

China and India are making the planet greener, NASA says

By Emily Dixon, CNN

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(CNN)The Earth is facing a [climate crisis](#), but it's also getting greener and leafier. According to new research, the rise is largely courtesy of China and India.

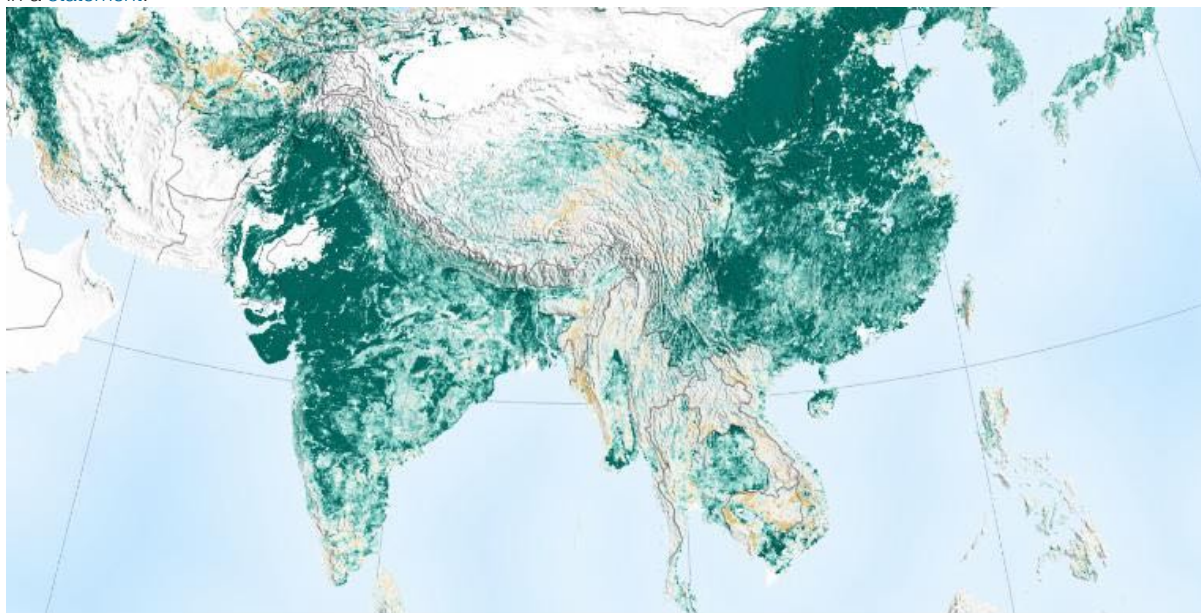
A [study](#) by NASA, based on extensive satellite imagery and published in the journal [Nature Sustainability](#), has revealed that the two countries with the world's biggest populations are also responsible for the largest increase in green foliage.

<https://www.nature.com/articles/s41893-019-0220-7>

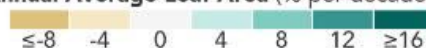
Since the turn of the new millennium, the planet's green leaf area has increased by 5%, or over two million square miles. That's an area equivalent to the sum total of the Amazon rainforests, NASA says. But researchers stressed that the new greenery does not neutralize deforestation and its negative impacts on ecosystems elsewhere.

A third of the leaf increase is attributable to China and India, due to the implementation of major tree planting projects alongside a vast increase in agriculture.

"China and India account for one-third of the greening, but contain only 9% of the planet's land area covered in vegetation -- a surprising finding, considering the general notion of land degradation in populous countries from overexploitation," Chi Chen, the study's lead author and a graduate researcher at Boston University's Department of Earth and Environment, said in a [statement](#).



Trend in Annual Average Leaf Area (% per decade, 2000-2017)



NASA satellite data reveals the Earth is greening, with China and India jointly responsible for a third of the increase.

Between 2000 and 2017, a NASA sensor known as the Moderate Resolution Imaging Spectroradiometer (MODIS) gathered high-resolution data of the Earth's surface from aboard two satellites, the Terra and the Aqua.

Using the MODIS data, researchers discovered that China is the source of a quarter of the increase in green leaf area, despite possessing only 6.6% of the world's vegetated area. Forests account for 42% of that increase, while croplands

make up a further 32%.

China's increase in forest area is the result of forest conservation and expansion programs, NASA said, established to combat the impacts of climate change, air pollution and soil erosion.

India has contributed a further 6.8% rise in green leaf area, with 82% from croplands and 4.4% from forests.

Both countries have engineered a significant increase in food production, thanks to "multiple cropping practices," which see fields replanted and crops harvested multiple times each year. "Production of grains, vegetables, fruits and more have increased by about 35-40% since 2000 to feed their large populations," NASA said.



Planet has only until 2030 to stem catastrophic climate change, experts warn

Rama Nemani, a co-author of the study and a researcher at NASA's Ames Research Center, said in a statement, "When the greening of the Earth was first observed, we thought it was due to a warmer, wetter climate and fertilization from the added carbon dioxide in the atmosphere, leading to more leaf growth in northern forests, for instance."

"Now, with the MODIS data that lets us understand the phenomenon at really small scales, we see that humans are also contributing," Nemani said. "This will help scientists make better predictions about the behavior of different Earth systems, which will help countries make better decisions about how and when to take action."

The researchers emphasized however that this phenomenon does not make up for negative impacts on environmental ecosystems elsewhere. "The gain in greenness, which mostly occurred in the Northern temperate and high latitudes, does not offset the damage from loss of leaf area in tropical natural vegetation," the study authors wrote, citing depleted areas in the Democratic Republic of the Congo, Brazil and Indonesia.

Still, the researchers are optimistic about the results of the study. "Once people realize there's a problem, they tend to fix it," Nemani said. "In the '70s and '80s in India and China, the situation around vegetation loss wasn't good. In the '90s, people realized it. And today things have improved. Humans are incredibly resilient. That's what we see in the satellite data."



In India, croplands delivered the biggest increase in green leaf area.

Thomas Pugh, an associate professor at the University of Birmingham's School of Geography, Earth and Environmental Sciences, said the NASA report expands scientists' understanding of the causes behind global greening. Previously, Pugh told CNN, the increase in green vegetation over the past two decades was attributed to higher levels of atmospheric CO₂. Global greening is a "tangible sign of how the biosphere is responding to human activities, whether through climate change or how we use the land," he said. "It generally implies an increase in vegetation coverage or productivity of that vegetation, or both, although neither of those relationships are unambiguous and universally consistent."

Pugh cautioned that a direct line cannot be drawn between an increase in global greening and a decrease in adverse impacts of climate change. "In some ecosystems, such as forests, greening may imply more net carbon removal from the atmosphere, but the relationship isn't direct," he explained. "In croplands the relation of greening to carbon storage is even less clear. Then there is the effect on the reflectivity of the Earth, which again can go in both warming and cooling directions depending on the local context."

"What green surfaces do less ambiguously is increase the fraction of energy that goes into evaporating water, rather than heating the surface, so they tend to cool the surrounding area, which can offset some of the impacts of climate change."