



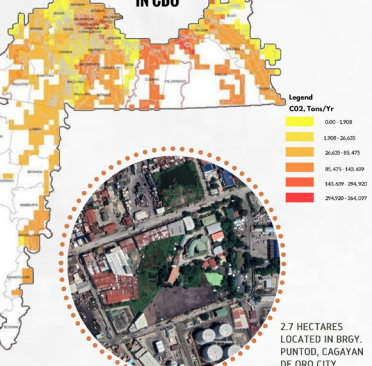
GOING BEYOND NEUTRAL: CURBING CARBON SOURCE THROUGH URBAN FOREST PARK WITH CARBON SEQUESTRATION CENTERED DESIGN IN CAGAYAN DE ORO CITY

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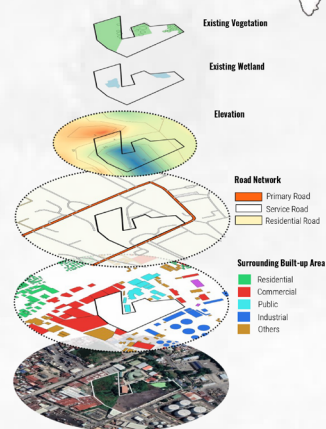
PROJECT LOCATION



CARBON EMISSION IN CDO



SITE INVENTORY



SITE ANALYSIS



S Almost half of the site is vegetated, consisting mostly of grass and some trees, and it also has two existing wetlands. Accessible through Corrales Road, which is one of the major roads in the city. The site has relatively flat terrain.

W The site does not have a definite main entry point. There are few informal settlers surrounding the site.

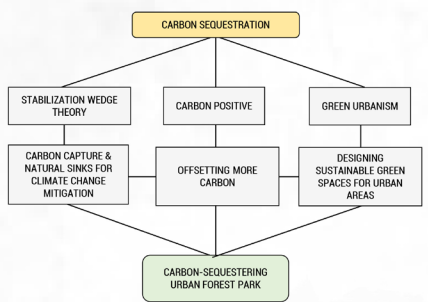
O The site is currently unutilized and has the potential to be designed to increase the vegetation cover in the barangay.

T There is a large volume of vehicles passing by the Corrales Road and it is also surrounded by built-up area which makes the site susceptible to pollution.

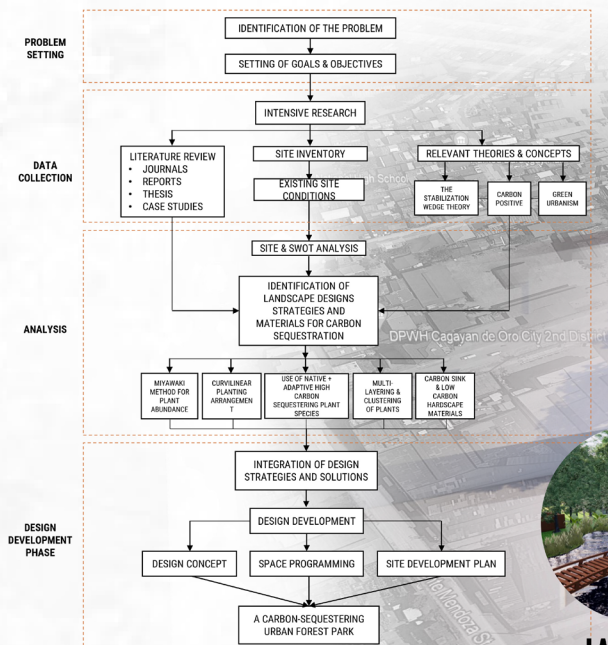
ABSTRACT

High emissions of carbon dioxide (CO₂) and other greenhouse gases (GHGs) are the primary contributors to climate change, causing the environment to degrade significantly. Cities are responsible for more than 75% of global carbon emissions. In urban settings, urban forests and green spaces are the primary land use that contributes to carbon sequestration and storage (Forest Research, n.d.). However, these elements and spaces are often undervalued and eliminated to give way to new developments that bring more tangible economic benefits (Pansit, 2019). Cagayan De Oro (CDO) City is one of the highly urbanized cities in the Philippines. Its continuous urbanization, population growth, increased demand for mobilization, and land-use change contribute to its increasing greenhouse gas emissions. In 2016, the total net emission of CDO City was 1,101,438.49 tons of CO₂e (CDO GHG Management Committee, 2017). With this, the challenge is to provide nature-based solutions that help reduce the carbon emission in the city. To address this, a 2.7 hectares underused site, located in Brgy. Puntod, CDO is envisioned to be a carbon-sequestering urban forest park, where nature and people can work together in curbing carbon emissions. The project illustrates the design strategies based on carbon sequestration-centered design, including Miyawaki method, use of high carbon-sequestering native plant species, multi-layered and clustered planting, utilization of local materials with low embodied carbon, and integration of educational awareness as well as reconnection between people and nature. With these design solutions, the urban forest park acts as a carbon sink while rejuvenating urban biodiversity and improving the overall livability of the city.

