

ScienceTalk

Working with, not against, nature to combat climate change

Reforestation of degraded lands and avoiding further forest loss can help limit warming



Koh Lian Pin

During his National Day Rally speech on Aug 18, Prime Minister Lee Hsien Loong spoke of the need to take the impact of climate change very seriously.

He emphasised the Government's commitment to safeguarding Singapore against this existential threat through strategic investments in research and development, as well as implementation of climate actions.

While his speech and the public discussions that followed focused largely on human-engineered solutions, such as the construction of barrages and sea walls for flood regulation and coastal protection, there is growing scientific consensus that nature itself may be harnessed to help stabilise global warming.

CLIMATE CHANGE IMPACT

According to the United Nations Intergovernmental Panel on Climate Change, even a 0.5 deg C difference in the level of global warming can significantly increase the risk of droughts, floods, extreme weather and poverty for hundreds of millions of people globally.

The direct impact of climate change for Singapore, including temperature increases, sea-level rise and major flooding events, will likely worsen in the future if global warming continues.

Additionally, given that Singapore's economy and the well-being of its people are inextricably tied to that of the wider Asia-Pacific region, its science and policy considerations on climate change must necessarily also take on a regional perspective



About the writer

Professor Koh Lian Pin, 43, is vice-president and principal of science partnerships and innovation at Conservation International – a global environmental organisation headquartered in Washington, DC. In this role, he leads the development of strategic partnerships with academia, industry and government agencies. He is also a World Economic Forum Young Global Leader, an adjunct professor at the University of Adelaide, and a visiting professor at the National University of Singapore.

The Mandai Mangrove and Mudflat. The idea of nature-based climate solutions is gaining traction among governments, non-governmental organisations and businesses. PHOTO: NATIONAL PARKS BOARD

to anticipate any potential indirect impact. For example, climate change may reduce the productivity of agriculture, aquaculture and fisheries across the Asia-Pacific.

As a country that imports over 90 per cent of its food, Singapore is highly vulnerable to climate-related effects on regional food production and supply, especially if producer countries reduce exports to ensure their own food security.

Understanding the likelihood of climate change impact on natural and human systems in the Asia-Pacific region is of critical importance to clarifying risks and developing strategies to future-proof Singapore against environmental, social and economic shocks.

NATURE AS AN ALLY

The Paris climate agreement – to which all members of both Asean and the Asia-Pacific Economic Cooperation forum are signatories – commits countries to holding global warming to below 2 deg C above pre-industrial levels, and to pursue efforts to limit warming to 1.5 deg C.

Achieving these ambitious targets requires countries to not only undergo rapid decarbonisation of their energy sector, but also implement changes to policy and practices in agriculture, forestry and other land use activities.

In a recent study, an international group of scientists reported that nature can provide 37 per cent of the necessary climate mitigation between now and 2030 for a greater than 66 per cent likelihood of achieving the 2 deg C target of the Paris climate agreement.

These so-called "nature-based climate solutions" include the conservation, restoration and improved management of forests, wetlands and agricultural lands to increase carbon sequestration, reduce carbon dioxide emissions and enhance climate resilience.

Globally, these land management strategies can save up to 11 gigatonnes of carbon dioxide emissions a year – equivalent to the combined emissions of the United States and the European Union. The most effective of these actions is a combina-

tion of reforestation of degraded lands and avoiding the further loss of intact forests, including preventing the future outbreak and spread of forest fires in the most carbon-rich regions of the world – as is unfortunately happening now in the Amazon and parts of South-east Asia.

In the same way that low-emission technologies and improvements in energy efficiency are worthwhile investments regardless of future climates, nature-based climate solutions are "no regrets" actions that contribute both to addressing the impact of climate change and providing multiple benefits to society, including clean air and water, food security and livelihood opportunities.

The idea of nature-based climate solutions is gaining traction among international stakeholders across governmental, non-governmental and business sectors, including the United Nations Environment, the International Union for Conservation of Nature and the World Business Council on Sustainable Development, all of which recently incor-

porated nature-based solutions in their institutional goals, strategies or initiatives.

KNOWLEDGE GAPS

There are, however, considerable gaps in research and its implementation that need to be addressed to identify and realise the promise of nature-based climate solutions for the Asia-Pacific region.

For example, the potential and limits of nature-based climate solutions for increasing carbon sequestration and reducing carbon dioxide emissions at the regional level have yet to be studied, and the extent to which these solutions may contribute to meeting Asean and Apec countries' nationally determined contributions to reducing carbon dioxide emissions is unknown.

Furthermore, the value of natural ecosystems as "green infrastructure" for enhancing climate resilience – through processes such as biodiversity conservation, coastal protection and flood regulation – remains unclear.

Quantifying the cost effective-

ness and viability of nature-based climate solutions for Singapore and the Asia-Pacific region would help to inform climate and land use policies for achieving climate mitigation and adaptation goals.

Another key consideration is that nature-based climate solutions may not always align with other interests and priorities of society – climate policies favouring one set of actions can create barriers for others.

For example, the need of some rural communities to maintain their traditional livelihoods or expand their agricultural lands may compete with climate strategies that protect or restore forests for carbon storage and sequestration.

Identifying these potential opportunity costs and trade-offs would be critical to ensuring the effective, collaborative and equitable implementation of climate solutions across the Asia-Pacific region.

SINGAPORE'S STRATEGIC ROLE

Given Singapore's highly skilled talent pool, significant infrastructure for test-bedding innovations and entrepreneurial environment for cross-sectoral collaborations, the country has the potential to lead the discovery and delivery of innovative climate solutions.

Innovations in science and technology can maximise the effectiveness of nature-based climate solutions, reduce barriers for their implementation, and create new solutions and economic opportunities.

For example, the development of real-time terrestrial and coastal monitoring systems using satellite, civilian drones, machine learning and other novel technologies by researchers at the National University of Singapore and Nanyang Technological University can help keep track of the carbon stocks in forests and reefs, as well as enhance the timeliness and effectiveness of emergency responses during forest fires and other catastrophic events.

There have also been efforts led by the private sector. Notably, the Perlin Network Group, a Singapore-based start-up, is using the power of blockchain technology to help improve the transparency and accountability of climate mitigation efforts by governments and companies, including enhancing the supply-chain traceability of forestry and agricultural products.

More importantly, given Singapore's intimate knowledge of the social, cultural and geopolitical contexts of the region, it is ideally positioned to help with the implementation of climate mitigation and adaptation strategies in socially and culturally responsible ways for achieving a carbon-neutral economy and stable climate at the local, regional and global levels.

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