News Release

20 March 2026

CDL AND PARTNERS MARK FIRST ANNIVERSARY OF CDL MICROFOREST WITH FIRST-YEAR DATA SUPPORTING "COOLING THROUGH GREENING" AND LAUNCH OF EXPANSION AT CITY GREEN

- **Singapore's first research-driven regenerative tropical microforest in a retail mall**
- **Designed to mitigate urban heat, enhance climate resilience and boost biodiversity, the 2,800 sq ft microforest is located at City Square Mall's City Green park**
- **One year on, preliminary monitoring shows that temperatures within the CDL MicroForest can be up to 5°C cooler than surrounding and roadside areas**
- **Doubles in size by another 2,800 sq ft to a total of 5,600 sq ft to bolster cooling effects, complementing the national agenda to tackle rising heat stress**

City Developments Limited (CDL) celebrates one year of the CDL MicroForest, the first research-driven regenerative tropical microforest in a retail mall located in Singapore's high-density city centre. Launched in March 2025, the 2,800 square feet (sq ft) CDL MicroForest was collaboratively developed with experts from the National University of Singapore (NUS) and supported by the National Parks Board (NParks) as a living laboratory to study nature-based solutions for urban heat mitigation and biodiversity enhancement.

Alarmingly, Singapore is warming at approximately twice the global average, and urban heat has emerged as one of the defining challenges of our time as it presents profound implications for human health. Over the years, Singapore experienced soaring temperatures, highlighting the urgency of urban cooling strategies. Nature-based solutions like the CDL MicroForest offer complementary approaches to traditional infrastructure, helping to reduce ambient temperature and support biodiversity connectivity and ecosystem services in dense city centres.

Early findings from data collected over the past year indicate that the CDL MicroForest has recorded cooler temperatures by up to 5°C compared to surrounding and roadside areas. Data also found that areas within 1 to 2 metres of the microforest edge have recorded temperatures of up to 1°C to 4°C lower than urban surfaces further away, a promising finding that warrants further investigation on potential localised cooling beyond the forest boundary. Acoustic observations also recorded higher bird call activity within the microforest compared to surrounding areas, suggesting that the site may already be providing ecological value for urban wildlife.

To encourage community involvement, the microforest project has also progressed to incorporate citizen science via the iNaturalist app since 10 March 2026. The free platform encourages visitors to capture their biodiversity observations and environmental monitoring by uploading photos and information of the plants, animals and other organisms that they encounter. The initiative has recorded 65 observations across 46 species within the CDL MicroForest, demonstrating biodiversity presence via the promising and keen participation.

In addition, Environmental DNA (eDNA) sampling suggests approximately 70% more species richness within the microforest as compared to another grass patch outside the microforest. Biodiversity species detected in the microforest also include ecologically important bioindicator organisms such as millipedes and springtails, each with distinct habitat requirements that reflect environmental conditions.

As cities warm and nature loss accelerates globally, the CDL MicroForest stands as a pioneering example of mission-driven climate innovation in action. Building on its initial success, the inaugural CDL MicroForest has now been expanded by an additional 2,800 sq ft under the City Square Mall asset enhancement initiative (AEI), doubling its footprint to 5,600 sq ft, which will amplify cooling effects, ecological benefits and research opportunities.

The first-anniversary celebration features the release of CDL MicroForest data that supports "cooling through greening" and serves as a platform for conversation about how design, research and nature can work together to strengthen climate resilience in cities.

Ms Esther An, CDL's Chief Sustainability Officer, said, "In Singapore, the urban heat island effect can make urban spaces up to 7°C hotter than suburban forested areas. The CDL MicroForest was set up to prove that nature-based solutions can provide a living shield against the rising heat, cooling urban spaces through greening. First-year data captures how dense, regenerative vegetation can help moderate temperatures and support biodiversity. These outcomes are increasingly critical as cities like Singapore warm at approximately twice the global average. The CDL MicroForest isn't just a garden; it is critical climate infrastructure that proves we can green our way toward a more liveable and healthier built environment. The expansion of the CDL MicroForest at City Green reflects CDL's firm commitment to nature-based solutions, and we hope this will inspire more innovative application of nature-based solutions to cool urban spaces."

