Carbon Footprints Assessment for Organization and Potential Offsetting Through Carbon Sequestration in a Park:
A case Study of Chiang Mai Provincial Administrative Organization (CMPAO)

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Abstracts

Climate change has caused significant environmental degradation worldwide, affecting quality of life across multiple sectors. Central and local governments play a crucial role in addressing this issue through monitoring emissions and implementing environmental management plans, particularly due to their involvement in energy use and infrastructure management. **Carbon footprint assessment** provides a systematic method to quantify greenhouse gas (GHG) emissions from organizational activities, while **carbon sequestration** serves as a complementary strategy to offset emissions through natural systems. **The Chiang Mai Provincial Administrative Organization (CMPAO)** plays an important role in supporting sustainable development in Chiang Mai province. However, limited information on emission sources and sequestration potential within CMPAO's responsibility area makes it difficult to evaluate carbon offset capacity in relation to organizational emissions. This pilot study quantifies CMPAO's carbon footprint and the carbon sequestered by trees within its facilities, identifies major emission sources, and proposes offsetting strategies. Tree height, diameter at breast height (DBH), species, and coordinates were measured using a clinometer and tape, while organizational records were used to estimate emissions. Scenario analysis was applied to evaluate reduction strategies. The results quantify key emission sources, assess existing and potential sequestration capacity, and outline a feasible pathway toward reducing net GHG emissions. These findings provide practical guidance for CMPAO's carbon neutrality goals and support evidence-based local climate policy development.

Introduction

- Climate change is driving significant environmental and socio – economic impacts globally. Greenhouse gas (GHGs) emission from organizational and governmental activities contribute substantially to this issue.
- Local governments are responsible for energy use, infrastructure management, and public services, making them key actors in emission reduction and sustainability planning.
- Limited data on **carbon emissions and carbon sequestration** potential within the **Chiang Mai Provincial Administrative Organization (CMPAO)** restricts the ability to evaluate its progress toward carbon neutrality.

Objectives

1. Measuring Carbon Footprints and Carbon Sequestration in CMPAO's Facilities
2. Identifying Main Sources of Emission
3. Recommending Future Strategies

Methodology

Data collection

Carbon Footprints in Organization	Activity Data Electricity bills (3 months)	**Carbon Sequestration**	Tree Data Collection

Calculation

Carbon Footprints in Organization	CFOs Calculation by TGO	**Carbon Sequestration**	Tree Measurement Calculation by TGO

Results

Carbon Footprints in Organization	55.45 tCO_2e	**Carbon Sequestration**	10.25 tCO_2e

Literature reviews

Example of Government Sectors from Thailand

Municipality	Emission Sources	Mitigation Strategies
Chiang Mai Municipality	Energy consumption	• Reduce electricity consumption • Encourage LED lighting system • Improve the efficiency of vehicle use
Ban Suan Municipality, Chonburi	Energy consumption	• Reducing electricity consumption (turning off light when not use) • Encourage LED lighting systems
Tha Yiam Subdistrict Municipality, Nakhon Ratchasima	Energy consumption	Reducing electricity consumption (turning off light when not use)

Example of Government Sectors from New Zealand

Municipality	Emission Sources	Mitigation Strategies
New Zealand Government Agencies	Air travel	• Reduce travel • EV fleets • Energy efficiency improvement
Taupō District Council	Landfill waste	• Renewable energy support
Wellington City Council	Transportation	• Low carbon transport • Building energy efficiency

Recommendations

CMPAO should prioritize **energy efficiency, sustainable waste management, Low – carbon transportation, and urban green space expansion** to significantly reduce greenhouse gas emissions. Lessons from municipalities in Thailand and New Zealand demonstrate that these strategies are practical and effective for achieving long – term carbon neutrality.

References

Thailand Greenhouse Gas Management Organization. (n.d.). Calculation for Carbon Sequestration in trees (Forestry and Agriculture Project). Retrived Novenber 27, 2025 from https://ghgreduction.tgo.or.th/en/methodology/calculation-tools/forestry-and agriculture-project/item/3451-calculation-for-carbon-sequestration.html