Project Update: January 2024

Introduction

Coastal lagoon landscapes (CLLs) belong to the international wetland ecosystems known as a very important site supporting high biological productivity. However, little is known about its potential for carbon stock, which is an important variable for bioenergy modelling, food security, environmental assessment, climate change research, and biodiversity conservation. Most of the threats in CLL come from small-scale activities of local communities (Management Plan of 1017 the Ramsar site, 2022), such as deforestation, hunting and agricultural practices (UICN/BIODEV2030, 2021; Prudencio et al., 2002), which have caused significant declines in wildlife populations and loss of natural habitats. This report presents the progression of the activities we are carrying out on the CLLs in order to provide baseline data for developing a conservation and sustainable management strategy of the CLL in the southern Benin and in building the technical capacity for the conservation and sustainable management strategy implementation of this wetland area.

Methodology

- **Field data collection**

✓ ***Forest inventory*:**

Based on the land use and land cover map using remote sensing and GIS (Yetein et al., unpublished data), the main land use types were selected for the establishment of plot (figure 1).

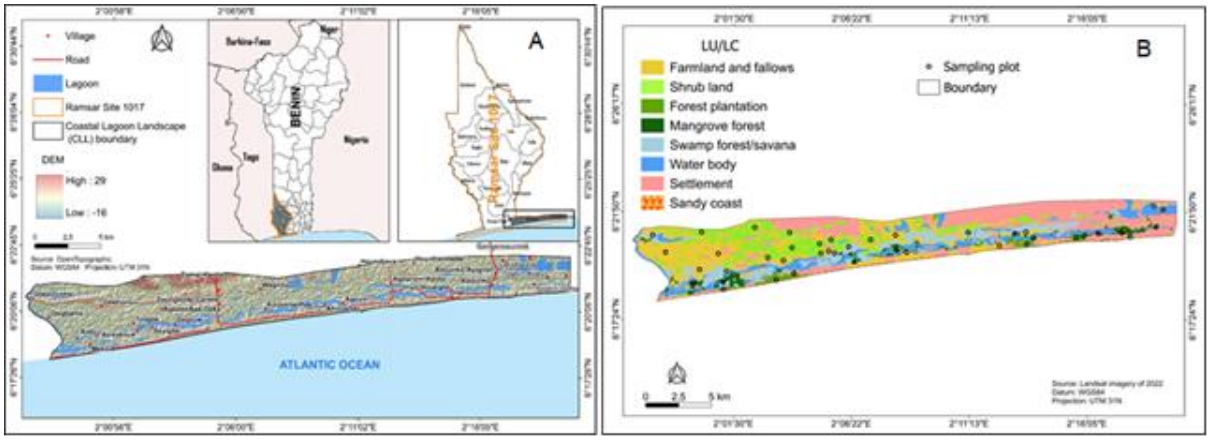

Figure 1: Map of Coastal Lagoon Landscape (CLL) showing the forest inventory plots.

Two carbon pools were considered: above-ground carbon (live trees carbon and herbaceous) and below-ground carbon (roots and soil carbon).

Photo 1: Field exploration for plot finding.

Photo 2: Diameter at breast height (DBH) of mangrove (*Avicennia germinans*) tree measurement.

In the field, the diameter at breast height (DBH) of the trees and the total height (H; m) were measured using a diameter tape (Photo 2) and digital hypsometer (Nikon Forestry Pro II Laser) (Photo 3) respectively.

Photo 3: Total height (H; m) measurement using a digital hypsometer (Nikon Forestry Pro II Laser).

The geographic coordinates of each plot, sample or specimen were recorded using the GPS to map the main vegetation types, species distribution, and priority habitats for biodiversity conservation.

Herbarium specimens of unknown species were collected for further identification in the National Herbarium of Benin.

From a point located in the centre of each plot, the soil was sampled at a depth of 50 cm.

- ✓ ***Survey with local population***

A survey was conducted with local population to determine species which are threatened in the area according to their perception and field survey. They were also be surveyed on the land use types and anthropogenic pressure which threaten species conservation (Photo 5)

Photo 5: Group discussion and Individual interview with local people

Results (First results)

Vegetation patterns, floristic and structural diversity analysis

A total of 48 plant species (tree and herb) belonging to 46 genera and 27 families were inventoried in the CLL at the 1017 Ramsar site. Arecaceae (19%) were the most represented family followed by Anacardiaceae, Annonaceae, Bignoniaceae, Caesalpiniaceae, Fabaceae and Moraceae for 12% each (Figure 2).

This study reported that mangrove (814 stem ha^{-1}) was the vegetation type with highest tree density followed by swamp forest/savanna (377 stem ha^{-1}) and forest plantation (136 stem ha^{-1}). The lowest tree density was found in sandy coast (17 stem ha^{-1}). Significant differences were found regarding tree density distribution by diameter classes across all vegetation types (Chi-Sq. = 134.73, d.f. = 9, $p < 0.05$). Results displayed trees in smaller diameter classes were the most abundant. Value of basal area varied significantly between vegetation types ranging from 2.71 ± 1.26 m^2 ha^{-1} (farmland/fallow) to 38.77 ± 1.26 m^2 ha^{-1} (mangrove forest). Forest plantation was the vegetation type with the largest mean DBH (29.73 ± 5.14 cm) while shrub land was this with lowest mean DBH (9.20 ± 1.94 cm). Similarly, mean tree height was lowest in mangrove forest (4.56 ± 2.26 m) and highest in forest plantation forest (13.92 ± 2.31 m). Species richness varied significantly between vegetation types ranging from six species to 18 species per ha. With respect to species richness at plot level, the number of species in the sampled areas ranged from two to nine with an average value of species richness of five species per plot.

