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Study: Overhauling global food systems with sustainable seafood may help boost food security and avert worsening land crisis

15 August 2025

By Responsible Seafood Advocate

Sustainably sourced seafood could help free land bigger than Africa by 2050 – and give the planet a powerful boost against climate change, says study

Maximizing sustainable seafood production — alongside reducing food waste by 75 percent — could spare an area of land larger than Africa by 2050, according to a study by 21 leading scientists.

The findings, **published in *Nature* (https://doi.org/10.1038/s41586-025-09365-5)**, suggest that the ocean's bounty, if managed responsibly, could play a pivotal role in halting land degradation, slowing climate change and protecting biodiversity.

The scientists also underline especially the importance of halting food waste and sustainably managing lands and suggest a target of 50 percent land restoration for 2050 (currently 30 percent by 2030).

Maximizing sustainable seafood production — alongside reducing food waste by 75 percent — could spare an area of land larger than Africa by 2050, according to a study by 21 leading scientists. Photo credit: UNCCD.

“This paper presents a bold, integrated set of actions to tackle land degradation, biodiversity loss and climate change together, as well as a clear pathway for implementing them by 2050,” said lead author Fernando T. Maestre of the King Abdullah University of Science and Technology (KAUST), Saudi Arabia. “By transforming food systems, restoring degraded land, harnessing the potential of sustainable seafood and fostering cooperation across nations and sectors, we can ‘bend the curve’ and reverse land degradation while advancing towards goals of the UN Convention to Combat Desertification and other global agreements.”

One of the study's key recommendations is to integrate land and marine food systems. According to the study, replacing much of the world's red meat with sustainably sourced seafood could free up vast stretches of land. The study notes that beef and other red meats, when produced intensively, consume huge amounts of pasture, water and feed, while emitting high levels of greenhouse gases. Seafood and seaweed, by contrast, offer nutrient-rich protein with far lower environmental costs – and seaweed needs no freshwater while absorbing carbon.

Sunlight, seawater and wind: A simple recipe for ambitious algae grower Susewi

Utilizing proven large-scale pond engineering, Susewi aims to become the world's largest producer of algal biomass, with its sights set on aquafeeds.

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Shifting 70 percent of unsustainably produced red meat to wild-caught or farmed fish and mollusks could spare 17.1 million square kilometers (6.6 square miles) of land. Replacing 10 percent of global vegetable intake with sustainably harvested seaweed products would free another 0.4 million square kilometers. Such changes are most relevant for wealthier nations with high meat consumption, though in many poorer regions, animal products remain essential.

"Integrating land and marine food systems is fundamental to achieve food security, enable the restoration of degraded land and maintain healthy populations," said Dolors Armenteras, co-author and professor at the Universidad Nacional de Colombia, Bogotá.

Other key recommendations include a call for restoring half of the world's degraded land – about 13 million square kilometers – through sustainable practices led by local communities, including Indigenous Peoples and smallholder farmers. Proposals include shifting subsidies to sustainable

small-scale producers, taxing high-impact farming, adding environmental labels and improving land-use data.

Cutting food waste by 75 percent could free another 13.4 million square kilometers, with steps such as banning cosmetic standards for produce, supporting donations, educating households and improving storage and transport, citing Spain's new surplus food laws as a model.

The scientists urge the UN's three Rio Conventions – on biodiversity, desertification and climate change – to unite around shared land and food system goals, share knowledge, track progress and turn science into policy to speed action. They stress these systems are key to meeting the conventions' targets and the Sustainable Development Goals, noting the UNCCD's 197 Parties recently agreed at COP16 in Riyadh to combat farmland degradation.

"Food production alone drives nearly 20 percent of global emissions of greenhouse gases," said Elisabeth Huber-Sannwald, co-author and professor at the Instituto Potosino de Investigación Científica y Tecnológica, San Luis Potosí, Mexico. "We need to act. To secure a thriving future –and protect land – we must reimagine how we farm, how we live and how we relate to nature – and to each other. It's time for land stewardship: to care for the land as a living ally, no longer as a resource to exploit."

Read the full study (https://doi.org/10.1038/s41586-025-09365-5).

Author

RESPONSIBLE SEAFOOD ADVOCATE

editor@globalseafood.org (mailto:editor@globalseafood.org)