THEORETICAL FRAMEWORK



RESEARCH DESIGN



DESIGN CONCEPT

Lambago Tree (*Hibiscus tiliaceus*)

Lambago tree (*Hibiscus tiliaceus*) is considered as an important symbol in Cagayan de Oro city's history. Before the city was named Cagayan de Oro, it was known by the natives as "Kalambagohan", because of the abundance of this plant species at the area. For this reason, it is used as the inspiration for the design of the forest park. This is translated using curvilinear forms in the layout of the site and in the landscape design elements since the branches of the tree often bend over time.



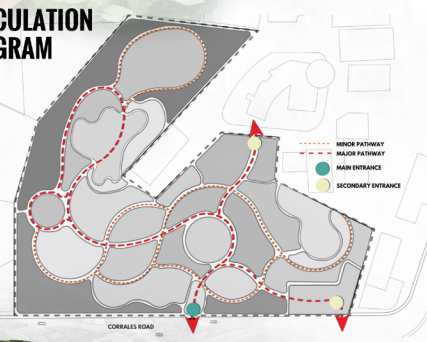
VISION

The goal of the study is to create an urban forest park that serves as a carbon sink and increases the carbon sequestration in Cagayan de Oro City.

FUNCTIONAL DIAGRAM



CIRCULATION DIAGRAM



FOREST AREA



BAMBOO GROVES



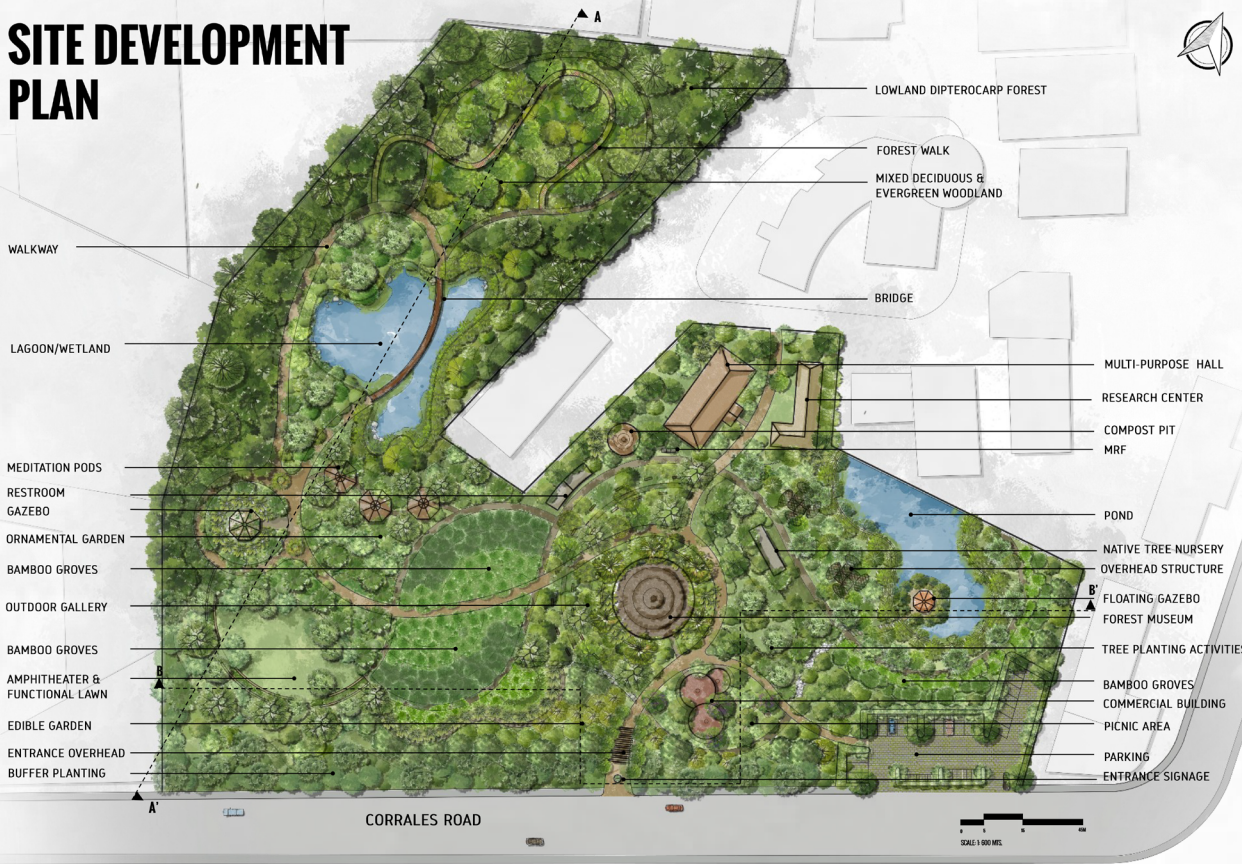
LAGOON



ENTRANCE



SITE DEVELOPMENT PLAN



FOREST AREA



FEATURES HIGH CARBON SEQUESTERING PLANTS SPECIES



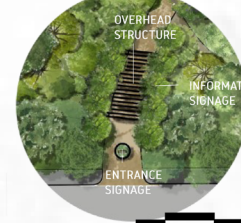
FOREST AREA SECTION-ELEVATIONS

FOREST MUSEUM & OUTDOOR GALLERY



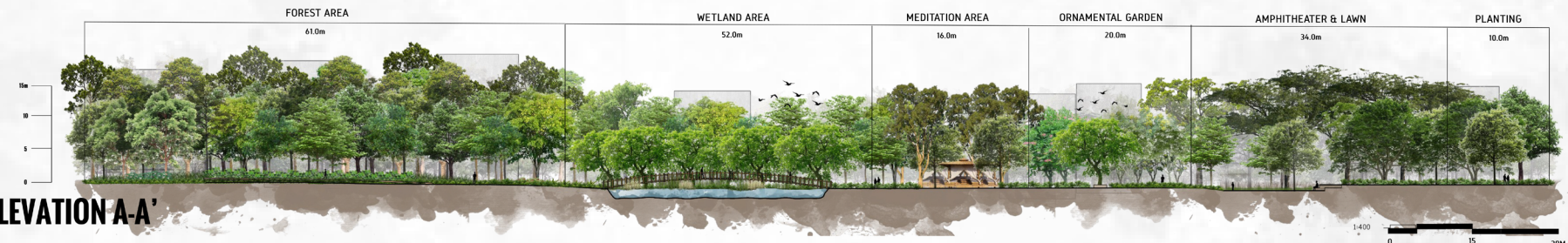
FOREST MUSEUM & OUTDOOR GALLERY SECTION-ELEVATIONS

ENTRANCE

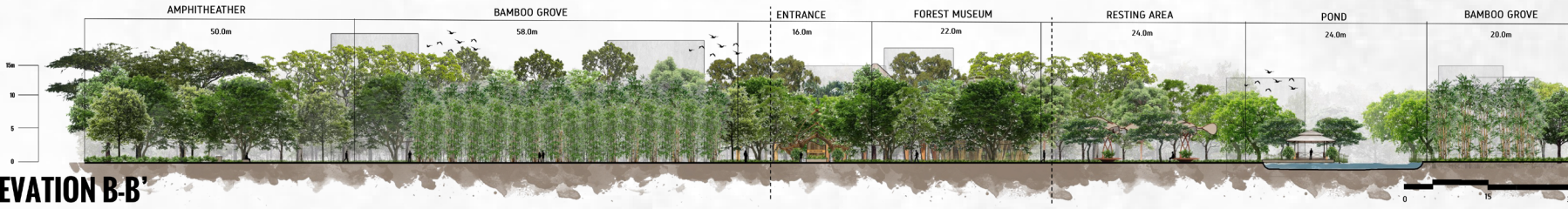


ENTRANCE SECTION-ELEVATIONS

SECTION-ELEVATION A-A'



SECTION-ELEVATION B-B'

