**Research Titles :** A Study of Carbon Storage in Perennial Plants and Carbon Neutraility Potential at Kasetsart University Laboratory School Center for Educational Research and Development

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## Abstract

This research aims to study the carbon sequestration capacity of perennial trees and determine the carbon offset potential of Kasetsart University Laboratory School (Center for Educational Research and Development), ultimately comparing these figures to assess evaluate the feasibility of achieving carbon neutrality. The study was conducted at the Botanical Garden area, where tree species and populations were surveyed. Methodology involved measuring tree circumference at breast height (1.30 meters) and total height during two data collection periods: January 2025 and December 2025. Data analysis included calculating above-ground biomass, carbon sequestration, and the annual carbon increment over a one-year period. Furthermore, the school's carbon footprint was analyzed in accordance with the GHG Protocol. Finally, the carbon sequestration data was compared against the total carbon footprint to analyze the school's carbon balance and self-mitigation capacity

The study results can be summarized as follows: 1. First Survey (January 2025): The total biomass of perennial trees in the study area was 45,435.64 kg, with a total carbon sequestration of 21,354.75 kg. 2. Second Survey (December 2025): The total biomass increased to 59,183.17 kg, with a total carbon sequestration of 27,816.09 kg. 3. Annual Carbon Footprint (2025): The organizational carbon footprint for Scope 1 and Scope 2 was measured at 2,125,723.94 kg$CO_2$e. 4. Carbon Neutrality Analysis: The current carbon sequestration capacity of perennial trees within the Kasetsart University Laboratory School (Center for Educational Research and Development) is insufficient to offset the greenhouse gas emissions generated by school activities.

To achieve the goal of Carbon Neutrality, the research team proposes the following strategic recommendations which are Green Space Expansion: Increase the density of green spaces within the school by prioritizing high-potential carbon-sequestering species identified

in this study, namely the Ficus (Ficus maclellandii), Bastard Poon Tree (Sterculia foetida), and Rain Tree (Albizia saman). Carbon Credit Procurement: Explore and study guidelines for acquiring external carbon credits to offset the residual greenhouse gas emissions that cannot be mitigated internally. And Strategic Alignment: These actions will drive the school toward becoming a Low-Carbon Educational Model, aligning with the KU Carbon Neutrality 2035 strategy.

**Keywords** Carbon Sequestration of Perennial Trees, Carbon Stock Increment of Perennial Trees, Carbon Footprint, Carbon Neutrality

**Acknowledgement**

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**Background and Significance of the Problem**

Thailand's carbon dioxide emissions have been increasing annually since 1998. Although there was a brief decline between 2019 and 2021 due to COVID-19 pandemic measures, emissions surged back to 247.7 million tons—a 1.5% increase from 2021—once the situation normalized in 2022 (Information and Communication Technology Center, 2022; Energy Policy and Planning Office, 2023).

Currently, Thailand has implemented various policies to expand green spaces through reforestation projects led by government agencies, the private sector, educational institutions, and communities. These initiatives aim to raise awareness of the multi-dimensional benefits of green spaces, such as reducing smog, acting as carbon sinks, restoring natural balance, and mitigating global warming. A notable example is the "One Million Trees" project in Bangkok, initiated by Chadchart Sittipunt, which helps purify the air, expand urban green zones, and sequester atmospheric carbon dioxide through photosynthesis to store it as biomass in roots, trunks, branches, and leaves (Thailand Greenhouse Gas Management Organization, 2016; Chadchart Sittipunt, 2022). Furthermore, green spaces and forests play a vital role in addressing climate change by absorbing carbon while simultaneously increasing resilience and immunity against the impacts of global warming and greenhouse gas phenomena.

The IPCC (2006) defines five natural carbon pools: 1. Above-ground biomass 2. Below-ground biomass 3. Dead wood 4. Litter 5. Soil organic matter. For this research, the team focused on above-ground biomass, which includes all living biomass above the soil, such as trees, shrubs, palms, bamboo, and vines. Assessing above-ground carbon, particularly in trees, is a practical approach as it can be measured and analyzed with relative ease and lower costs compared to other pools.

In alignment with Kasetsart University's commitment to achieving KU Carbon Neutrality by 2035, the Kasetsart University Laboratory School as a subordinate unit plays a crucial role in driving this strategy forward. Given the school's physical landscape, characterized by dense green spaces and numerous perennial trees, the research team is interested in studying the carbon sequestration capacity of these trees. This data will be compared with the Carbon Footprint for Organization (CFO) to evaluate the school's potential to reach carbon neutrality. This study does not merely focus on quantitative surveys but emphasizes creating a database for strategic carbon offset planning within the area, supporting Kasetsart University's overarching goals and serving as a future model for sustainable low-carbon educational institutions.

**Research Objectives**

1. To calculate the biomass and carbon sequestration of perennial trees within the Kasetsart University Laboratory School.
2. To analyze the organization's carbon footprint within Scope 1 and Scope 2 boundaries for the Kasetsart University Laboratory School.
3. To compare carbon sequestration capacity against greenhouse gas emissions, and to evaluate the potential for achieving Carbon Neutrality at the Kasetsart University Laboratory School.

**Research Questions**

1. What are the values for the above-ground biomass and carbon sequestration of perennial trees within the Kasetsart University Laboratory School?
2. What is the total Carbon Footprint of the Organization (CFO) within Scope 1 and Scope 2 boundaries for the Kasetsart University Laboratory School?
3. To what extent can the carbon sequestration potential of existing perennial trees offset greenhouse gas emissions to achieve Carbon Neutrality, and what are the strategic guidelines for enhancing this capacity?

**Research Hypothesis**

The volume of greenhouse gas emissions from organizational activities exceeds the carbon sequestration capacity of existing perennial trees, resulting in the Kasetsart University Laboratory School currently maintaining a status as a 'Net Carbon Source' rather than a 'Carbon Sink'.

**Expected Benefits**

1. Ecological Potential: To determine the total carbon sequestration capacity of perennial trees within the Suan Mit Samphan (Mit Samphan Garden) at the Kasetsart University Laboratory School (Center for Educational Research and Development).

2. Greenhouse Gas Management: To establish the annual greenhouse gas emission levels for Scope 1 and Scope 2, providing a critical baseline for developing systematic energy reduction and emission control measures.
3. Carbon Neutrality Policy: To identify the school's carbon balance status and evaluate its progress toward Carbon Neutrality; this will serve as a framework for policy-making regarding carbon credit procurement or the expansion of green spaces to achieve Net Zero emissions.