Professor Veera Sekaran, Office of the President, NUS, said, "CDL Sustainability in collaboration with NUS is advancing a 2,800 sq ft regenerative tropical microforest at City Square Mall precinct and its other developments, targeting urban heat reduction and biodiversity restoration through a co-designed governance model and performance metrics. This partnership bodes well for Singapore and places emphasis on nature-based solutions based on Regenerative principles for Singapore."

Associate Professor Adrian Loo, Deputy Director, Centre for Nature-based Climate Solutions, NUS, said, "Despite its compact footprint, the microforest at City Square Mall has indeed surprised us as a green urban sanctuary. Our preliminary data show increased biodiversity and activity alongside a measurable reduction in ambient temperatures. Coupled with the EcoTrain and programmes by CDL, the area has become a living laboratory for understanding climate adaptation and playing a role in Singapore's vision as a City in Nature."

For more information, please refer to:

- Annex A – About the CDL MicroForest
- Annex B – Research findings of the CDL MicroForest after one year

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ANNEX A

About the CDL MicroForest at City Square Mall's City Green


Unveiled on 10 March 2025 by President Tharman Shanmugaratnam, the CDL MicroForest is Singapore's first research-driven regenerative tropical microforest piloted within a retail mall in the high-density city centre.

Located at City Green, the urban park beside City Square Mall, the approximately 2,800 sq ft CDL MicroForest is a research-driven regenerative tropical microforest designed as a living laboratory. It studies how dense, native planting can cool urban spaces, enhance biodiversity and strengthen ecological resilience in the heart of Singapore's city centre, representing one of the pioneering applications of the microforest concept within a highly built-up environment in Singapore.

Its development comes at a critical time. In 2024, Singapore recorded its fourth consecutive year of near-record temperatures within a decade, alongside one of its heaviest rainfall years since 1980. Rising urban heat, flash floods, infrastructure strain and biodiversity pressures underscore the growing climate risks facing dense cities. As temperatures climb and extreme weather intensifies, the need for scalable, science-based and nature-based solutions has become increasingly urgent.

Against this backdrop, the national focus on heat resilience has sharpened. Speaking at this year's Committee of Supply Debate, Deputy Prime Minister Gan Kim Yong underscored that Singapore is ramping up targeted measures to address heat stress. As urban temperatures continue to rise, heat resilience is no longer optional. It is a critical national agenda and initiatives such as the CDL MicroForest aim to complement and support these broader efforts.

Biodiversity spotted at the CDL MicroForest
(Left to Right): Lime Butterfly (*Papilio demoleus*); Yellow-and-black Carpenter Bee (*Xylocopa flavonigrescens*); Six-spotted Zigzag Ladybird (*Cheilomenes sexmaculata*)

In response, the CDL MicroForest was established as a nature-based solution grounded in the principle of "cooling through greening". This unique collaboration between CDL and researchers from NUS brings together private sector leadership and academic expertise in urban nature-based solutions. The site functions as a data-driven pilot, collecting measurable insights on temperature moderation, habitat restoration and environmental performance.

Designed to mimic the layered structure of a tropical rainforest, the CDL MicroForest incorporates a high diversity of predominantly native species to maximise canopy cover, evapotranspiration and ecological function. Early observations indicate its potential to moderate temperatures while creating a habitat for native pollinators, birds and other urban wildlife.

The expanded CDL MicroForest is located at City Green, adjacent to the original plot.

By incorporating a diverse range of plant species, the CDL MicroForest mimics a tropical forest, lowering temperatures and providing refuge for Singapore's wildlife, including native pollinators and dispersers. This project is a scalable model for integrating regenerative tropical microforests into dense urban areas, supporting ecological connectivity and reinforcing Singapore's vision of a City in Nature. Through research and measurable outcomes, this collaboration aims to promote nature-based solutions, laying the groundwork for sustainable, ecologically resilient urban environments that will thrive for generations to come.

