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Floristic Diversity and Structure of Woody Stands in the wetland Areas of Douala IV and Dibombari Districts (Littoral-Cameroon)

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ABSTRACT

This study aims to determine the floristic diversity and structure of woody stands marshy areas of the Douala IV and Dibombari districts located in the Littoral Region of Cameroon. The sampling method for data collection consisted of 25 m x 25 m quadrats; thus, a total of 30 quadrats (15 quadrats per site) were established in the study area. All individuals with a diameter at breast height (DBH) ≥ 10 cm were identified and measured using a DBH tape measure. A total of 172 individual 28 species, 25 genera, and 18 families were identified. The Bomono Ba Mbengue swamp was the more diverse, with higher Shannon (2.923 bits), Pielou (0.887), and Simpson (0.938) values. The Sorensen's similarity coefficient applied showed a low similarity (47%) between the different marshes. The most represented families at Bomono Ba Mbengue and Bonaberi were Rubiaceae (17%) and Euphorbiaceae (34%), respectively. There is a significant difference between the density and basal area of species at Bomono Ba Mbengue (220 ± 49 stems/ha and 18.70 ± 5.71 m²/ha, respectively) and those at Bonaberi (124 ± 14 stems/ha and 6.97 ± 1.88 m²/ha, respectively). The diameter structure of the woody plants in both marshes has a bell-shaped distribution, indicating a well-balanced population with a dominance of medium-diameter individuals, suggesting a regenerating environment. For wetlands undergoing restoration, it would be necessary to ensure their protection and monitoring to reach a climax stage.

Keywords: Floristic Survey; Marshes; Douala IV; Dibombari; Diametric Structure; Vulnerable Ecosystem.

1.0. Introduction

Wetlands are transitional areas between terrestrial and aquatic environments. They are characterized by hydromorphic soils, dominant vegetation composed of hygrophilous plants, and provide continuous or temporary habitat for animal species dependent on these spaces [1, 2]. They are difficult to access due to dense vertical aquatic vegetation [3]. Furthermore, in addition to supporting biodiversity, they also provide various ecological services such as improving water quality and regulating river flow [4]. In Cameroon, these areas represent 1% of the land area, which is of significant ecological importance because these natural spaces harbor a substantial portion of biodiversity and provide numerous invaluable services to the environment and humans [5]. They also support a diverse range of forest ecosystems, some of which constitute micro-refuges for rare animal and plant species [3, 6]. However, this area has decreased by approximately 50% in recent centuries, and existing wetlands are degraded [7]. Wetlands are fragile environments; their unsustainable use leads to their degradation. Human activities such as rapid urbanization, industrial development, land insecurity, logging, agricultural intensification led to changes in plant formations, erosion of biodiversity, and a reduction in area [8, 9]. Indeed, aquatic ecosystems worldwide face serious threats. Forests are destroyed, wetlands and waterways are polluted, and wetlands are drained, degraded, and overexploited [10, 11] Biodiversity conservation is a crucial tool for any society committed to sustainable development. Moreover, knowledge of the plant diversity of species in wetlands used by local populations is essential for implementing appropriate actions [3, 12].

In Cameroon, the marshy areas of the Douala IV and Dibombari districts harbor a rich and varied flora, essential for maintaining local biodiversity. However, increasing urbanization and human activities threaten these ecosystems,

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potentially altering the structure of the tree cover in these wetlands. Although the vegetation cover of these wetlands has been significantly modified since the beginning of the settlement process, due to rapid population growth, some rare patches of swamp forest still remain and must be preserved, as they constitute reservoirs of rare species. The identification and understanding of wetland flora have become a major ecological concern for several decades, contributing to the optimal conservation of degraded wetlands [13, 6]. Recent work carried out in urban and peri-urban wetlands in Cameroon remains poorly documented; however, this knowledge would allow for the development of management and restoration plans for these wetlands.

1.1. Study Objectives

Hence, the objective of this study is to (i) assess the floristic diversity and (ii) the structure of woody plant communities in the wetlands of the Douala IV and Dibombari districts in the Littoral Region.

