

Urban forests have role in carbon emissions offset: Study

But cutting emissions remains crucial in climate mitigation efforts here: Researcher

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Trees can help to cool the surroundings for urban dwellers, but how effective are they at soaking up heat-trapping carbon dioxide, the main greenhouse gas driving global warming?

As urban reforestation efforts take hold globally, a research group at the National University of Singapore (NUS) did an analysis of over 7,500 cities to find an answer. The results showed urban forests can help to reduce a city's carbon footprint by up to 25 per cent.

Factors that could influence this include the land available in each location for reforestation as well as the city's total emissions.

For instance, the researchers found that 9,165ha of land – or 12.6 per cent of Singapore's total land area – may be suitable for reforestation. But the amount of carbon these urban forests can store will make up only 0.31 per cent of the country's total emissions.

In comparison, reforesting green areas in the Nigerian city of Onitsha-Amaigbo in Africa, where 58 per cent of its land area is deemed suitable for reforestation, could in theory help offset 43 per cent of its emissions.

Mr Teo Hoong Chen, the lead author of the study, noted that planting trees in urban areas cannot be a city's only solution to reducing its emissions.

"Every small contribution adds up but, for developed cities like us, our total emissions are high relative to cities in the Global South, so emissions reduction has to be the cornerstone of climate mitigation efforts," said Mr Teo, who is a PhD student at the NUS Centre for Nature-based Climate Solutions.

The Global South is a term used by organisations like the World Bank to refer to low- or middle-income countries located in regions like Africa, Asia, Latin America and the Caribbean.

For the study, the researchers first identified over 7,500 cities with a minimum population of 50,000. These areas each have a population density of at least 1,500 inhabitants per sq km.

Next, they used satellite data to identify areas suitable for reforestation. These refer to areas covered by grass or shrubs.

The analysis also excluded competing land uses like airports, golf courses, existing nature reserves, parks and gardens, Mr Teo said.

They then estimated the potential of these urban forests to take in carbon dioxide using natural forest regrowth values. These are standard units of measure scientists use to calculate the rate at which trees can absorb carbon dioxide.

Overall, their findings showed that about 17.6 per cent of all city areas were suitable for growing urban forests, and they could offset just about 1 per cent of global emissions.

The burning of fossil fuels for energy to power factories, homes and malls produces carbon dioxide, which accumulates in the atmosphere and traps heat on the planet, throwing the climate system out of whack.

But trees have the unique ability to take in carbon dioxide through a process called photosynthesis.

Earlier research had focused on how such natural ecosystems, mainly in rural areas, can help the world limit warming to 1.5 deg C above pre-industrial levels.

But Mr Teo said having an estimate of urban reforestation potential for cities can help to coordinate efforts at global or regional levels.

For instance, many countries have already launched such plans.

Last year, Singapore launched a One Million Trees movement to plant a million more trees over the next decade.

Malaysia said last December that it wants to plant 100 million trees in five years.

Mr Teo said: "(Having such estimates) also gives us a reality check, by reminding us that cities with high emissions must reduce them; reforestation can only provide a small offset, and should not be used as a smokescreen to avoid pursuing emissions reduction efforts."

Moreover, he and his colleagues also noted limitations to urban reforestation. For instance, biophysical challenges – such as poorer soil conditions, light pollution and other human disturbances – could reduce the ability of trees to take in carbon dioxide.

In 2019, a research group led by ecologist Thomas Crowther at the Swiss Federal Institute of Technology published a paper stating that planting a trillion trees would be one of the most effective ways to address climate change. It drew flak from climate scientists who argued that he was oversimplifying the climate problem.

Climate scientist Winston Chow, an associate professor of science, technology and society at the Singapore Management University, said the NUS paper discusses the limitations of urban reforestation well.

Prof Chow, referring to the ability of trees to take in and store carbon dioxide, said: "There remain local biophysical, developmental and management challenges that would likely reduce the effectiveness of actual sequestration in cities such as Singapore."

He added that more data on observed measurements of carbon sequestration of urban forests is needed to validate the models.

But he said urban trees have other benefits, such as reducing the ambient heat of urban areas and providing a habitat for native animals.

He added: "This makes Singapore's One Million Trees initiative a win-win proposition regardless of the carbon sequestered."

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