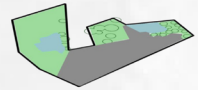




DESIGN STRATEGIES FOR CARBON-SEQUESTERING FOREST PARK

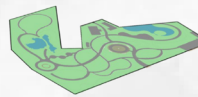
01 INCREASE VEGETATION

BEFORE

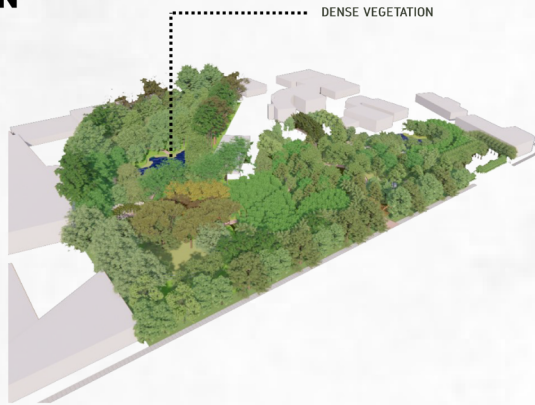


THE PAVED AREAS ARE MINIMIZED AND CONVERTED TO PLANTING AREAS

PROPOSED



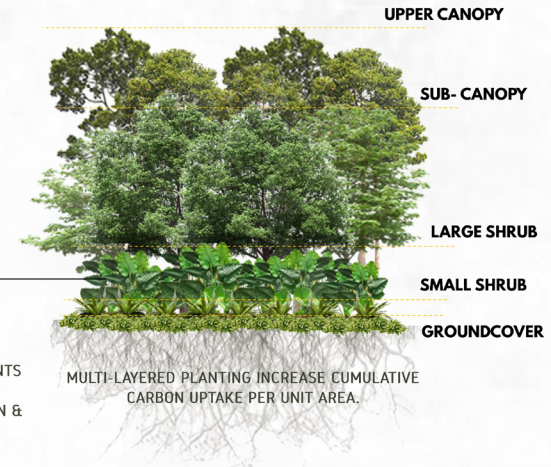
80% OF THE SITE IS COVERED WITH ABUNDANT VEGETATION USING MIYAWAKI METHOD



DENSE VEGETATION

03 CURVILINEAR PLANTING + MULTI-LAYERING & CLUSTERING OF PLANTS

CURVILINEAR DESIGN LANDSCAPE SETTING SEQUESTERS MORE CARBON PER M2.



UPPER CANOPY

SUB-CANOPY

LARGE SHRUB

SMALL SHRUB

GROUNDCOVER

CLUSTERING PLANTS SUPPORTS INTERCONNECTION & RESILIENCE

MULTI-LAYERED PLANTING INCREASE CUMULATIVE CARBON UPTAKE PER UNIT AREA.

02 USE OF HIGH CARBON SEQUESTERING NATIVE PLANTS SPECIES

DIPTEROCARP

BAMBOOS SEQUESTER 2 TONS OF CO2 IN 7 YEARS



Shorea almon (Almon)



Hopea acuminata (Manggachapui)



Shorea polysperma (Tanguile)



Shorea negrosensis (Red Lawa-an)



Parashorea malaanonan (Bagtikan)



GENERA OF HOPEA, DRYOBALANOPS, DIPTEROCARPUS, SHOREA AND PARASHOR HAVE HIGH CARBON SEQUESTRATION RATE BECAUSE OF THEIR LARGE BIOMASS.



04 CARBON SINK & LOW EMBODIED CARBON MATERIALS



AGGREGATES

LOWER EMBODIED CARBON THAN OTHER PAVING MATERIALS. (SEATING AREAS, PATHWAYS)



WOOD

CO2 IS STORED IN WOOD & REMAINS THERE AS LONG AS ITS INTEGRITY IS MAINTAINED.



BAMBOO

BAMBOO PRODUCTS ARE COMMONLY USED DUE TO ITS FAST-GROWTH, RENEWABILITY, AND AVAILABILITY.



DECOMPOSED GRANITE

LOWER EMBODIED CARBON THAN OTHER PAVING MATERIALS. PERMEABILITY OF WATER THROUGH THE SURFACE.



RECYCLED PAVERS

REDUCES HARVESTING FROM RAW MATERIALS



CO2 SEQUESTERING CONCRETE

CO2 IS CAPTURED FROM FACTORIES & REMAINS IN THE CONCRETE