## Scope of Research

1. Study Area: The primary research site is the Suan Mit Samphan (Mit Samphan Garden) located within the Kasetsart University Laboratory School (Center for Educational Research and Development).
2. Organizational Boundary: The carbon footprint assessment covers all operational activities within the Organizational Boundary of the Kasetsart University Laboratory School.
3. Survey Criteria for Perennial Trees: The survey includes all existing and planted perennial trees with a height exceeding 1.50 meters. Inclusion is limited to trees with a Diameter at Breast Height (DBH)—measured at 1.30 meters above ground—of more than 4.5 centimeters, or a circumference of 14.50 centimeters and above.
4. Data Collection Timeline: Data collection will be conducted twice: first in January 2025 and second in December 2025.
5. Scope of Carbon Footprint Assessment: The study focuses on greenhouse gas emissions within two main scopes, following the GHG Protocol standards:
   - Scope 1 (Direct Emissions): Direct GHG emissions, including stationary combustion (e.g., generators, cooking gas), mobile combustion (e.g., fuel consumption by school vehicles), and fugitive emissions (e.g., refrigerant leakage).
   - Scope 2 (Energy Indirect Emissions): Indirect GHG emissions from purchased energy, specifically electricity consumption within the school.
6. Carbon Neutrality Assessment: The evaluation includes a comparative analysis between the net carbon sequestration from perennial trees and the total greenhouse gas emissions within the defined research scope.

## Research Methodology

### Study Site Selection

1.1 Site Location: The primary study site is the Botanical Garden, located within the Laboratory School of Kasetsart University, Educational Research and Development Center. The address is 50 Ngamwongwan Road, Lat Yao, Chatuchak, Bangkok. The site is situated at the geographic coordinates 13°5105N 100°3401E / 13.851360°N 100.56699

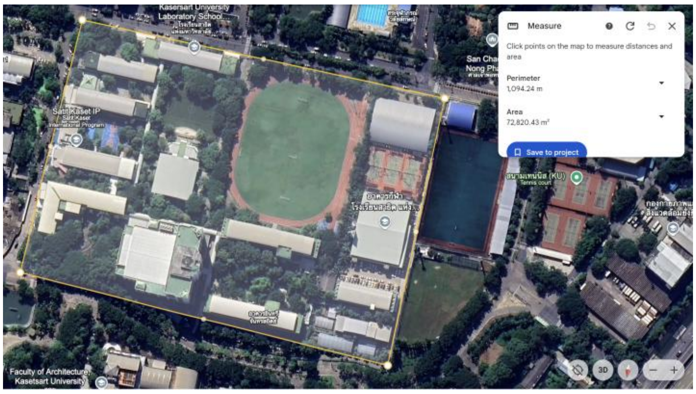


Figure 1: Aerial view of the Kasetsart University Laboratory School Educational Research and Development Center.

1.2 Site Dimensions: The specific area of study within the Botanical Garden measures 55 meters in width and 80 meters in length, encompassing a total area of 4,400 square meters.

Figure 2: Detailed map of the study area within the Botanical Garden.

### Materials and Equipment

To conduct the field measurements, the following instruments were utilized:

1. Measuring Tape: Used for determining the Circumference at Breast Height (CBH) of the trees.

2. Meter Ruler / 1.30m Height Gauge: Used to standardize the measurement point at exactly 1.30 meters from the ground (Breast Height).
3. Laser Rangefinder: Used for the precise measurement of total tree height.

**Research Methodology**

1. **Carbon Storage**

**1.1 Literature Review**

Review of relevant literature regarding carbon sequestration in trees and carbon dioxide absorption rates. This includes studying Land Cover measurement protocols based on GLOBE standards, tree circumference and height measurement techniques, and methods for determining above-ground biomass.

**1.2 Study Site Identification**

The study was conducted at Botanical Garden, Kasetsart University Laboratory School Center for Educational Research and Development), located at 50 Ngamwongwan Road, Lat Yao, Chatuchak, Bangkok.

* Geographic Coordinates: 13°51’05”N 100°34’01”E / 13.851360°N 100.56699°E

* Dimensions: 55 meters wide by 80 meters long, totaling 4,400 square meters.

**1.3 Land Cover Measurement (GLOBE Protocol)**

Data collection involved measuring the circumference and height of all perennial trees during the two specified periods (July 2024 and January 2025).

1.3.1 Measurements: Tree circumference was measured at Diameter at Breast Height (DBH), 1.30 meters above the ground, using a measuring tape. Tree height was measured using a Laser Range Finder.

1.3.2 Environmental Factors: Ambient temperature, relative humidity, and $CO_2$ levels were measured in the vicinity of the studied trees.

1.3.3 Documentation: Tree names, locations, circumferences, and heights were recorded.

1.3.4 Tree Mapping: A spatial map of all trees within the Suan Mit Sampan study site was developed.

**1.4 Data Analysis**

Circumference (converted to DBH) and height data were used to calculate biomass and carbon sequestration using allometric equations by Ogawa et al. (1965).

1.4.1 Biomass Calculation

The above-ground biomass was calculated using the following equations:

1.4.1.1 Stem Biomass (kg.)

$$Ws=0.0396\ (D^2H)^{0.933}$$

1.4.1.2 Branch Biomass (kg.)

$$Wb = 0.00349\ (D^2H)^{1.030}$$

1.4.1.3 Leaf Biomass (kg.)

$$Wl= \left(\frac{28}{(W_s + W_t)} + 0.025\right)^{-1}$$

1.4.1.4 Total Above-ground Biomass

$$Wt= Ws + Wb + Wl$$

When Ws is Stem Biomass (kg.)

Wb is Branch Biomass (kg.)

Wl is Leaf Biomass (kg.)

Wt is Total Above-ground Biomass

D is diameter at breast height, DBH (cm.)

H is Total tree height (m.)

1.4.2. Carbon Storage Calculation

The carbon storage was calculated using the following equations:

Above-ground Carbon Storage = Total Above-ground Biomass X 0.47

1.4.3 Carbon Dioxide Absorption Calculation

The Carbon Dioxide Absorption was calculated using the following equations:

The Carbon Dioxide Absorption = Above-ground Carbon Storage X 44/12

1.4.4 Oxygen Production Calculation

The Oxygen Production was calculated using the following equations:

$$\text{The Oxygen Production} = \text{Above-ground Carbon Storage} \times 32/12$$

2. Carbon Footprint for Organization Calculation

To evaluate the school's carbon balance, the Carbon Footprint for Organization (CFO) was analyzed following the GHG Protocol Corporate Accounting and Reporting Standard, focusing on Scope 1 and Scope 2 emissions.

2.1 Identification of Operational Boundaries

The greenhouse gas (GHG) emission sources within Kasetsart University Laboratory School were identified and categorized as follows:

Scope 1: Direct GHG Emissions

Stationary Combustion: Fuel consumption for school activities (e.g., LPG for cooking in the cafeteria).

Mobile Combustion: Fuel consumption from school-owned vehicles.

Fugitive Emissions: Leakage of refrigerants from air conditioning systems.

Scope 2: Energy Indirect GHG Emissions

Purchased Electricity: Emissions from the generation of electricity purchased from the Metropolitan Electricity Authority (MEA).

