

# Reforestation not a cheap fix for climate change

Costs and other constraints may make it practical to reforest as little as 0.4% to 6% of land available in S-E Asia

**Audrey Tan**  
Environment Correspondent

Trees are often touted as nature's quick fix for climate change.

They take in carbon dioxide and provide oxygen in return – a seemingly free solution to reducing the amount of the heat-trapping gas in the atmosphere.

But a new study led by Singapore scientists has shown that reforestation in South-east Asia could come with a hefty price tag.

The direct and indirect costs of reforesting the region, coupled with other constraints, could drastically reduce the amount of land available for reforestation, the scientists found.

The researchers had mapped out the land suitable for reforestation in South-east Asia, and found that about 121 million ha – an area almost five times the size of Britain – was available.

But if costs and other constraints were factored into the analysis, it may be practical to reforest just 0.4 per cent to 17 per cent of this area.

Three types of constraints were considered: the costs of reforestation, alternatives for land use and operational feasibility.

For instance, the researchers calculated the direct and indirect costs of reforestation, such as the need for constant site maintenance, and the opportunity costs of not using the land to grow crops for sale.

Factoring these costs into the cost-benefit analysis shrank the area suitable for planting trees by between 50 per cent and 87 per cent, depending on whether a low, moderate or high cost option was selected.

The researchers further narrowed down this area by factoring in land-use constraints, such as setting aside land that is currently being used for agriculture by large agroforestry companies and small communities.

Lastly, they also considered operational constraints, narrowing down areas feasible for reforestation to plots with low deforestation risk, legal protection, a close proximity to seed sources and areas that are easy to monitor.

“Our analysis shows that when a combination of financial, land-use and operational constraints are taken into account, only a fraction of the climate mitigation potential of reforestation may be achievable,” noted the authors.

The study was published on Monday in the scientific journal *Nature Climate Change*.

National University of Singapore (NUS) conservation scientist Koh Lian Pin, who supervised the research, said the study was the first to take a realistic look at reforestation in South-east Asia by considering such practical constraints.

Said Professor Koh, who helms the new NUS Centre for Nature-based Climate Solutions: “The study's key take-home message is that the theoretical benefit of reforestation, or any climate solution, for that matter, needs to be tempered with a proper accounting of on-the-ground realities.”

The most limiting scenario that accounted for all three constraints – financial, social and operational – showed that just 0.4 per cent to 6 per cent of the 121 million ha of land can be reforested, said the lead author of the study, Dr Zeng Yiwen, a post-doctoral fellow at NUS.

But the study also pointed to

ways to overcome these constraints.

“Even a moderate reduction in opportunity costs could almost double the climate mitigation potential of reforestation,” said Dr Zeng.

This could include solutions such as involving farmers in the reforestation process through agroforestry initiatives, he said.

Such efforts, which involve the planting of stands of forests on agricultural land, could allow reforestation to be carried out without compromising on community livelihoods or food security.

Professor Nophea Sasaki, a forestry and carbon expert at the Asian Institute of Technology in Thailand who was not involved in the latest study, said the paper provides useful information about the potential land availability for reforestation in South-east Asia and the implications for climate policy.

“Reforestation can also improve ecosystem functions and services, and stimulate local economic growth through job creation and conservation of biodiversity,” said Prof Sasaki.

But he noted the importance of selecting the right tree species for reforestation, as choosing non-native species could have adverse consequences for the environment.

More research needs to be done on how reforested lands can be managed to inform policy, he said.

For example, planting a single fast-growing exotic tree species could provide a steady supply of wood, but would negatively impact the ground, surface water and forest-dwelling animals that rely on a diversity of native plants for food.

“Further study on how to manage the reforested lands could provide more insight about balancing reforestation with the need to meet increasing demand for raw materials,” Prof Sasaki said.

Reforestation has been gaining traction among policymakers as a nature-based climate solution.

During the World Economic Forum in January, for example, the One Trillion Tree initiative was launched to urge governments, companies and grassroots organisations to plant new trees and avoid deforestation.

In April, Singapore launched a One Million Trees movement, which aims to plant a million trees or more over the next decade.

Dr Adrian Loo, group director at the National Parks Board (NParks), said the intensification of tree planting is possible through the application of ecology and science.

He pointed to the roadside planting of native trees and shrubs, saying these “nature ways” adopt the tiered structure of Singapore's forests and support native biodiversity.

“Over time, a natural and sustainable landscape will establish,” he said.

Dr Loo also pointed to the importance of involving the community in the movement, saying that partners such as NUS and Keppel Corp have committed to either planting more trees on their premises, or contributing funds to plant trees in Singapore's parks and nature reserves.

He added: “With the support of the community and corporate partners, NParks hopes to galvanise wider community action and sustain active stewardship of the environment into the future.”

audreyt@sph.com.sg