



Keystone

Air pollution limits global warming, says study

By Marcus Berry

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Researchers at the Zurich Institute of Technology contribute to a seemingly paradoxical study which indicates that atmospheric pollution has a curbing effect on global warming by helping plants to process sunlight and hence absorb carbon dioxide. The study, carried out in tandem with climatologists in the UK, has serious implications for current international polices to put the brakes on climate change.

Until recently, it was generally accepted that photosynthesis - the chemical process which plants use to transform sunlight into energy and therefore growth - would be compromised by air pollution as it blocks out the sun's rays: the so-called "global dimming" effect. But new research appears to have proven otherwise. As Lina Mercado at the UK-based Centre for Ecology and Hydrology and leader of the study team says: "Astonishingly, the effects of atmospheric pollution seem to have increased global vegetation by almost a quarter between 1960 and 1999," she said.

Using plant coverage, atmospheric and oceanic data as well as historical sunlight distribution records from around the world (collected at the Zurich Institute of Technology), the Hadley Global Environment Model (Hadgem) calculated the effects of global dimming on plant absorption of sunlight.

The institute's Dr Martin Wild, a co-author of the study, told Swisster. "We discovered that because of global dimming direct sunlight had indeed decreased between the 1950s and 1980s," he said.

Crucially, Hadgem also took into account new findings, mainly from field research in German forests, which show that plants are more efficient at processing indirect sunrays. Nicolas Bellouin, climatologist at the UK Met Office Hadley Centre, another member of the research team, told Swisster that although atmospheric particles (aerosols) did reflect some sunlight back into space, they also bounced the rest around at low levels causing what scientists call "diffuse radiation".

"When you have direct sunlight on a clear day, it only comes from one direction. If you have too much light on a leaf it will do what it can to photosynthesize before reaching a saturation point," he said. "But if the sunlight comes from more than one direction, there will be a more uniform distribution of sunlight and leaves will be able to process it more efficiently, because there are fewer of them in the shade."

Plants - a vital sponge for CO₂, the second most prevalent greenhouse gas after water vapour - therefore tend to thrive in hazy conditions. "It's a more democratic distribution," said Wild, "Although overall there's actually less sunlight."

If these aerosols were not floating around the atmosphere, the average global temperature of the planet would now be 1 to 1.1 degrees Celsius hotter compared to the 0.7 degree hike recorded since the onset of industrialisation says Knut Alfsen, director of Oslo's international

environmental research facility.

This presents an alarming dilemma. Current international policies to reduce air pollution and provide cleaner air to breathe in places such as say, Athens or Mexico City, essentially threaten to accelerate global warming and the potentially devastating effects of climate change which include increased drought in hotter climates, heatwaves, melting polar ice caps, rising sea-levels, more rainfall in temperate regions, related flooding, the disappearance of glaciers and other doomsday scenarios.

"It's clear we need to fight against air pollution for human health, so from this we can deduce that we will have to further reduce greenhouse gases," Wild said.

Bellouin agrees: " What we're saying is that by improving air quality you're making it more difficult to reach emission targets and from a scientific point of view, we have to include all the effects in the climate system to figure out what CO2 emissions we can afford in the future," he said.

To put that in perspective: CO2 levels prior to industrialization stood at roughly 280 parts per million (ppm) - they're now approaching 400 ppm, already way past 350 ppm, which many climatologists reckon is the upper safe limit.

The study " Impact of Changes in Diffuse Radiation on the Global Land Carbon Sink" has been published in this month's edition of Nature magazine out April 23.