Study of carbon sequestration in trees located around the parking lot and auditorium of Phak Mai Wittayanukul School.

Research team : Mr.Kriangkrai Srisongkram ,Ms.Waranya Wisetchat ,
Mr.Kittiwat Naknaul ,Mr.Jedsadapong Budda

Grade level : Grade 12

Research Advisors : Mrs.Darunee Samerpak ,Mr.Samraun Samerpak ,Ms.Sasiwimon Paengma

Phakmai Wittayanukul School Phakmai Subdistrict, Huai Thap Than District, Sisaket Province ,Thailand

Abstract

This research aimed to study the amount of carbon sequestration by trees planted within the area of Phak Mai Wittayanukul School, as trees play an important role in absorbing carbon dioxide (CO_2),one of the greenhouse gases that contributes to global warming.The study involved surveying tree species and measuring trunk circumference in order to calculate the amount of carbon that each tree could store. The results showed that a total of 15 trees from 7 species were able to sequester5,919kilograms of carbon. These findings indicate that trees within the school play a significant role in reducing greenhouse gas levels in the atmosphere. The data obtained can be used to plan additional tree planting or to develop environmental promotion activities within the school in the future.

Introduction

Greenhouse gas emissions and global warming are mainly caused by human activities, particularly waste burning, transportation, and industrial processes. Waste burning in schools and communities, although often underestimated, significantly affects air quality and contributes to climate change and extreme environmental impacts. Trees play an essential role in mitigating these problems by absorbing and storing carbon dioxide through photosynthesis, while also improving air quality, ecological balance, and human well-being. This study examines the carbon sequestration capacity of different tree species around the school parking area and auditorium, considering factors such as tree size and species characteristics. The findings can support tree-planting initiatives, environmental policy planning, and environmental education, helping to promote sustainable development and awareness at local and national levels.

Research Questions

- How does carbon fixation efficiency vary among different tree species?
- Based on the research findings, which tree species should be recommended for widespread planting due to their high carbon fixation efficiency?

Research Hypothesis

Trees can store different amounts of carbon depending on the type of tree, trunk sizeze and age. Larger and older trees tend to store more carbon than smaller and youngertrees.

Research Objective

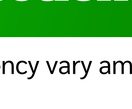
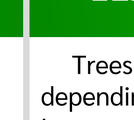
1. This study aimed to investigate the carbon storage capacity of various tree species in the auditorium area of Phak Mai Wittayanukul School. Data on the physical characteristics of the trees, such as species and height, were collected and then analyzed for comparative analysis.
2. To explain the differences in carbon storage capacity based on various factors.

Variables Involved

Independent Variables : Tree species and tree size .
Dependent Variable : Amount of carbon stored in each tree.
Controlled Variables : Study location (the area between the parking area and the auditorium of Phak Mai Witthayanukul School), data collection period, and measurement procedures and calculation methods used throughout the study.

Materials and Equipment

Measuring tape – used for measuring the circumference of tree trunks.

[Measuring tape]

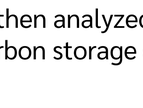
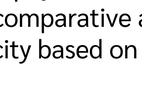
Mobile phone – used for photographing trees, estimating tree height, and calculating carbon storage.

[Mobile phone]

[Results from tree height calculation]

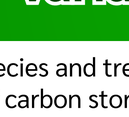
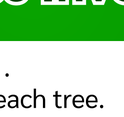
[GLOBE Observer application]

Notebook – used to record measured data such as tree size.

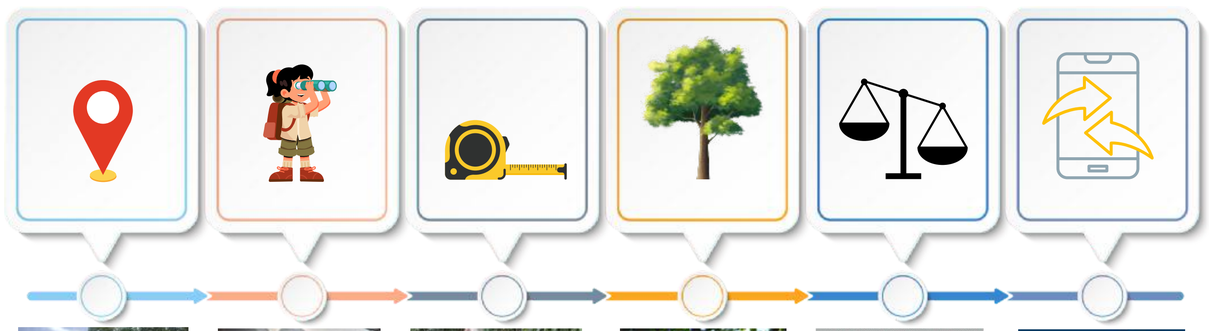
[Notebook]

Pen or pencil – used for writing down data.

