



# Study of the quality and quantity of carbon sequestration affecting the neem and pterocarpum trees in the area of Phakmai Wittayanukul School

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## Abstract

This research aimed to investigate the amount of carbon stored in trees within Phak Mai Wittayanukul School, Phak Mai Subdistrict, Huai Thap Than District, Sisaket Province. The study focused on evaluating carbon storage based on tree species, trunk size, and above- and below-ground biomass. The methodology involved measuring diameter at breast height (DBH), tree height, and applying standard equations to calculate biomass. Carbon stock was then estimated from biomass using an average carbon content value of 50% of dry weight. The results indicated that the amount of carbon stored in individual trees varied according to species and tree size. Larger trees were found to store significantly more carbon than smaller trees. This study highlights the important role of trees in absorbing carbon dioxide from the atmosphere, thereby helping to mitigate the impacts of global warming. The findings can be applied to forest conservation planning and the management of green spaces in the future.

## Introduction

At present, the world is facing increasingly severe climate change. One of the major causes is the accumulation of greenhouse gases in the atmosphere, particularly carbon dioxide (CO<sub>2</sub>), which has increased due to human activities such as the combustion of fossil fuels, deforestation, and various forms of land use. These activities contribute significantly to global warming and environmental degradation worldwide.

Trees and forests play a crucial role in the atmosphere through the process of photosynthesis and storing carbon in the form of biomass, particularly in stems, branches, leaves, and roots. Therefore, studying the amount of carbon that trees can store is essential for evaluating the role of green spaces in mitigating the impacts of global warming. Such information can also be used to support planning for the sustainable conservation of natural resources.

This research aims to investigate the amount of carbon stored in trees within a designated area by measuring tree dimensions and calculating biomass using standard equations. The results will be used to estimate the amount of carbon that can be sequestered by trees. This information will be beneficial for promoting tree planting, managing green spaces, and addressing environmental problems in the long term.

## Research Questions

How Carbon Quality Affects Carbon Sequestration in Pterocarpus indicus and Azadirachta indica Trees.

## Research Hypotheses

1. Larger trees are able to sequester more carbon than smaller trees.
2. Tree species have a significant effect on carbon sequestration.

## Research Objectives

To compare and examine the amount of carbon sequestration of trees affecting carbon storage in Pterocarpus indicus and Azadirachta indica at Phak Mai Wittayanukul School, Phak Mai Subdistrict, Huai Thap Than District, Sisaket Province.

## Variables of the Study

**Independent variables:** Soil quality, such as soil temperature, soil acidity-alkalinity (pH), and soil nutrient contents, including nitrogen, phosphorus, and potassium.

**Controlled variables:** The age of Pterocarpus indicus and Azadirachta indica trees, planting area size, local climatic conditions, and the tree species under study.

**Dependent variable:** The amount of carbon that Pterocarpus indicus and Azadirachta indica trees can sequester.

## Materials, Equipment, and Chemicals



1. Soil thermometer



2. Soil macronutrient test kit



3. Mobile phone



4. Hoe

5. Pencil, pen

6. Notebook

7. Scissors

8. Test tube rack

9. Soil sample container

10. Stopwatch

11. Distilled water

12. Measuring tape

## Research Method



1. Determination of study sites
2. Field survey
3. Carbon sequestration of Pterocarpus indicus and Azadirachta indica was estimated using measurements of tree height and trunk circumference.
4. Analysis of carbon sequestration among different tree species
5. The collected data were entered into the GLOBE program through the Data Entry system (<https://www.globe.gov>).



Establishment of study points



Field survey



Measurement of carbon sequestration



Soil temperature measurement



Soil sampling



Measurement of soil nutrients

The collected data were submitted to the GLOBE program via the Data Entry system (<https://www.globe.gov>).

## Research Results

**Table 1** Results of carbon sequestration measurements of trees in the Kru Noppaphat Garden

name of the tree	height per tree(m)	circumference per tree(cm)	amount of carbon stored
Large tree No. 1	17	137	1788.17
Large tree No. 2	18	120	695.76
Small neem tree No. 1	7	49	197.18
Medium neem tree No. 2	8	63	119.59
Medium neem tree No. 3	5	48	874.87

sampling site	measured parameters				
	temperature(c)	pH	nitrogen	phosphorus	potassium
Large tree No. 1	32	8	low	moderate	low
Medium neem tree No. 3	31	8	very low	very low	moderate

## Summary and Discussion of Research Results

From the study of carbon storage in trees, it was found that individual trees differ in their capacity to accumulate carbon, depending on key factors such as diameter at breast height (DBH), tree height, and tree species. Larger and longer-lived trees clearly have a greater ability to sequester carbon than smaller trees.

Biomass calculations based on standard equations revealed that certain tree species, such as hardwood or slow-growing species, possess higher biomass and carbon content than softwood species, even when their sizes are similar. In addition, tree density within an area influences total carbon storage; areas with a higher number of trees exhibit greater overall carbon accumulation than areas with fewer trees.

The results of this study are consistent with ecological principles and previous research, which indicate that trees play a crucial role in absorbing carbon dioxide from the atmosphere and represent one of the most effective natural methods for mitigating the impacts of global warming. Therefore, promoting tree planting, conserving forest areas, and maintaining trees in urban environments are essential actions that should be continuously implemented to enhance national carbon sequestration potential and to address future climate change challenges.

## Research Benefits

1. The study provides quality data on carbon sequestration suitable for planted tree species, such as the Pruk and Neem trees. This information supports effective planning for tree planting and management practices that enhance carbon sequestration capacity.
2. The findings enhance understanding of the role of carbon in ecosystems, enabling the development of better guidelines for soil and tree management within the school environment.

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## Badge