2.2 Data Collection (Activity Data)

Activity data for the fiscal year (coinciding with the tree measurement periods) was gathered from secondary sources:

- Invoices for electricity consumption (kWh).
- Records of fuel consumption (liters or kg).
- Refrigerant top-up records (kg).

2.3 Calculation Methodology

GHG emissions were calculated by multiplying the activity data by the appropriate Emission Factor (EF) provided by the Thailand Greenhouse Gas Management Organization (TGO).

The basic equation for GHG calculation:

$$GHG\ Emissions\ (tCO2e) = Activity\ Data \times Emissions\ Factor / 1{,}000$$

2.4 Emission Factors (Reference)

The study utilized the most recent Emission Factors published by TGO (e.g., Grid Emission Factor for Scope 2 and specific fuel density/heating values for Scope 1).

3. Carbon Neutrality Potential and Balance Analysis

To determine the school's status regarding carbon neutrality, the total carbon sequestration was compared against the total operational carbon footprint using the following parameters:

3.1 Net Emission Calculation

The net carbon balance of the school was calculated as:

Net Emissions = (Total Scope 1 + Total Scope 2) - Total  Annual Carbon Sequestration

## Research Results

This research, titled "A Study of Factors Affecting Carbon Sequestration of Perennial Trees at the Kasetsart University Laboratory School (Center for Educational Research and Development)," presents the findings in three distinct parts as follows:

- Part 1: Biomass and Carbon Sequestration Levels of perennial trees within the Kasetsart University Laboratory School.
- Part 2: Organizational Carbon Footprint Analysis and the Potential to Achieve Carbon Neutrality at the Kasetsart University Laboratory School.

**Part 1** Biomass and Carbon Sequestration Levels of perennial trees within the Kasetsart University Laboratory School.

The research team conducted a field survey and data collection by measuring the circumference and height of all perennial trees within the study area of Suan Mit Samphan. The survey included all perennial trees with a height exceeding 1.50 meters and a Diameter at Breast Height (DBH)—measured at 1.30 meters above ground level—of more than 4.5 centimeters, or a circumference of 14.50 centimeters and above.

Subsequently, the collected data, including tree circumference, diameter, and height, were used to calculate tree biomass and carbon sequestration using the Allometric Equations of Ogawa et al. (1965).

The study results are presented in Table 1, which displays the tree circumference, DBH, height, biomass, and above-ground carbon sequestration derived from the first survey conducted in January 2025.

**Table 1:** Tree circumference, Diameter at Breast Height (DBH), height, biomass, and above-ground carbon sequestration data from the first survey in January 2025.

| No. | Botanical Name | Scientific Name | Circum ference (cm) | Diameter (m) | Height (m) | Total Above-ground Biomass | Aboveground Carbon Storage |
|---|---|---|---|---|---|---|---|
| 1 | Banyan Tree | Ficus maclellandii King | 304.00 | 96.77 | 20.00 | 4260.25 | 2002.32 |
| 2 | Banyan Tree | Ficus maclellandii King | 291.00 | 92.63 | 20.00 | 3921.19 | 1842.96 |
| 3 | Bastard Poon Tree | Sterculia foetida L. | 256.50 | 81.65 | 19.50 | 3013.64 | 1416.41 |
| 4 | Rain Tree | Albizia saman (Jacq.) Merr. | 234.00 | 74.48 | 18.40 | 2397.28 | 1126.72 |
| 5 | Bastard Teak | Butea monosperma (Lam.) Taub. | 265.00 | 84.35 | 13.30 | 2231.44 | 1048.78 |
| 6 | Banyan Tree | Ficus maclellandii King | 215.00 | 68.44 | 20.00 | 2209.98 | 1038.69 |
| 7 | Yellow Flame | Peltophorum pterocarpum (DC.) Backer ex K.Heyne | 243.00 | 77.35 | 14.90 | 2108.85 | 991.16 |
| 8 | Bastard Poon Tree | Sterculia foetida L. | 173.00 | 55.07 | 19.70 | 1444.61 | 678.97 |

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|---|---|---|---|---|---|---|---|
| 9 | Bastard Poon Tree | Sterculia foetida L. | 153.00 | 48.70 | 23.90 | 1374.79 | 646.15 |
| 10 | Bastard Poon Tree | Sterculia foetida L. | 163.00 | 51.88 | 19.40 | 1272.38 | 598.02 |
| 11 | Resin Tree | Dipterocarpus alatus Roxb. ex G.Don | 150.00 | 47.75 | 19.80 | 1108.73 | 521.10 |
| 12 | Yellow Flame | Peltophorum pterocarpum (DC.) Backer ex K.Heyne | 158.00 | 50.29 | 17.20 | 1070.82 | 503.29 |
| 13 | Yellow Flame | Peltophorum pterocarpum (DC.) Backer ex K.Heyne | 157.00 | 49.97 | 17.00 | 1046.45 | 491.83 |
| 14 | Bastard Poon Tree | Sterculia foetida L. | 147.00 | 46.79 | 19.00 | 1026.49 | 482.45 |
| 15 | Yellow Flame | Peltophorum pterocarpum (DC.) Backer ex K.Heyne | 179.00 | 56.98 | 12.80 | 1025.44 | 481.96 |
| 16 | Resin Tree | Dipterocarpus alatus Roxb. ex G.Don | 126.00 | 40.11 | 22.30 | 892.54 | 419.49 |
| 17 | Yellow Flame | Peltophorum pterocarpum (DC.) Backer ex K.Heyne | 139.00 | 44.24 | 17.80 | 868.43 | 408.16 |
| 18 | Yellow Flame | Peltophorum pterocarpum (DC.) Backer ex K.Heyne | 143.00 | 45.52 | 16.80 | 867.55 | 407.75 |
| 19 | Yellow Flame | Peltophorum pterocarpum (DC.) Backer ex K.Heyne | 134.00 | 42.65 | 18.60 | 844.74 | 397.03 |
| 20 | Mahogany | Swietenia macrophylla King | 142.00 | 45.20 | 16.50 | 841.70 | 395.60 |
| 21 | Yellow Flame | Peltophorum pterocarpum (DC.) Backer ex K.Heyne | 128.50 | 40.90 | 18.60 | 780.49 | 366.83 |
| 22 | Yellow Flame | Peltophorum pterocarpum (DC.) Backer ex K.Heyne | 132.00 | 42.02 | 16.90 | 750.09 | 352.54 |
| 23 | Bengal Almond | Terminalia catappa L. | 128.00 | 40.74 | 16.70 | 699.85 | 328.93 |
| 24 | Queen's Flower | Lagerstroemia speciosa (L.) Pers. | 132.00 | 42.02 | 15.70 | 699.72 | 328.87 |
| 25 | Yellow Flame | Peltophorum pterocarpum (DC.) Backer ex K.Heyne | 136.50 | 43.45 | 13.90 | 664.49 | 312.31 |