Main threats to the conservation of CLL ecosystems

According to local community perception, the main threats to the conservation of CLL ecosystems were mangrove forest degradation for fuelwood need (68.33%), trees collection for basket making for the production of salt (53.33%), wood harvesting as building and handicraft material (61.66%) (Photo 6), land requirement for farming (43.33%) (Photo 7) and others such as urbanisation and quarry installation.

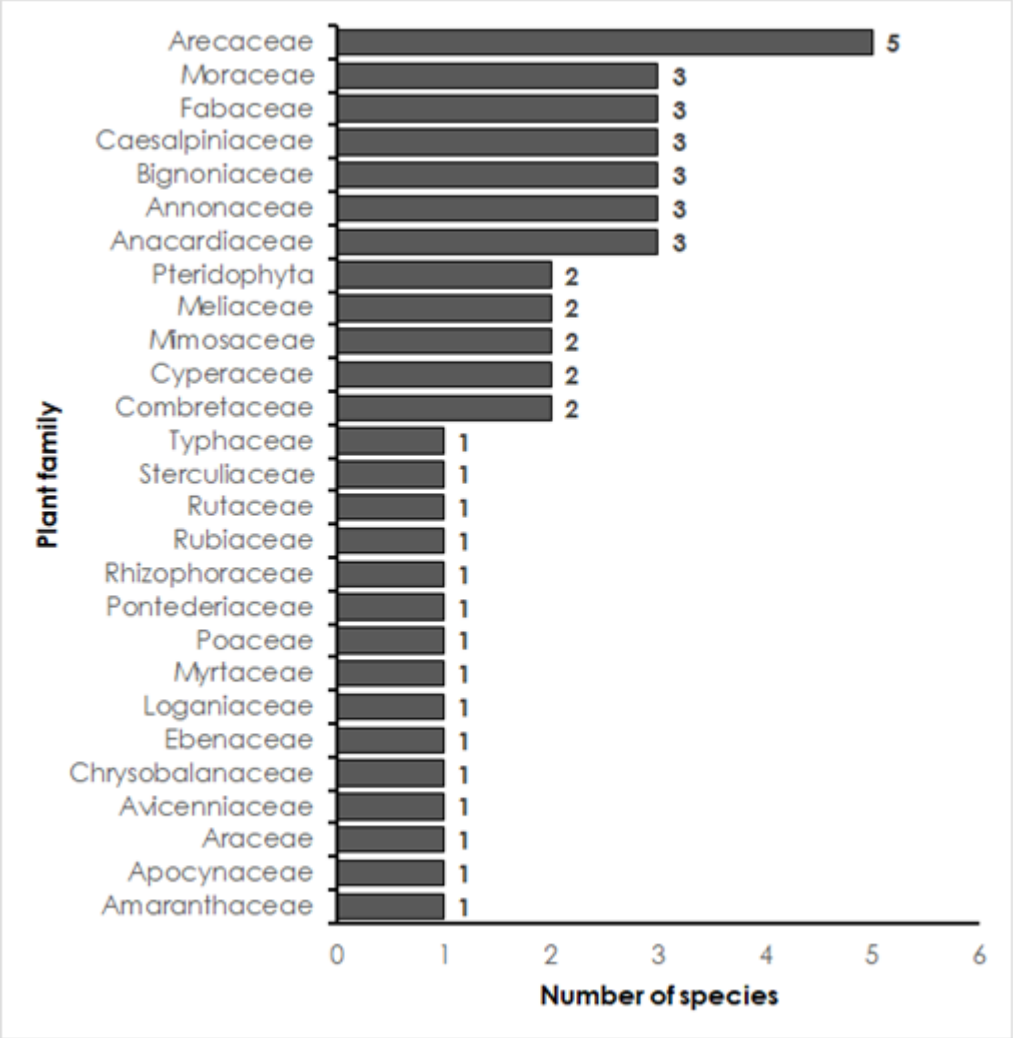

Figure 2. Plant species (tree and herb) distribution among families on the CLL.

In all vegetation types, the most abundant tree in our plots were *Rhizophora racemosa*. Species ranking based on species richness showed variation between vegetation types: *Rhizophora racemosa*, *Avicennia germinans and Acrostichum aureum* were the three most abundant species in the mangrove forest; *Ficus trichopoda*, *Raphia vinifera, Elaeis guineensis*, *Acacia auriculiformis*, *Cyperus articulatus*, *Typha domingensis* in the swamp forest/savanna; *Cocos nucifera, Acacia auriculiformis* and *Elaeis guineensis* in forest plantation; *Chrysobalanus icaco*, *Diospyros tricolor*, *Annona senegalensis*, *Uvaria chamae* in shrub land, and *Elaeis guineensis*, *Newbouldia laevis*, *Chromolaena odorata and Voacanga africana* were the dominant species in the farmland/fallows. In sandy coast, the dominant species were *Cocos nucifera*, *Remirea maritima* and *Scaevola plumieri*.

Photo 6: Mangrove ecosystem degradation for fuelwood purpose (A), basket making for salt production (B) and trees harvesting as building material (C).

Photo 7: Land requirement for farming within the coastal lagoon landscape (CLL) at the 1017 Ramsar site.