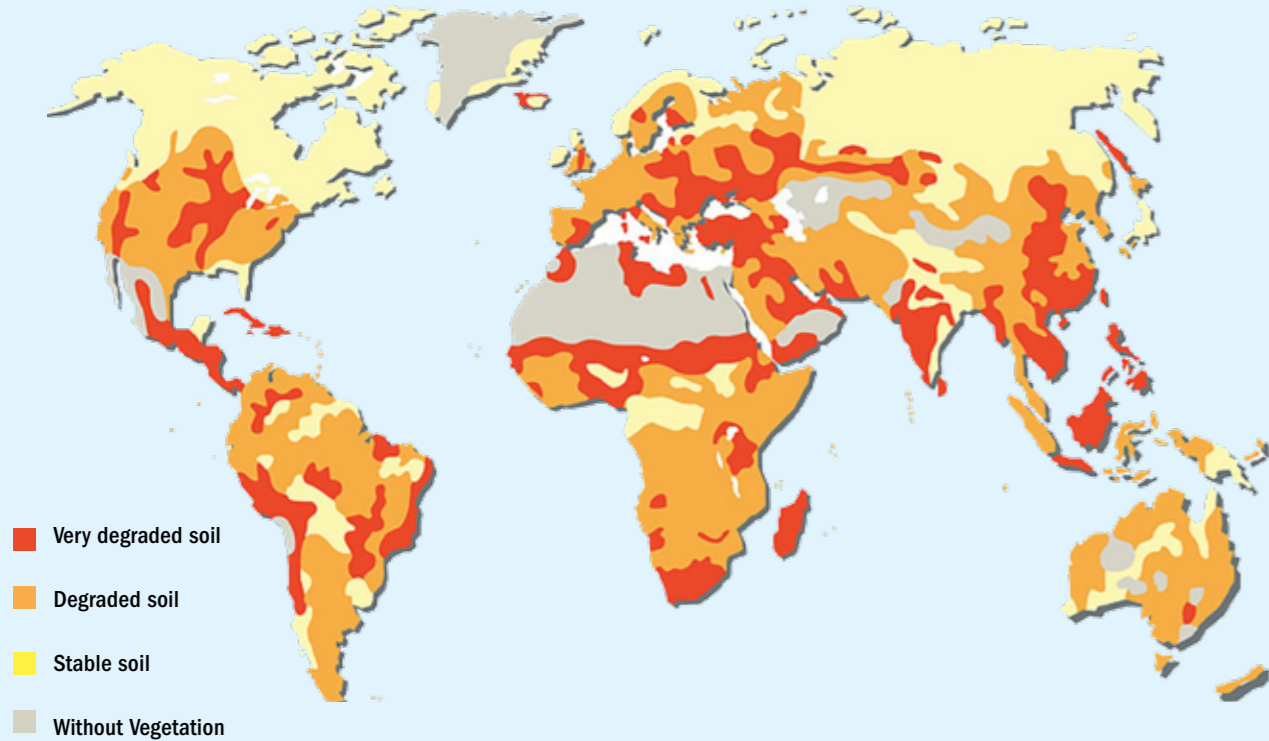
It's estimated that human-induced soil degradation in Asia accounts for 31 percent of arable land, the highest share of any global region

▶ A dried up lake or swamp; an effect of global warming



Shutterstock

Soil Degradation



Source: UNEP (1997)

Declining Fast

Degraded soils are vulnerable to the impact of extreme weather events fuelled by climate change. Countries in northeast Asia face the threats of desertification, land degradation, and drought. These events threaten high-quality food-producing lands that support the livelihoods of more than half of the population in this area.

The rate of human-induced soil degradation is up to 100 times greater than the pace of natural processes that replace degraded soil. It takes around 500 years for 2.5 centimetres of topsoil to be created without any ecological interference.

In India, for example, organic matter content in the topsoil is already lower than 0.5 percent. It should be a minimum of 2.5 to 3 percent. The topsoil layer is the topmost layer of the earth, approximately 30 centimetres thick. It plays a crucial role for crops to grow; it is where the carbon, water and nutrients

Extreme climate events have contributed to a sharp decline in crop production, and India stands to lose 10 to 40 percent in crop production by the turn of the century

get stored. Extreme climate events have contributed to a sharp decline in crop production, and India stands to lose 10 to 40 percent in crop production by the turn of the century.