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|---|---|---|---|---|---|---|---|
| 26 | Mahogany | Swietenia macrophylla King | 121.50 | 38.67 | 15.00 | 573.16 | 269.38 |
| 27 | Yellow Flame | Peltophorum pterocarpum (DC.) Backer ex K.Heyne | 110.00 | 35.01 | 16.30 | 513.83 | 241.50 |
| 28 | Resin Tree | Dipterocarpus alatus Roxb. ex G.Don | 110.00 | 35.01 | 14.00 | 445.09 | 209.19 |
| 29 | Queen's Flower | Lagerstroemia speciosa (L.) Pers. | 121.50 | 38.67 | 10.20 | 398.23 | 187.17 |
| 30 | Bastard Poon Tree | Sterculia foetida L. | 82.00 | 26.10 | 21.30 | 379.83 | 178.52 |
| 31 | Bastard Poon Tree | Sterculia foetida L. | 85.00 | 27.06 | 19.50 | 373.98 | 175.77 |
| 32 | Ironwood | Hopea odorata Roxb. | 86.00 | 27.37 | 17.20 | 339.59 | 159.61 |
| 33 | Gold Apple | Diospyros decandra Lour. | 125.00 | 39.79 | 8.10 | 337.96 | 158.84 |
| 34 | Balck rosewood | Afzelia xylocarpa (Kurz) Craib | 97.50 | 31.04 | 12.40 | 316.00 | 148.52 |
| 35 | Carallia | Carallia brachiata (Lour.) Merr. | 85.50 | 27.22 | 12.80 | 254.05 | 119.40 |
| 36 | Jackfruit | Artocarpus heterophyllus Lam. | 100.00 | 31.83 | 8.80 | 239.73 | 112.67 |
| 37 | Santol | Sandoricum koetjape (Burm. f.) Merr. | 88.00 | 28.01 | 11.30 | 238.46 | 112.07 |
| 38 | Mahogany | Swietenia macrophylla King | 84.00 | 26.74 | 12.00 | 231.15 | 108.64 |
| 39 | Gold Apple | Diospyros decandra Lour. | 107.00 | 34.06 | 7.30 | 228.32 | 107.31 |
| 40 | Carallia | Carallia brachiata (Lour.) Merr. | 75.00 | 23.87 | 13.90 | 214.37 | 100.76 |
| 41 | Carallia | Carallia brachiata (Lour.) Merr. | 78.50 | 24.99 | 12.30 | 208.17 | 97.84 |
| 42 | Carallia | Carallia brachiata (Lour.) Merr. | 78.00 | 24.83 | 12.30 | 205.67 | 96.66 |
| 43 | Carallia | Carallia brachiata (Lour.) Merr. | 73.50 | 23.40 | 12.30 | 183.80 | 86.39 |
| 44 | Carallia | Carallia brachiata (Lour.) Merr. | 67.00 | 21.33 | 14.30 | 177.90 | 83.61 |
| 45 | Carallia | Carallia brachiata (Lour.) Merr. | 72.00 | 22.92 | 12.30 | 176.77 | 83.08 |
| 46 | Tamarind | Tamarindus indica L. | 66.00 | 21.01 | 14.00 | 169.48 | 79.65 |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| 47 | Elephant Apple | Dillenia indica L. | 74.00 | 23.55 | 9.30 | 142.91 | 67.17 |
| 48 | Carallia | Carallia brachiata (Lour.) Merr. | 59.50 | 18.94 | 12.30 | 123.23 | 57.92 |
| 49 | Garcinia | Garcinia dulcis (Roxb.) Kurz | 72.00 | 22.92 | 7.90 | 116.28 | 54.65 |
| 50 | Mango | Mangifera indica L. | 67.00 | 21.33 | 8.20 | 105.12 | 49.40 |
| 51 | Devil Tree | Cerbera odollam Gaertn. | 78.00 | 24.83 | 5.80 | 101.00 | 47.47 |
| 52 | Ashoka Tree | Brownea grandiceps Jacq. | 64.00 | 20.37 | 7.00 | 82.98 | 39.00 |
| 53 | Devil Tree | Cerbera odollam Gaertn. | 64.00 | 20.37 | 6.40 | 76.23 | 35.83 |
| 54 | Wild Cinchona | Nauclea orientalis (L.) L. | 55.00 | 17.51 | 8.00 | 70.68 | 33.22 |
| 55 | Queen's Crape Myrtle | Lagerstroemia loudonii Teijsm. & Binn. | 52.00 | 16.55 | 8.00 | 63.56 | 29.87 |
| 56 | Carambola | Averrhoa carambola L. | 52.50 | 16.71 | 7.70 | 62.42 | 29.34 |
| 57 | Queen's Crape Myrtle | Lagerstroemia loudonii Teijsm. & Binn. | 49.00 | 15.60 | 8.80 | 62.15 | 29.21 |
| 58 | Lychee | Litchi chinensis Sonn. | 49.00 | 15.60 | 7.60 | 54.10 | 25.43 |
| 59 | Devil Tree | Cerbera odollam Gaertn. | 55.00 | 17.51 | 5.90 | 52.98 | 24.90 |
| 60 | Devil Tree | Cerbera odollam Gaertn. | 55.00 | 17.51 | 5.90 | 52.98 | 24.90 |
| 61 | Bastard Poon Tree | Sterculia foetida L. | 48.00 | 15.28 | 7.50 | 51.38 | 24.15 |
| 62 | Devil Tree | Cerbera odollam Gaertn. | 55.00 | 17.51 | 5.50 | 49.57 | 23.30 |
| 63 | Sarinwood | Murraya paniculata (L.) Jack | 48.00 | 15.28 | 6.90 | 47.48 | 22.32 |
| 64 | Siamese Rough Bush | Streblus asper Lour. | 63.00 | 20.05 | 4.00 | 47.42 | 22.29 |
| 65 | Sarinwood | Murraya paniculata (L.) Jack | 43.50 | 13.85 | 7.10 | 40.49 | 19.03 |
| 66 | Asian Bullet Wood | Mimusops elengi L. | 38.50 | 12.25 | 7.50 | 33.84 | 15.91 |
| 67 | Carambola | Averrhoa carambola L. | 37.00 | 11.78 | 7.00 | 29.41 | 13.82 |
| 68 | Pomerac | Syzygium malaccense (L.) Merr. & L.M.Perry | 43.00 | 13.69 | 4.50 | 25.73 | 12.09 |

