GREEN SECRETS UNVEILED: PROBING CARBON STORAGE AND ASSESSING FOOTPRINT IN LIVING SPACES

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ABSTRACT

THE OBJECTIVE OF THIS RESEARCH IS TO ASSESS AND COMPARE THE ABOVEGROUND CARBON STORAGE OF PLANT SPECIES IN THE RESEARCH AREA, UTILIZING THE NON-STANDARD SITE CARBON CYCLE PROTOCOL FOR MEASURING CARBON DYNAMICS.

THE MEASUREMENTS INCLUDE
1) THE CIRCUMFERENCE AT BREAST HEIGHT (CBH) FOR TREE TRUNKS
2) THE HEIGHT OF SHRUBS/SAPLINGS AS INDEPENDENT VARIABLES IN ALLOMETRIC EQUATIONS, CALCULATING BIOMASS TO DETERMINE ABOVEGROUND CARBON STORAGE
3) WEIGHING HERBACEOUS COMPONENTS.

THE RESULTS ARE THEN COMPARED WITH THE CARBON FOOTPRINT DATA USING THE INTERNATIONAL STANDARD ISO 14064-1:2006 GREENHOUSE GASES – PART 1: SPECIFICATION WITH GUIDANCE AT THE ORGANIZATION LEVEL FOR QUANTIFICATION AND REPORTING OF GREENHOUSE GAS EMISSIONS AND REMOVALS.

INTRODUCTION

- THE INCREASING GLOBAL TEMPERATURE IS A CONSEQUENCE OF HUMAN-INDUCED DISRUPTION TO THE BALANCE OF CARBON DIOXIDE IN THE WORLD.
- GREENHOUSE GASES (GHG) RESULT FROM BURNING BIOENERGY, CHEMICAL PROCESSES, LAND USE, LIVESTOCK FARMING, AND FERTILIZER/ANIMAL MANURE USE.
- THESE GASES IN THE ATMOSPHERE CAN TRAP, ABSORB, AND RE-EMIT INFRARED RADIATION FROM THE SUN.

HYPOTHESIS

- Majestic trees lead in carbon storage, followed by shrubs/saplings and herbaceous.
- Tree age, height, and diameter at breast height (DBH) exhibit a positive relationship.
- Carbon storage in trees is expected to positively correlate with biomass.
- Our carbon footprint might exceed vegetation's storage capacity.
- Electricity stands out as the primary carbon footprint contributor.

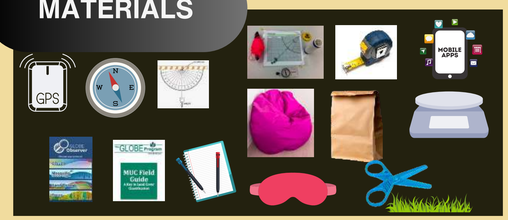
OBJECTIVE

To quantify and compare our carbon footprint with the vegetation's capacity to store carbon.

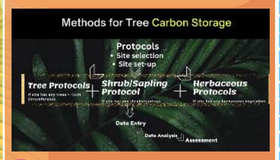
Research Question

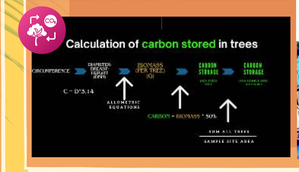
- HOW EXTENSIVE IS THE CARBON STORE WITHIN THE VEGETATION AT OUR HOME SITE?
- HOW MUCH CARBON FOOTPRINT DO WE PRODUCE?

MATERIALS



METHODOLOGY





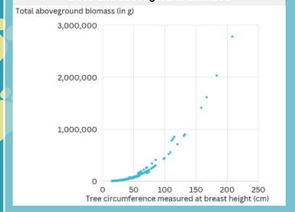
Emission factors (EF) for greenhouse gas emissions, Types 1, 2, and 3.

Activity	Measured Unit	Scope of Work	GHG Emission (MgCO2e/unit)
Energy (Mobile Combustion)		Scope 1	
Benzene	liter		2.2376
Electricity Usage		Scope 2	
Thailand Grid Mix Electricity	kWh		0.5813
Water Usage		Scope 3	
Thailand Consumption Water Authority	cubic meter		0.7848
Air Travel		Scope 3	
Intl short-haul flight (Economy class)	passenger/km		0.0933
Intl long-haul flight (Economy class)	passenger/km		0.0834

Source: Citing data from the Emission Factor gathered from meteorological information for assessing the carbon footprint of the greenhouse gas management organization (privateSector), updated as of April 30, 2013."

Data Summary

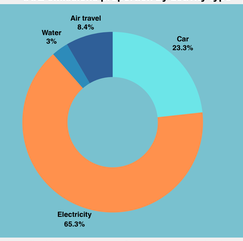
The relationship between the circumference size of trees and aboveground biomass



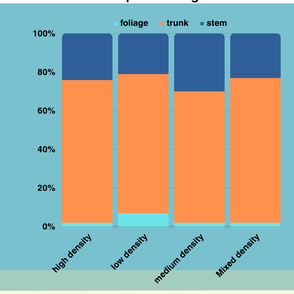
Summary of the Carbon Storage in Vegetation

	Herbaceous	Shrubs	Trees	Total
Biomass g/sq.m.	10	29.1	3,237	3,276
Carbon Storage gC/sq.m.	5	14.5	1,618	1,638
%	0.3	0.9	98.8	100

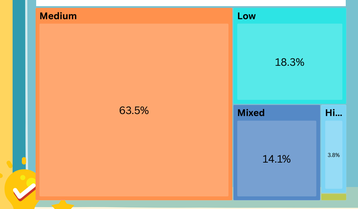
CO2 emissions proportion by activity type



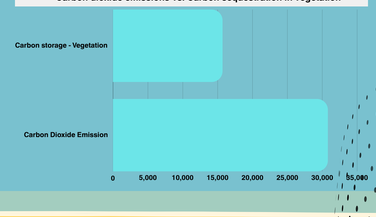
The proportion of aboveground biomass in various parts of large trees



The proportion of large trees in the area categorized by wood density



Carbon dioxide emissions vs. Carbon sequestration in vegetation



Conclusion

- The group of large trees stores the most carbon at 1,618 gC/sq.m., followed by shrubs at 14.5 gC/sq.m., and grass at 5 gC/sq. m.
- As trees age, there is a positive correlation between their age and both height and circumference.
- There is a positive correlation between carbon sequestration capability and biomass of plant species.
- Plant species in the carbon storage area sequestered 15,701 kg of carbon, while emissions were 30,802 kgCO2e, nearly 1.96 times the carbon sequestration.
- The primary factor contributing to our carbon footprint is electricity usage.
- Consideration should be given to finding evergreen, dense-canopy, and hardwood tree species with abundant branches and leaves, such as oak, for additional planting.
- Measures to reduce carbon footprint include transitioning to solar energy and using electric vehicles, aiming for a low-carbon lifestyle.

ACKNOWLEDGMENTS

Thank you to Ms. Chomchanok Sutthapas, a teacher at Shrewsbury International School Bangkok and Mr.Kongkiat Suriye, Ph.D. for serving as a research advisor.
Thank you Mrs. Petcharat Thongtang, Ms. Lalita Chaipetch, Mr. Wutthichai Jansak, Mrs. Mi Su Su Mon, Mr. Min Tay Zaw, Ms. Kananoot Lekvijit and Mr. Atikhun Thongtang for all the support.

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