

Saving S-E Asia's trees requires action on climate, land use: Study

Region's forests facing 'double whammy' of threats from climate change, deforestation

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Stocked full of plants that produce aromatic resins, bark that can be used to make cloth and all manner of herbs and spices, South-east Asia's vast forests throng with plant life that both humans and animals rely on.

But a study has found that the region's leafy apothecaries are facing a "double whammy" of threats from climate change and deforestation.

The trees across all forest types in the region are projected to suffer severe losses by 2090 in three of four scenarios modelled in the study.

The trend of decline be stopped and reversed, so tree cover in the region increases instead, only in the scenario where policies to address both climate change and land use change are enacted.

This scenario also helps to reduce the threat of extinction for many species.

Said the study's lead author Sean Pang: "Policymakers must recognise that addressing both climate and land use change is crucial for protecting the fate of South-east Asia's trees, and likely for much of the region's biodiversity."

The study, done as part of Dr Pang's doctoral dissertation at the National University of Singapore, was published on Aug 27 in scientific journal *Nature Sustainability*.

Protecting nature and taking climate action to reduce the release of planet-warming emissions into the

atmosphere have often been treated as separate issues.

But there is a growing body of research that emphasises the interconnectedness of the climate and nature crises, and the importance of addressing both holistically.

"It is hard to say if climate change or land use change is the bigger threat," said Dr Pang, now a post-doctoral fellow at the Aarhus University in Denmark.

One interesting finding of the study was that different tree groups responded to the two changes differently.

For example, climate-related losses were notably more severe in mountainous regions, whereas land use-driven losses generally occurred across coastal and lowland regions.

Coastal and lowland regions tend to be cleared first due to their accessibility.

The four scenarios used by the authors of this study were originally developed by the Intergovernmental Panel on Climate Change.

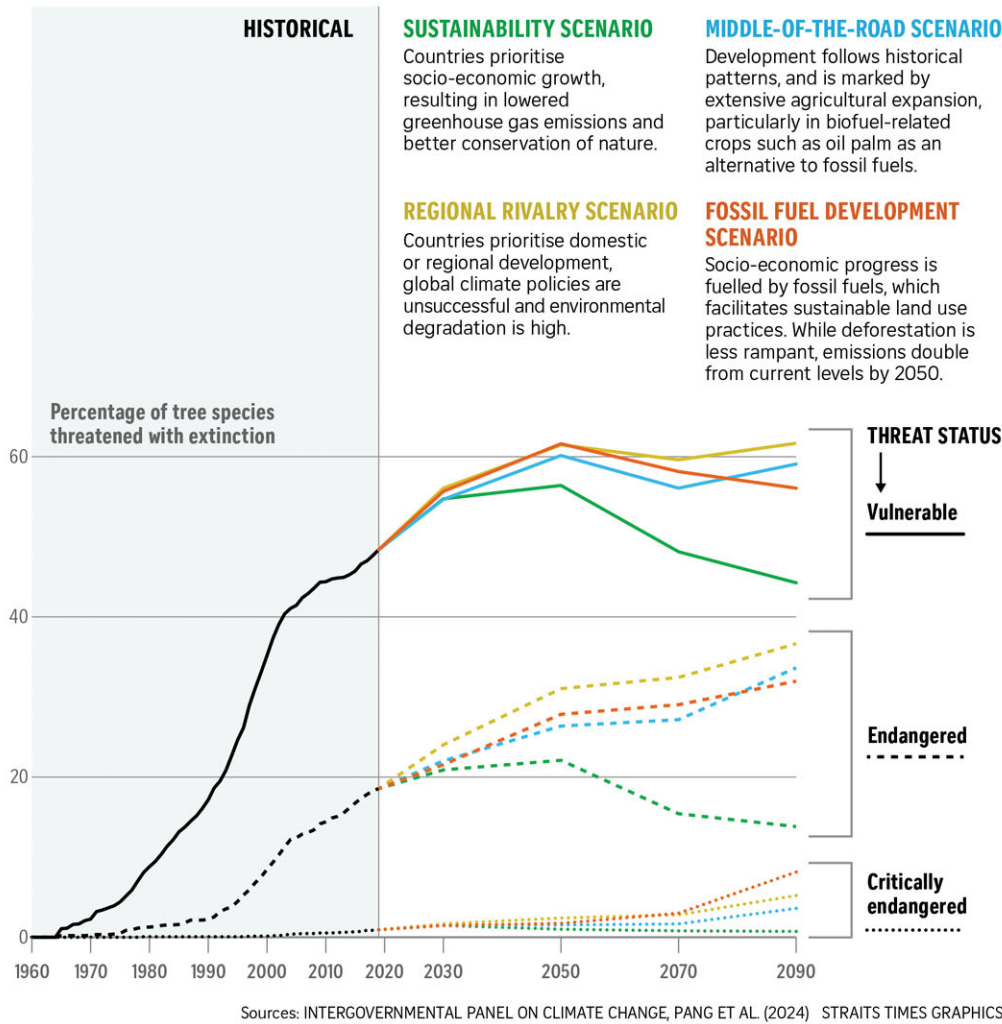
Dubbed "shared socio-economic pathways", the different scenarios combine emissions trajectories with other broad, socio-economic and geopolitical trends to provide researchers with a framework to see how the planet could be impacted under different circumstances.