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|---|---|---|---|---|---|---|---|
| 69 | Aahoka Tree | Brownea grandiceps Jacq. | 44.00 | 14.01 | 4.00 | 24.04 | 11.30 |
| 70 | False White Fig | Canarium pimela | 35.00 | 11.14 | 5.80 | 22.16 | 10.41 |
| 71 | False White Fig | Canarium pimela | 31.50 | 10.03 | 6.70 | 20.81 | 9.78 |
| 72 | Burmese Grape | Baccaurea ramiflora Lour. | 39.00 | 12.41 | 4.20 | 20.03 | 9.42 |
| 73 | Chinese Perfume Plant | Aglaia odorata | 38.00 | 12.10 | 4.40 | 19.93 | 9.37 |
| 74 | Spanish Cherry | Mimusops elengi L. | 31.00 | 9.87 | 6.00 | 18.18 | 8.55 |
| 75 | Guayacan | Guaiacum officinale L. | 31.00 | 9.87 | 5.90 | 17.90 | 8.41 |
| 76 | Pomerac | Syzygium malaccense (L.) Merr. & L.M.Perry | 32.50 | 10.35 | 4.50 | 15.15 | 7.12 |
| 77 | False White Fig | Canarium pimela | 26.50 | 8.44 | 6.20 | 13.94 | 6.55 |
| 78 | False White Fig | Canarium pimela | 25.00 | 7.96 | 6.10 | 12.29 | 5.78 |
| 79 | Gustavia | Carallia brachiata (Lour.) Merr. | 27.50 | 8.75 | 4.40 | 10.81 | 5.08 |
| 80 | Gustavia | Carallia brachiata (Lour.) Merr. | 27.00 | 8.59 | 4.50 | 10.67 | 5.01 |
| 81 | False White Fig | Canarium pimela | 21.50 | 6.84 | 6.30 | 9.53 | 4.48 |
| 82 | Gustavia | Carallia brachiata (Lour.) Merr. | 24.50 | 7.80 | 4.80 | 9.43 | 4.43 |
| 83 | Gustavia | Carallia brachiata (Lour.) Merr. | 23.00 | 7.32 | 4.80 | 8.37 | 3.93 |
| 84 | Pomerac | Syzygium malaccense (L.) Merr. & L.M.Perry | 23.50 | 7.48 | 4.50 | 8.20 | 3.86 |
| 85 | Gustavia | Carallia brachiata (Lour.) Merr. | 24.00 | 7.64 | 4.30 | 8.18 | 3.84 |
| 86 | Gustavia | Carallia brachiata (Lour.) Merr. | 20.50 | 6.53 | 4.80 | 6.73 | 3.17 |
| 87 | Custard Apple | Syzygium malaccense (L.) Merr. & L.M.Perry | 22.00 | 7.00 | 3.90 | 6.32 | 2.97 |
| 88 | Yellow Star | Schoutenia glomerata King subsp. peregrina (Craib) | 20.00 | 6.37 | 4.60 | 6.17 | 2.90 |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| 89 | Champi Sirindhorn | Magnolia sirindhorniae Noot & Chalermglin | 20.50 | 6.53 | 4.00 | 5.67 | 2.66 |
| 90 | Carallia | Carallia brachiata (Lour.) Merr. | 21.00 | 6.68 | 3.50 | 5.23 | 2.46 |
| 91 | Lignum Vitae | Guaiacum officinale L. | 20.00 | 6.37 | 3.70 | 5.03 | 2.36 |
| 92 | Lamdman | Melodorum fruticosum Lour. | 18.00 | 5.73 | 4.30 | 4.75 | 2.23 |
| 93 | Yellow Star | Schoutenia glomerata King subsp. peregrina (Craib) | 16.00 | 5.09 | 5.00 | 4.38 | 2.06 |
| 94 | Custard Apple | Syzygium malaccense (L.) Merr. & L.M.Perry | 16.00 | 5.09 | 4.20 | 3.72 | 1.75 |
| 95 | Lamdman | Melodorum fruticosum Lour. | 16.00 | 5.09 | 4.00 | 3.55 | 1.67 |
| 96 | Lamdman | Syzygium malaccense (L.) Merr. & L.M.Perry | 15.00 | 4.77 | 4.20 | 3.29 | 1.55 |
| 97 | Gustavia | Carallia brachiata (Lour.) Merr. | 14.00 | 4.46 | 4.80 | 3.28 | 1.54 |
| 98 | Yellow Star | Schoutenia glomerata King subsp. peregrina (Craib) | 14.50 | 4.62 | 4.00 | 2.95 | 1.38 |
| 99 | Gustavia | Carallia brachiata (Lour.) Merr. | 15.00 | 4.77 | 3.50 | 2.77 | 1.30 |
| 100 | Gustavia | Carallia brachiata (Lour.) Merr. | 15.00 | 4.77 | 3.50 | 2.77 | 1.30 |

According to Table 1, which displays tree circumference, diameter at breast height (DBH), height, biomass, and above-ground carbon sequestration from the first survey in January 2025, the total biomass of all perennial trees was 45,435.63652 kilograms., with a total carbon sequestration of 21,354.74917 kilograms.

**Table 2**: Tree circumference, Diameter at Breast Height (DBH), height, biomass, and above-ground carbon sequestration data from the second survey in December 2025.