Benefits of a regenerative tropical microforest:

- Cooling by greening: Enhances thermal comfort by reducing urban heat through natural shade and evapotranspiration.
- Reduces flooding and helps with flash floods: Improves water absorption and drainage, reducing surface runoff and flood risks.
- Enhances biodiversity: Supports a rich variety of plant and animal species, creating a thriving ecosystem.
- Improves air quality: Absorbs pollutants and releases oxygen, contributing to cleaner air.
- Sequesters carbon: Captures and stores carbon dioxide, helping to mitigate climate change.
- Supports mental well-being: Provides green spaces that promote relaxation and reduce stress.
- Boosts soil health: Enhances soil fertility and prevents erosion through deep-rooted vegetation.

In 2026, as part of CDL's Asset Enhancement Initiative at City Square Mall, the MicroForest was expanded by an additional 2,800 sq ft to further strengthen canopy density, species richness and ecological connectivity. With over 80% of native tree species, the enhancement increases canopy cover, structural diversity and species richness, improving urban cooling, water absorption, biodiversity support and reinforces the site's role as resilient green infrastructure.

The CDL MicroForest demonstrates how underutilised urban spaces can be transformed into regenerative ecosystems. As cities warm and biodiversity loss accelerates, this scalable model illustrates how integrating research, design and measurable outcomes can support Singapore's vision of a City in Nature and contribute to more climate-resilient, liveable urban environments for generations to come.

The MicroForest initiative is a joint effort between CDL and the following experts from NUS:

- **Professor Veera Sekaran,** Office of the President, NUS
  Joint-Appointments: NUS Cities, Engineering Design & Innovation Centre (EDIC- College of Design and Environment, Director, Regenerative Agritech Centre, Biological Sciences, Faculty of Science.

- **Associate Professor Adrian Loo**, Deputy Director, Centre for Nature-based Climate Solutions, NUS

ANNEX B

CDL MicroForest's First Year Data Demonstrates Real-World Benefits

Key Findings

One year on, preliminary monitoring shows that **temperatures within the CDL MicroForest can be up to 5°C cooler than surrounding and roadside areas**, highlighting the cooling benefits of dense urban greenery to help mitigate local heat and improve microclimatic comfort through shade and evapotranspiration.

Early data also suggests that **areas within 1 to 2 metres of the microforest edge have recorded some lowered temperatures of up to 1°C to 4°C compared to nearby urban surfaces further away**. These early results suggest that even small patches of dense greenery may influence the surrounding microclimate, though continued monitoring and further research is needed to better understand the spatial extent of this effect.

Acoustic observations recorded **higher bird call activity within the microforest compared to surrounding areas**, suggesting that the site may already be providing habitat and ecological value for urban wildlife.

Since 10 March 2026, the microforest project has incorporated a citizen science component through the iNaturalist app which is free to use. The platform encourages visitors to participate in biodiversity observations and environmental monitoring by documenting the plants, animals and other organisms they encounter, and uploading it onto the app. The initiative has since recorded 65 observations across 46 species within the CDL MicroForest, demonstrating promising early participation and biodiversity presence.

Environmental DNA (eDNA) sampling conducted to assess soil health and biodiversity detected **approximately 70% greater species richness within the microforest** compared with another grass patch outside the microforest Species detected include **ecologically important and bioindicator organisms** which reflect the presence of varied microhabitats and soil conditions within the developing microforest ecosystem:

- Millipedes typically occur in moist, shaded leaf litter and decaying organic matter where they contribute to nutrient cycling.
- Springtails thrive in moist soils that are rich in organic material and are highly sensitive indicators of soil quality.

Methodology

1. In situ environmental, climatic and bioacoustic monitoring

Environmental and climatic sensors were deployed in situ (on site) to monitor microclimatic conditions within the CDL MicroForest. One sensor station was placed inside the microforest, while another was installed just outside the CDL EcoTrain to provide a comparative reference point.