[Pen]

Research Methodology

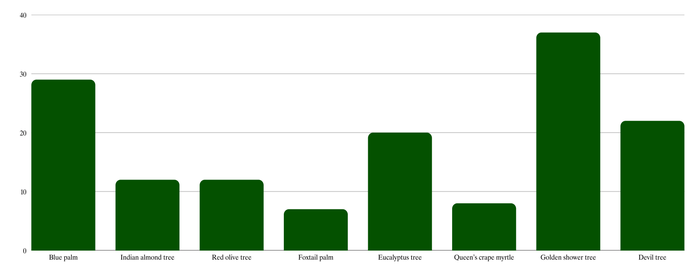


research Results

Period for Requesting Certification of Greenhouse Gas Sequestration From 17 June 2025 to 19 June 2025

Order	Plant species name	Plant species category	Height (m)	Tree circumference (cm)	Greenhouse gas sequestration
1	Blue palm	Palm group	7	129	164.35
2	Blue palm	Palm group	7	144	161.73
3	Blue palm	Palm group	7	118	155.23
4	Blue palm	Palm group	8	119	183.16
5	Indian almond tree	General plant species	5	29	31.28
6	Indian almond tree	General plant species	7	66	192.36
7	Red olive tree	General plant species	12	149	1,477.25
8	Foxtail palm	General plant species	7	62	181.27
9	Eucalyptus tree	General plant species	20	91	952.87
10	Queen's crape myrtle	General plant species	8	49	123.91
11	Golden shower tree	General plant species	10	32	70.55
12	Golden shower tree	General plant species	15	60	332.86
13	Golden shower tree	General plant species	12	72	388.84
14	Devil tree	General plant species	11	77	411.22
15	Devil tree	General plant species	11	130	1,099.13

[shows the amount of carbon sequestered by trees in the Phak Mai Witthayanukul School area.]



[shows the amount of carbon sequestered by trees in the Phak Mai Witthayanukul School area.]

Summary of surveyed trees

Tree species group	Number of trees (trees)	Greenhouse gas sequestration ($kgCO_2eq$)
General plant species	11	5,245.56
Palm group	4	664.46
Overall	15	5,919.00

[summarizes the number of trees surveyed.]

Summary and Discussion of Research Results

The results of the study indicate that different tree species have varying capacities for carbon sequestration, depending on several factors such as size, height, trunk circumference, wood density, and species characteristics. Mature trees that have reached full growth generally exhibit a higher potential for carbon sequestration than smaller or younger trees that are still in the growth stage.The findings further demonstrate that tree planting can significantly contribute to reducing atmospheric carbon dioxide levels, which is one of the major greenhouse gases responsible for global warming. Trees absorb CO_2 through the process of photosynthesis and store it as biomass both aboveground and belowground, thereby enabling ecosystems to function as important carbon sinks.

Research Benefits

1. Helps reduce global warming by absorbing and storing carbon dioxide in trees.
2. Supports effective forest management and tree planting by identifying species with high carbon storage potential.
3. Provides scientific data for environmental policy and planning related to carbon emission reduction.

Acknowledgement

We would like to express our sincere gratitude to the Director of Phak Mai Witthayanukul School for providing the opportunity to conduct this environmental science research. Our heartfelt thanks go to Mrs. Darunee Samerpak for her valuable knowledge, technical guidance, and continuous support throughout the research process. We also wish to extend our appreciation to the parents of the students for their care and encouragement, which contributed greatly to the successful completion of this research.

Badge

Bibliography

Phak Mai Witthayanukul School. (2025). A study of carbon sequestration in trees around the parking area and the auditorium of Phak Mai Witthayanukul School. Phak Mai Witthayanukul School.

Intergovernmental Panel on Climate Change (IPCC). (2019). Climate change and land: An IPCC special report. IPCC.

Food and Agriculture Organization of the United Nations. (2018). Measuring and modelling carbon stocks and stock changes in forest ecosystems. FAO.

Department of National Parks, Wildlife and Plant Conservation. (2020). Guidelines for carbon storage assessment in trees. Ministry of Natural Resources and Environment, Thailand.