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Changing what we eat could offset years of climate-warming emissions

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Summary: Plant protein foods -- like lentils, beans, and nuts --c an provide vital nutrients using a small fraction of the land required to produce meat and dairy. By shifting to these foods, much of the remaining land could support ecosystems that absorb CO2, according to a new study.

FULL STORY

Plant protein foods -- like lentils, beans, and nuts -- can provide vital nutrients using a small fraction of the land required to produce meat and dairy. By shifting to these foods, much of the remaining land could support ecosystems that absorb CO_2, according to a new study appearing in the journal *Nature Sustainability*.

In their study, the researchers analyzed and mapped areas where extensive production of animal-sourced food, which requires 83 percent of Earth's agricultural land, suppresses native vegetation, including forests.

The study highlights places where changing what people grow and eat could free up space for ecosystems to regrow, offsetting our CO_2 emissions in the process.

"The greatest potential for forest regrowth, and the climate benefits it entails, exists in high- and upper-middle income countries, places where scaling back on land-hungry meat and dairy would have relatively minor impacts on food security," says Matthew Hayek, the principal author of the study and an assistant professor in New York University's Department of Environmental Studies.

Burning fossil fuels for energy emits CO_2, warming the planet. When warming reaches 1.5 °C (2.7 °F) above pre-industrial levels, more severe impacts like droughts and sea level rise are expected. Scientists describe how much fossil fuel we can burn before hitting that limit using the global "carbon budget."

According to the authors' findings, vegetation regrowth could remove as much as nine to 16 years of global fossil fuel CO_2 emissions, if demand for meat were to drastically plummet in the coming decades along with its massive land requirements. That much CO_2 removal would effectively double Earth's rapidly shrinking carbon budget.

"We can think of shifting our eating habits toward land-friendly diets as a supplement to shifting energy, rather than a substitute," says Hayek. "Restoring native forests could buy some much-needed time for countries to transition their energy grids to renewable, fossil-free infrastructure."

In their report, the authors emphasize that their findings are designed to assist locally tailored strategies for mitigating climate change. Although meat consumption in many countries today is excessive and continues to rise, raising animals remains critical in some places.

These considerations will be important as countries attempt to develop their economies sustainably, according to Colorado State University's Nathan Mueller, one of the study's co-authors.

"Land use is all about tradeoffs," explains Mueller, an assistant professor in the Department of Ecosystem Science and Sustainability and the Department of Soil and Crop Sciences. "While the potential for restoring ecosystems is substantial, extensive animal agriculture is culturally and economically important in many regions around the world. Ultimately, our findings can help target places where restoring ecosystems and halting ongoing deforestation would have the largest carbon benefits."

Recent proposals to cover much of Earth's surface in forests have generated controversy as a climate solution. Physically planting upward of a trillion trees would require a substantial physical effort. Additionally, poor planning could encourage uniform tree plantations, limit biodiversity, or deplete dwindling water in dry areas. Lastly, challenges lie in finding enough land to keep trees safe from logging or burning in the future, releasing stored carbon back into the atmosphere as CO_2.

However, the researchers kept these potential problems in mind when devising their study.

"We only mapped areas where seeds could disperse naturally, growing and multiplying into dense, biodiverse forests and other ecosystems that work to remove CO_2¬ for us," Hayek says. "Our results revealed over 7 million square kilometers where forests would be wet enough to regrow and thrive naturally, collectively an area the size of Russia."

Technological fixes for climate change may soon be on the horizon, like machinery that removes CO_2 directly from the atmosphere or power plant exhaust pipes. Placing too much confidence in these technologies could prove dangerous, however, according to study co-author Helen Harwatt, a fellow of the Harvard Law School.

"Restoring native vegetation on large tracts of low yield agricultural land is currently our safest option for removing CO_2," says Harwatt. "There's no need to bet our future solely on technologies that are still unproven at larger scales."

But the benefits of cutting back on meat and dairy reach far beyond addressing climate change.

"Reduced meat production would also be beneficial for water quality and quantity, wildlife habitat, and biodiversity," notes William Ripple, a co-author on the study and a professor of ecology at Oregon State University.

Recent events have also shone a spotlight on the importance of healthy ecosystems in preventing pandemic diseases with animal origins, such as COVID-19.

"We now know that intact, functioning ecosystems and appropriate wildlife habitat ranges help reduce the risk of pandemics," Harwatt adds. "Our research shows that there is potential for giving large areas of land back to wildlife. Restoring native ecosystems not only helps the climate; when coupled with reduced livestock populations, restoration reduces disease transmission from wildlife to pigs, chickens, and cows, and ultimately to humans."

Story Source:

Materials provided by **New York University**. *Note: Content may be edited for style and length.*

Journal Reference:

1. Matthew N. Hayek, Helen Harwatt, William J. Ripple, Nathaniel D. Mueller. **The carbon opportunity cost of animal-sourced food production on land**. *Nature Sustainability*, 2020; DOI: 10.1038/s41893-020-00603-4

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