Degrading soil health also increases the risk of forest and peat fires. In Indonesia, farmers use the slash-and-burn method to clear large areas of forest and peatland for agricultural expansion. In 2015, between June and October, about 6.4 million acres of land were burned in Indonesia. Ancient peaty soil is flammable when dry, often causing fires to spread out of control, going beyond the intended areas.

This steep decline in soil health is occurring at a time when the world's demand for food is rapidly increasing. It's estimated that the world will need to grow 50 percent more food by 2050 to feed an anticipated population of 10 billion, with the food most needed in developing countries. A recent study from Cornell University showed that global farming productivity is 21 percent lower than it could have been without climate change, with an estimated loss of seven years of agricultural productivity growth.

An Underrated Ally

Soil plays a crucial role in combating climate change and ensuring food security: it takes carbon out of the atmosphere and is one of the Earth's biggest carbon sinks. According to the United Nations Convention to Combat Desertification, restoring the soils of degraded ecosystems could mean the potential to store up to 3 billion tonnes more carbon annually. And according to the FAO, healthy soils can produce some 60 percent more food than degraded soils.

But now, the capacity of soil to mitigate climate change and feed the world is under pressure. Less soil means a lower capacity to store carbon, water, and nutrients.

One way to restore the Earth's soils is to reimagine our industrial agricultural system. We need to cultivate the land within the threshold of renewal, also referred to as regenerative agriculture.

Regenerative agriculture, or natural farming, is climate-resilient as it eliminates the use of synthetic chemical fertilisers and pesticides. Instead, natural inputs are used to promote microbial activity, seed health, and soil protection. This reduces greenhouse gas emissions and decreases levels of soil, water, and air pollution.

India is spearheading the natural farming wave. Its Andhra Pradesh Community Managed Natural Farming movement has over a million farmers and farmworkers enrolled, and can be considered the largest regenerative agroecology initiative in the world. The programme is crucial in redefining the food and agriculture systems on a local and national scale, addressing the core reasons for farmers' distress.



GASP

Women in rural India learn about healthy soil



Speaking at the National Conclave on Natural Farming in December 2021, Indian Prime Minister Narendra Modi said natural farming is a promising tool to reduce the cost of agriculture by relying on traditional field-based technologies, which lead to improved soil health. “We have to take agriculture out of the chemistry lab and connect it to the lab of nature,” he added.

Indian farmers are embracing natural farming to improve crop yield

The Way Forward

With less than 10 years left to repair, rehabilitate, and regenerate our ecosystems to stave off a catastrophic climate meltdown, we must move fast. Since soil plays a key role in slowing down climate change and ensuring food security, we need to put it at the centre of policies and practices.

Climate change, agriculture and soil health are strongly correlated. By offering solutions to restore soil health at low cost, regenerative agriculture represents a triple win opportunity for nature, people, and the planet. ♦ AG

Japanese agricultural scientist and philosopher, Masanobu Fukuoka, pioneered the idea of natural farming. Here are its four principles:

- 1 Human cultivation of soil and ploughing is unnecessary, as is the use of mechanical machines.
- 2 Chemical fertilisers and prepared compost are unnecessary.
- 3 Weeding is unnecessary but it can be suppressed.
- 4 Dependence on pesticides or herbicides is unnecessary.



GASP

“We have to take agriculture out of the chemistry lab and connect it to the lab of nature.”