| No. | Botanical Name | Scientific Name | Circumference (cm) | Diameter (m) | Height (m) | Total Above-ground Biomass | Aboveground Carbon Storage |
|---|---|---|---|---|---|---|---|
| 1 | Banyan Tree | Ficus maclellandii King | 664.00 | 211.36 | 20 | 18867.88 | 8867.90 |
| 2 | Rain Tree | Albizia saman (Jacq.) Merr. | 238.00 | 75.76 | 21.4 | 2855.96 | 1342.30 |
| 3 | Bastard Poon Tree | Sterculia foetida L. | 47.00 | 14.96 | 12.2 | 78.25 | 36.78 |
| 4 | Yellow Flame | Peltophorum pterocarpum (DC.) Backer ex K.Heyne | 132.00 | 42.02 | 17.8 | 787.73 | 370.23 |
| 5 | Bastard Teak | Butea monosperma (Lam.) Taub. | 278.00 | 88.49 | 16.8 | 3047.95 | 1432.54 |
| 6 | Bastard Poon Tree | Sterculia foetida L. | 149.00 | 47.43 | 19.8 | 1094.82 | 514.56 |
| 7 | Yellow Flame | Peltophorum pterocarpum (DC.) Backer ex K.Heyne | 242.00 | 77.03 | 20.2 | 2790.79 | 1311.67 |
| 8 | Bastard Poon Tree | Sterculia foetida L. | 175.00 | 55.70 | 21.4 | 1596.39 | 750.30 |
| 9 | Yellow Flame | Peltophorum pterocarpum (DC.) Backer ex K.Heyne | 160.00 | 50.93 | 19.1 | 1210.57 | 568.97 |
| 10 | Resin Tree | Dipterocarpus alatus Roxb. ex G.Don | 90.5 | 28.81 | 22.3 | 477.87 | 224.60 |
| 11 | Yellow Flame | Peltophorum pterocarpum (DC.) Backer ex K.Heyne | 139.00 | 44.24 | 19.5 | 946.51 | 444.86 |
| 12 | Yellow Flame | Peltophorum pterocarpum (DC.) Backer ex K.Heyne | 143.00 | 45.52 | 17.4 | 896.76 | 421.48 |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| 13 | Yellow Flame | Peltophorum pterocarpum (DC.) Backer ex K.Heyne | 161.00 | 51.25 | 19.1 | 1224.90 | 575.70 |
| 14 | Bastard Poon Tree | Sterculia foetida L. | 259.00 | 82.44 | 20.5 | 3218.49 | 1512.69 |
| 15 | Yellow Flame | Peltophorum pterocarpum (DC.) Backer ex K.Heyne | 111.00 | 35.33 | 14.4 | 464.96 | 218.53 |
| 16 | Yellow Flame | Peltophorum pterocarpum (DC.) Backer ex K.Heyne | 144.50 | 46.00 | 17.2 | 904.68 | 425.20 |
| 17 | Resin Tree | Dipterocarpus alatus Roxb. ex G.Don | 129.00 | 41.06 | 20.5 | 861.82 | 405.06 |
| 18 | Bastard Poon Tree | Sterculia foetida L. | 156.00 | 49.66 | 17.8 | 1079.77 | 507.49 |
| 19 | Yellow Flame | Peltophorum pterocarpum (DC.) Backer ex K.Heyne | 142.50 | 45.36 | 16.8 | 861.83 | 405.06 |
| 20 | Yellow Flame | Peltophorum pterocarpum (DC.) Backer ex K.Heyne | 208.00 | 66.21 | 17.6 | 1839.53 | 864.58 |
| 21 | Mahogany | Swietenia macrophylla King | 89.50 | 28.49 | 16.7 | 356.11 | 167.37 |
| 22 | Yellow Flame | Peltophorum pterocarpum (DC.) Backer ex K.Heyne | 215.00 | 68.44 | 19.3 | 2136.75 | 1004.27 |
| 23 | Yellow Flame | Peltophorum pterocarpum (DC.) Backer ex K.Heyne | 137.00 | 43.61 | 18.9 | 894.20 | 420.27 |
| 24 | Bengal Almond | Terminalia catappa L. | 127.4 | 40.55 | 13.00 | 547.63 | 257.38 |
| 25 | Queen's Flower | Lagerstroemia speciosa (L.) Pers. | 131.5 | 41.86 | 17.10 | 753.05 | 353.93 |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| 26 | Balck Rosewood | Afzelia xylocarpa (Kurz) Craib | 99.5 | 31.67 | 13.90 | 365.77 | 171.91 |
| 27 | Resin Tree | Dipterocarpus alatus Roxb. ex G.Don | 109.00 | 34.70 | 15.80 | 490.40 | 230.49 |
| 28 | Mahogany | Swietenia macrophylla King | 139 | 44.24 | 20.40 | 987.69 | 464.21 |
| 29 | Queen's Flower | Lagerstroemia speciosa (L.) Pers. | 117 | 37.24 | 10.30 | 374.26 | 175.90 |
| 30 | Ironwood | Hopea odorata Roxb. | 92 | 29.28 | 19.40 | 432.18 | 203.12 |
| 31 | Resin Tree | Dipterocarpus alatus Roxb. ex G.Don | 144.00 | 45.84 | 19.30 | 1002.01 | 470.94 |
| 32 | Gold Apple | Diospyros decandra Lour. | 120.00 | 38.20 | 8.7 | 334.72 | 157.32 |
| 33 | Gold Apple | Diospyros decandra Lour. | 108.00 | 34.38 | 9 | 283.22 | 133.11 |
| 34 | Mahogany | Swietenia macrophylla King | 127 | 40.43 | 17.80 | 732.36 | 344.21 |
| 35 | Carallia | Carallia brachiata (Lour.) Merr. | 79.2 | 25.21 | 15.60 | 265.02 | 124.56 |
| 36 | Jackfruit | Artocarpus heterophyllus Lam. | 99 | 31.51 | 10.00 | 265.42 | 124.75 |
| 37 | Santol | Sandoricum koetjape (Burm. f.) Merr. | 90.00 | 28.65 | 11.4 | 250.89 | 117.92 |
| 38 | Carallia | Carallia brachiata (Lour.) Merr. | 85.00 | 27.06 | 14.2 | 277.15 | 130.26 |
| 39 | Bastard Poon Tree | Sterculia foetida L. | 76.00 | 24.19 | 22.7 | 349.43 | 164.23 |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| 40 | Carallia | Carallia brachiata (Lour.) Merr. | 68.00 | 21.65 | 15.3 | 195.03 | 91.67 |
| 41 | Carallia | Carallia brachiata (Lour.) Merr. | 72.00 | 22.92 | 15.3 | 217.30 | 102.13 |
| 42 | Tamarind | Tamarindus indica L. | 69.00 | 21.96 | 16.9 | 220.26 | 103.52 |
| 43 | Carallia | Carallia brachiata (Lour.) Merr. | 78.50 | 24.99 | 15.3 | 255.87 | 120.26 |
| 44 | Carallia | Carallia brachiata (Lour.) Merr. | 73.00 | 23.24 | 14.2 | 207.85 | 97.69 |
| 45 | Elephant Apple | Dillenia indica L. | 73.50 | 23.40 | 4.8 | 75.45 | 35.46 |
| 46 | Garcinia | Garcinia dulcis (Roxb.) Kurz | 69.50 | 22.12 | 7.7 | 106.15 | 49.89 |
| 47 | Mango | Mangifera indica L. | 70.50 | 22.44 | 10.2 | 142.30 | 66.88 |
| 48 | *Devil Tree* | Cerbera odollam Gaertn. | 77.00 | 24.51 | 6.1 | 103.38 | 48.59 |
| 49 | Carallia | Carallia brachiata (Lour.) Merr. | 60.00 | 19.10 | 19.7 | 195.48 | 91.88 |
| 50 | Devil Tree | Cerbera odollam Gaertn. | 83.00 | 26.42 | 6.1 | 119.15 | 56.00 |
| 51 | Queen's Crape Myrtle | Lagerstroemia loudonii Teijsm. & Binn. | 51.00 | 16.23 | 10.4 | 78.53 | 36.91 |
| 52 | Wild Cinchona | Nauclea orientalis (L.) L. | 57.70 | 18.37 | 12.1 | 114.48 | 53.81 |
| 53 | Siamese Rough Bush | Streblus asper Lour. | 78.00 | 24.83 | 3.8 | 67.68 | 31.81 |
| 54 | Carambola | Averrhoa carambola L. | 53.70 | 17.09 | 7.8 | 65.95 | 30.99 |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| 55 | Lychee | Litchi chinensis Sonn. | 50.5 | 16.07 | 7.90 | 59.42 | 27.93 |
| 56 | Ashoka Tree | Brownea grandiceps Jacq. | 60 | 19.10 | 7.60 | 79.38 | 37.31 |
| 57 | Satinwood | Murraya paniculata (L.) Jack | 47.5 | 15.12 | 7.60 | 51.01 | 23.97 |
| 58 | Devil Tree | Cerbera odollam Gaertn. | 77 | 24.51 | 6.10 | 103.38 | 48.59 |
| 59 | Asian Bullet Wood | Mimusops elengi L. | 64.00 | 20.37 | 10.2 | 118.50 | 55.69 |
| 60 | Satinwood | Murraya paniculata (L.) Jack | 43.3 | 13.78 | 7.60 | 42.81 | 20.12 |
| 61 | Chinese Perfume Plant | Aglaia odorata | 47.00 | 14.96 | 6.4 | 42.49 | 19.97 |
| 62 | Asian Bullet Wood | Mimusops elengi L. | 32.00 | 10.19 | 8 | 25.35 | 11.91 |
| 63 | Carambola | Averrhoa carambola L. | 37.50 | 11.94 | 8.1 | 34.63 | 16.28 |
| 64 | Lignum Vitae | Guaiacum officinale L. | 23.00 | 7.32 | 6.1 | 10.50 | 4.94 |
| 65 | False White Fig | Canarium pimela | 32 | 10.19 | 10 | 31.31 | 14.72 |
| 66 | Pomerac | Syzygium malaccense (L.) Merr. & L.M.Perry | 37.20 | 11.84 | 5 | 21.61 | 10.16 |
| 67 | Burmese Grape | Baccaurea ramiflora Lour. | 38.00 | 12.10 | 4.1 | 18.64 | 8.76 |
| 68 | False White Fig | Canarium pimela | 27.00 | 8.59 | 9.8 | 22.27 | 10.47 |
| 69 | False White Fig | Canarium pimela | 34.20 | 10.89 | 4.9 | 18.08 | 8.50 |
| 70 | False White Fig | Canarium pimela | 21 | 6.68 | 8.7 | 12.37 | 5.81 |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| 71 | Pomerac | Syzygium malaccense (L.) Merr. & L.M.Perry | 25.00 | 7.96 | 4.6 | 9.41 | 4.42 |
| 72 | Gustavia | Gustavia gracillima Miers. | 28 | 8.91 | 4.70 | 11.90 | 5.60 |
| 73 | Gustavia | Gustavia gracillima Miers. | 27 | 8.59 | 3.80 | 9.09 | 4.27 |
| 74 | Gustavia | Gustavia gracillima Miers. | 24.5 | 7.80 | 2.80 | 5.67 | 2.66 |
| 75 | Gustavia | Gustavia gracillima Miers. | 24.5 | 7.80 | 2.40 | 4.90 | 2.30 |
| 76 | Pomerac | Syzygium malaccense (L.) Merr. & L.M.Perry | 34 | 10.82 | 4.90 | 17.88 | 8.40 |
| 77 | Guayacan | Guaiacum officinale L. | 39.00 | 12.41 | 4.00 | 19.13 | 8.99 |
| 78 | Yellow Star | Schoutenia glomerata King subsp. peregrina (Craib) | 15 | 4.77 | 4.50 | 3.51 | 1.65 |
| 79 | Gustavia | Gustavia gracillima Miers. | 21 | 6.68 | 3.10 | 4.66 | 2.19 |
| 80 | Gustavia | Gustavia gracillima Miers. | 20 | 6.37 | 3.40 | 4.64 | 2.18 |
| 81 | Gustavia | Gustavia gracillima Miers. | 22 | 7.00 | 3.60 | 5.86 | 2.76 |
| 82 | Yellow Star | Schoutenia glomerata King subsp. peregrina (Craib) | 21 | 6.68 | 2.50 | 3.81 | 1.79 |
| 83 | Sugar Apple | Annona squamosa L. | 18 | 5.73 | 3.80 | 4.22 | 1.99 |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| 84 | Devil Tree | Melodorum fruticosum Lour. | 19.00 | 6.05 | 2.8 | 3.51 | 1.65 |
| 85 | Gu | Gustavia gracillima Miers. | 16.00 | 5.09 | 3.20 | 2.87 | 1.35 |
| 86 | Gustavia | Gustavia gracillima Miers. | 17.00 | 5.41 | 3.20 | 3.22 | 1.51 |
| 87 | Gustavia | Gustavia gracillima Miers. | 17.00 | 5.41 | 3.10 | 3.13 | 1.47 |
| 88 | Devil Tree | Melodorum fruticosum Lour. | 16.00 | 5.09 | 3.8 | 3.38 | 1.59 |