These sensors continuously recorded parameters such as temperature, humidity, wind speed, rainfall, and other environmental variables to assess how the microforest influences the surrounding microclimate. Wireless environmental sensor networks are commonly used in forest ecosystems to detect localised microclimate variations across space and time.

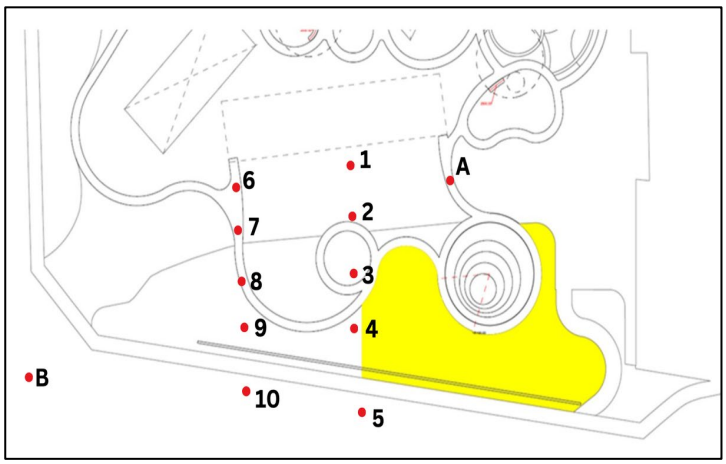
In addition, bioacoustic monitoring devices were installed to record ambient environmental soundscapes within and outside the microforest. These sensors capture bird calls and other ecological sound signals, which can be analysed to track biodiversity presence and activity patterns, providing insights into ecological changes within the microforest.

Environmental and climatic sensors deployed within and outside the CDL MicroForest.

2. Handheld temperature measurements

To complement the fixed sensors, handheld temperature sensors were later introduced as well to conduct spot measurements across different locations within and around the microforest. The researcher conducted manual air temperature measurements at 12 designated measurement points located within and around the microforest to capture spatial variations in thermal conditions. Measurements were carried out on sunny days during three time periods, morning, noon and evening, to assess diurnal temperature differences.

At each location, temperature readings were recorded at a height of approximately 1.5 metres above ground level, which aligns with common meteorological observation standards used to represent near-surface air temperature. To improve reliability and reduce random measurement error, five repeated readings were taken at each point for every time period, and the values were averaged for analysis.



12 designated measurement points located within and around the microforest to capture spatial variations in thermal conditions.

3. LiDAR mapping of the microforest

The structural characteristics of the microforest were mapped using LiDAR (Light Detection and Ranging) technology.

LiDAR works by emitting laser pulses toward surfaces and measuring the time taken for the reflected signals to return to the sensor. These measurements are used to generate precise three-dimensional point clouds that represent the physical structure of the environment.

Using this data, researchers can produce detailed 3D models of the microforest, capturing attributes such as canopy height, vegetation density and terrain structure. Such high-resolution mapping enables the analysis of forest structure, habitat complexity and biomass distribution. The resulting datasets support ecological monitoring by allowing researchers to track vegetation growth, canopy development and structural changes in the microforest over time.

NUS researchers using LiDAR technology to map the CDL MicroForest.

4. Environmental DNA (eDNA) sampling

eDNA sampling was conducted to assess soil health and biodiversity within the microforest ecosystem. eDNA refers to genetic material shed by organisms into their environment through sources such as skin cells, hair, pollen, feces and other biological traces. By collecting and analysing environmental samples, researchers can detect the presence of organisms without directly observing or capturing them.

Soil samples were collected from selected locations within the microforest as well as from another grass patch outside the microforest as a control. The collected samples were then sent to a laboratory where DNA fragments present in the soil are extracted and analysed to compare the detected DNA sequences against reference databases to identify the organisms that have left traces in the environment.

5. iNaturalist Citizen Science Platform

iNaturalist is a crowdsourced online science platform where users can document and share biodiversity information, whilst learning about flora and fauna. It connects a global community of users who share observations of wildlife to support research, conservation, and education. Users simply take a photo of a plant, animal, or organism and upload it to the app, where an AI-powered system suggests an identification that can be further verified or refined by the community.