- Narendra Modi, Prime Minister of India

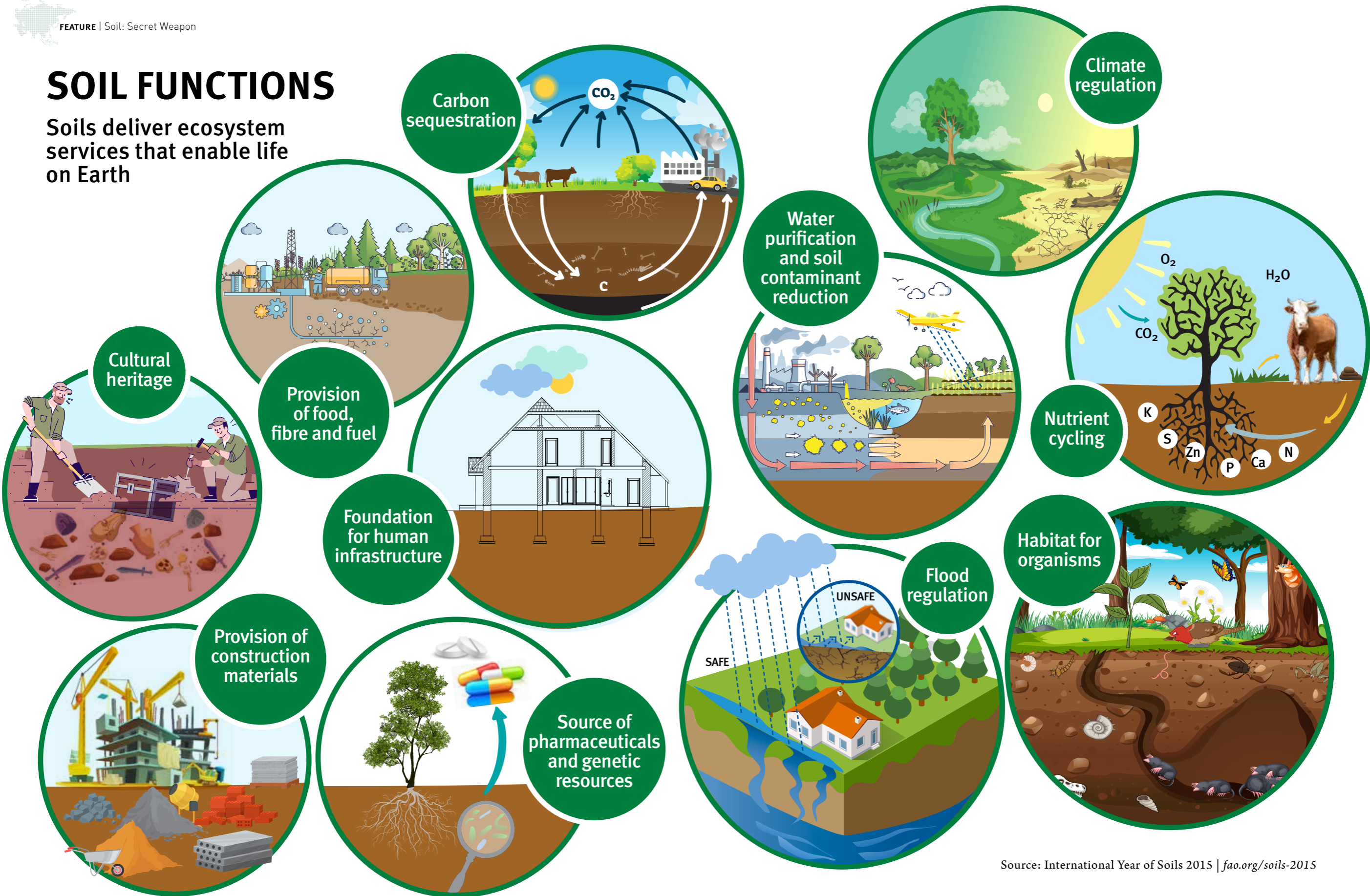
SATYA S. TRIPATHI is secretary-general of Global Alliance for a Sustainable Planet (GASP), an organisation that works with climate champions across the planet to achieve the UN Sustainable Development Goals by 2030.


