According to Table 2, which presents the data for tree circumference, diameter at breast height (DBH), height, biomass, and above-ground carbon sequestration from the second survey in December 2025, the total biomass of the perennial trees was 59,183.17 kilograms, with a total carbon sequestration of 27,816.09 kilograms.

Part 2: Organizational Carbon Footprint Analysis and the Potential to Achieve Carbon Neutrality at the Kasetsart University Laboratory School

The research team conducted a Carbon Footprint of the Organization (CFO) assessment for the Kasetsart University Laboratory School Center for Educational Research and Development. This involved collecting activity data within the school's organizational boundaries to perform a comparative analysis against the carbon sequestration capacity of the perennial trees studied in Suan Mit Samphan. The detailed findings are as follows:

The results of the greenhouse gas emission analysis for the Kasetsart University Laboratory School for the year 2025 are presented in Table 4.

**Table 4:** Greenhouse gas emissions from Scope 1 and Scope 2 operational boundaries.

| Scope | Emission Source | GHG emissions (kg$CO_2$e) |
|---|---|---|
| Scope 1 | Staionary Combustion: LPG consumption | 94,148.66 |
| | Mobile Combustion: School Vehicles | 26,925.34 |
| | Fugitive Emission | 6,093.00 |
| Scope 2 | Purchased Electricity | 1,998,556.94 |
| | Total | 2,125,723.94 |

With a total emission of 2,125,723.94 kg$CO_2$e per year, this figure serves as a critical baseline for comparison against the net carbon sequestration provided by perennial trees.

4.2 Potential to Achieve Carbon Neutrality Goals

By comparing the Carbon Footprint of the Organization (CFO) data with the carbon sequestration capacity of the perennial trees in the Suan Mit Samphan area, the research team analyzed the potential and feasibility of achieving Carbon Neutrality as follows:

2,125,723.94 – Total Carbon Sequestration of Trees = 2,119,262.599 kg$CO_2$e/year

2,125,723.94 – 6461.34083 = 2,119,262.599 kg$CO_2$e/year

According to the study findings, the current green spaces within the research boundaries of the Kasetsart University Laboratory School lack sufficient potential to achieve carbon neutrality independently at this stage. This is primarily because the volume of greenhouse gas emissions from electricity consumption (Scope 2) is disproportionately high compared to the total carbon sequestration capacity of the trees within the school.