For example, the most ideal pathway is one where the world takes steps to cut emissions and develop more sustainably, resulting in the lowest levels of global warming.

The other pathways outline scenarios with escalating levels of

Projected tree loss in South-east Asia

Climate change and deforestation are threatening South-east Asia's forests, a new study has found. Using a framework developed by the United Nations' Intergovernmental Panel on Climate Change to explore how societal, economic and environmental trends could impact the planet, the authors found that all but one scenario will result in severe tree loss in the region.



warming due to rising emissions, with the most severe situation involving a doubling of carbon emissions by mid-century.

For the study, the researchers found that only in the lowest emissions pathway, or the "sustainability scenario", would tree cover in South-east Asia increase. This scenario assumes that the world limits warming to below 2 deg C above pre-industrial levels – the threshold which scientists say can help the world ward off catastrophic climate impacts.

Better nature conservation policies are also implemented in this scenario.

In the other three scenarios, however, tree cover declines and more species face the threat of extinction.

Both intermediate pathways – the "middle of the road" and "re-

gional rivalry" scenarios – are characterised by high deforestation rates, with some effort made to control the release of planet-warming emissions.

In the "middle of the road" scenario, efforts to burn less fossil fuels mean more land is cleared for agricultural expansion, particularly for biofuel-related crops like oil palm, as a fossil fuel alternative.

In the "regional rivalry" scenario, the assumption is that countries prioritise domestic or regional energy and food security goals over broader-based development. Environmental degradation under this scenario is high.

The researchers say that under these two scenarios, the most at-risk trees are those found in coastal and lowland areas, such as mangroves or tropical rainforests.

But in the most extreme climate

pathway, called "fossil-fuelled development", fossil fuel use is the most rampant and carbon emissions double from current levels by 2050.

Socio-economic progress under this scenario is fuelled by fossil fuels, facilitating sustainable land use practices, noted the authors. Under this scenario, mountainous tree species – which typically grow in cooler conditions – were found to be most at risk from global warming.

"Our results, which show strongly negative outcomes across pathways other than (the sustainability scenario), demonstrate the severe threat posed by climate and land use change to tree distributions in South-east Asia," the authors wrote.

When tree diversity in the region is lost, the intangible links they

have to the region are severed too. "There could be heritage loss, or we could lose the potential to discover yet-unknown species with important medicinal properties. Much of the biodiversity in the region is still quite unknown, as are their yet untapped potential benefits for society," Dr Pang said.

He cited the example of the camphor tree (*Dryobalanops aromatica*), known for producing Bornean camphor, a highly valuable aromatic resin used in traditional medicine and religious ceremonies. There are three camphor trees listed as heritage trees in Singapore, Dr Pang noted.

Its timber is also highly valuable, and provides shelter and habitat for many animals. "But although valuable, this species is threatened by overexploitation for its timber and resin," he said.

Dr Pang said the study wanted to emphasise that choices we make today could have implications for the region's rich tree life.

"There are trade-offs involved when we move away from the sustainable scenario," he said. "Overall loss was the worst when land use change was extensive, but extreme climate change led to more endangered species. How does one say one outcome is worse than the other?"

Mr Rahman Adi Pradana, a senior policy director at non-government organisation Conservation International who was not involved in the study, said policymakers are becoming more aware of the interlinkages between climate change and other sectoral policies, including land use change.

However, they must sometimes compromise between protecting important ecosystems and converting them for the needs of human and economic development, he noted.

"Spatial planning can be an important tool for managing risk to ecosystems from land use changes," he told ST. "But this is only if the spatial planning aims to safeguard the ecosystems services important to human development and addressing climate change, including ensuring that forest, peatland and mangrove ecosystems continue to contribute to water and food security."

Mr Pradana said governments should prioritise the inclusion of indigenous people and local communities, as well as smallholder farmers, in spatial planning, to incentivise the protection of "irrecoverable carbon" ecosystems and ensure food security through diversified, sustainable landscapes, he added.

Irrecoverable carbon refers to the vast stores of carbon in nature that can be released into the atmosphere due to human activity, such as if disturbed by fire, agriculture or development. If lost, this carbon cannot be restored by 2050.

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