GASP

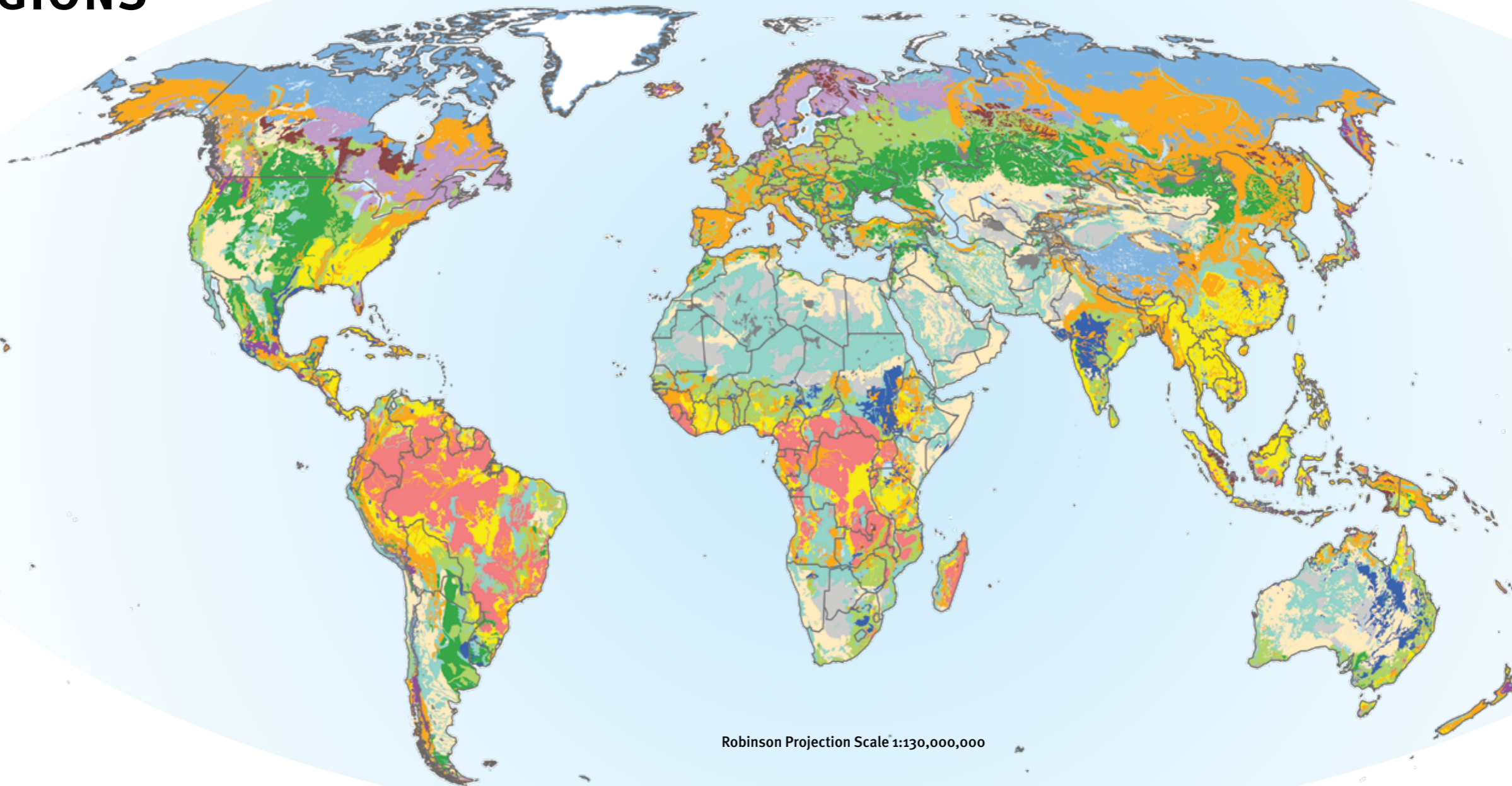
SOIL FUNCTIONS

Soils deliver ecosystem services that enable life on Earth



GLOBAL SOIL REGIONS

-  Alfisols
-  Andisols
-  Aridisols
-  Entisols
-  Gelisols
-  Histosols
-  Inceptisols
-  Mollisols
-  Oxisols
-  Spodosols
-  Ultisols
-  Vertisols
-  Rocky Land
-  Shifting Sand
-  Ice/Glacier



The Global Soil Regions map is derived from a reclassification of the FAO-UNESCO Soil Map of the World, together with the soil climate map. The map indicates the distribution of the 12 soil classes according to soil taxonomy.

Source:   US Department of Agriculture
Natural Resources Conservation Service
Soil Survey Division
World Soil Resources
soils.usda.gov/use/worldsoils
www.nrcs.usda.gov/wps/portal/nrcs/detail/soils/use/?cid=nr142p2_054013