## Conclusion and Discussion

### Research Conclusion

The study on factors affecting carbon sequestration of perennial trees at the Kasetsart University Laboratory School (Center for Educational Research and Development) can be summarized as follows:

1. First Survey (January 2025): The total biomass of perennial trees in the study area was 45,435.64 kg, with a total carbon sequestration of 21,354.75 kg
2. Organizational Carbon Footprint: The analysis of Scope 1 and Scope 2 greenhouse gas emissions for the year 2025 revealed a total emission of 1,959,177.52 kg$CO_2$e. The primary source of emissions is electricity consumption (Scope 2), accounting for 1,832,010.52 kg$CO_2$e, or 93.51% of total emissions.
3. Carbon Neutrality Potential: Comparative evaluation shows that the total accumulated carbon stored in all perennial trees (approximately 2,125,723.94 kg$CO_2$e) is currently insufficient to fully offset the school's annual greenhouse gas emissions. The cumulative offset capacity represents 0.3% of the annual emissions.

### Research Discussion

Based on the study results, First Survey (January 2025): The total biomass of perennialtrees in the study area was 45,435.64 kg, with a total carbon sequestration of 21,354.75 kg These findings are consistent with the studies of Wanatchaporn Rungchaeng (2024) and Ruj Yodsathasan & Penprapha Phetcharaburanin (2020), which illustrate the correlation between tree dimensions (size and height) and biomass/carbon sequestration. The positive relationship between tree height and circumference directly affects the variations in above-ground biomass and the individual carbon storage capacity of each tree. This confirms that perennial trees with larger growth dimensions are directly associated with higher carbon sequestration capabilities.

Results of the study on physical factors affecting above-ground biomass and carbon sequestration: It was found that tree circumference, Diameter at Breast Height (DBH), and tree height significantly influence the biomass of perennial trees. Specifically, trees with greater growth dimensions exhibit higher biomass values. Furthermore, the biomass of a tree directly determines its above-ground carbon sequestration capacity and its potential for carbon dioxide ($CO_2$) absorption.

When considering the overall greenhouse gas (GHG) emissions, the total Scope 1 and Scope 2 emissions for the Kasetsart University Laboratory School amounted to 1,959.17 $tCO_2e$. The primary contributor is Scope 2 (Electricity Consumption), accounting for a significant 93.51% of total emissions. This aligns with the infrastructure of an educational institution, which requires high electrical energy for air conditioning systems and instructional equipment. These findings reflect that GHG emissions within the school primarily stem from building energy use. Consequently, implementing energy reduction measures is a critical challenge that must be addressed alongside the enhancement of natural carbon sinks.

A comparison between the total carbon sequestration of perennial trees in Suan Mit Samphan (approximately 2,125.73 $tCO_2e$) and the annual GHG emission burden reveals a substantial gap between current sequestration capacity and actual emissions. The cumulative offset ratio stands at 0.3% of annual emissions, indicating that the school’s current status remains a net source of greenhouse gases. However, the discovery that the Ficus (Ficus maclellandii King) possesses the highest biomass increment rate (sequestering 2,002.32 kg of carbon) provides vital strategic data. Expanding the cultivation of such high-potential species in other available areas within the school could exponentially increase the "internal carbon offset potential.

The results of this research highlight the importance of linking botanical studies with GHG emission data. This serves as a crucial Baseline database, enabling the school to develop concrete and sustainable environmental management plans to achieve the goal of carbon neutrality in the future.

**Research Recommendations**

Since this study focused solely on carbon sequestration within standing trees and was limited to above-ground biomass, further research should be conducted to measure carbon storage in other components. This includes understory vegetation and below-ground carbon (soil and roots) to ensure more comprehensive and accurate data.

Additionally, further studies on above-ground biomass and carbon sequestration should be expanded to other areas within the school. This would provide a complete overview of the total carbon storage across the entire campus. Such data can serve as a guideline for tree conservation and management, while fostering awareness of the importance of expanding green spaces, which play a vital role in carbon sequestration and maintaining ecological balance.

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## Appendix

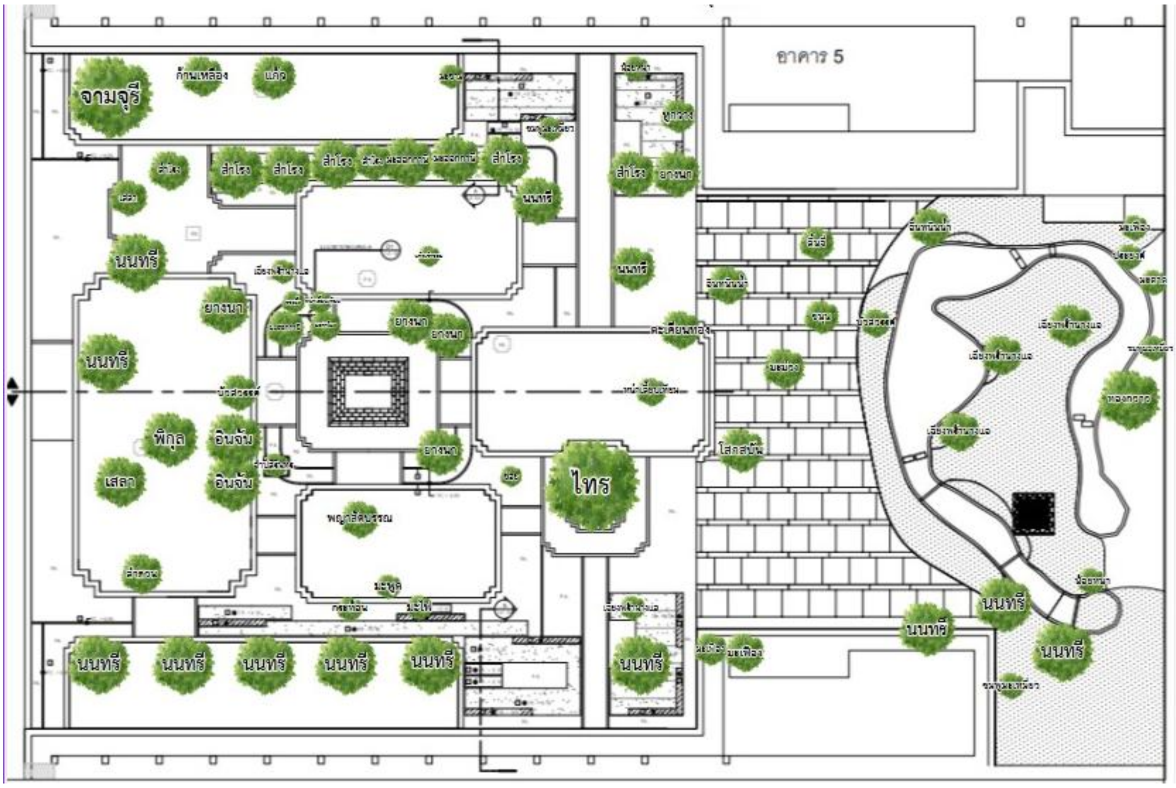


Figure 1: Display the survey map of the trees in the Suan Mit Samphan area at the Kasetsart University Laboratory School.

Figure 2: Measuring the tree circumference at Diameter at Breast Height (DBH).

Figure 3: Measuring the tree circumference at Diameter at Breast Height (DBH).

Figure 4: Measuring tree height using a Laser Rangefinder.