2.0. Materials and methods

2.1. Description of the study area

The study was conducted in two localities situated in different departments. The locality of Bomono Ba Mbengue is located in the Dibombari district, Moungo Department, Littoral Region of Cameroon. Its geographical boundaries are 4°8'39" N and 9°35'20" E [14]. The locality of Bonaberi is located in the Douala IV district, Wouri Department, Littoral Region of Cameroon. Its boundaries are: Latitude: 4°04′40″ North, Longitude: 9°40′33″ East [15] (Fig. 1).

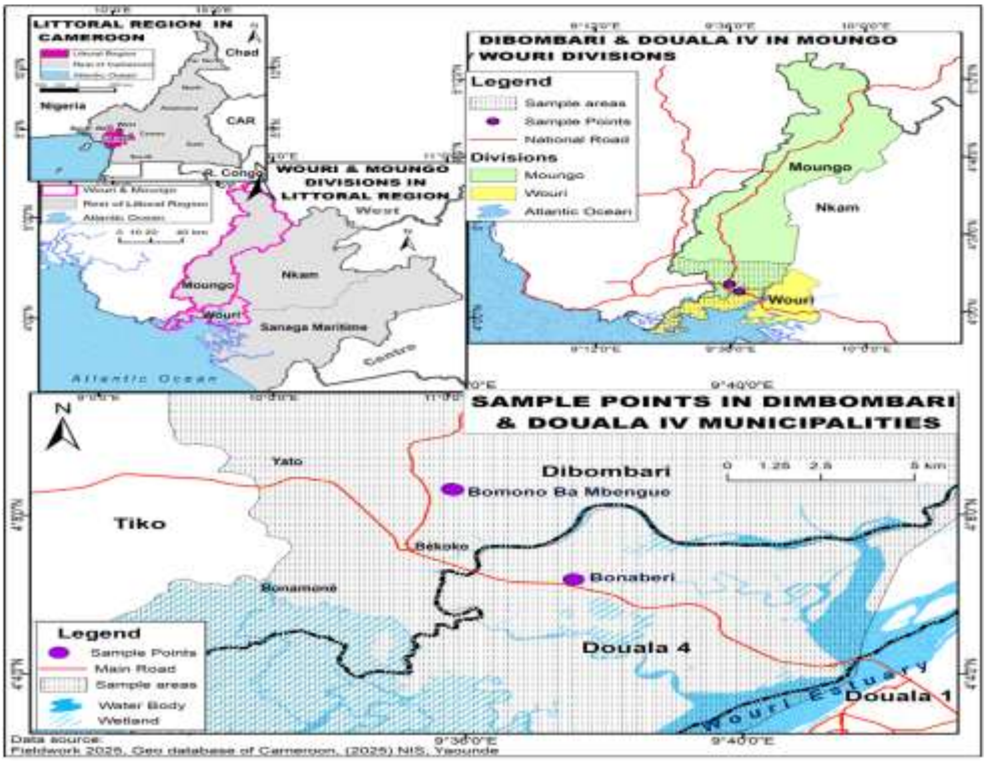

Figure 1. Location of the study site

The municipality of Dibombari, established in 1955, is located 18 km from the city of Douala, the capital of the Littoral Region to which it belongs. Douala IV is characterized by an urban topography, with often flat areas near the Wouri River, while hills and slopes are found on the periphery, affecting urbanization and access to infrastructure. In contrast, Dibombari has a more rugged terrain, with mountainous areas that favor subsistence farming. The soils of Dibombari are hydromorphic near watercourses and ferralitic with a clay-sand texture on the plains [15]. These two districts benefit from an equatorial climate characterized by high temperatures and abundant rainfall throughout the year. They feature diverse vegetation, marked by limited green spaces, but include gardens and fruit tree plantations. There are also areas of dense rainforest, industrial oil palm plantations, and a mangrove forest.

2.2. Sample collection

The choice of the study site can be justified by the fact that the wetlands in the Douala and Dibombari districts represent a unique and vulnerable ecosystem, subject to increasing anthropogenic pressures. Studying the floristic diversity and woody plant community structures in these environments will help fill a knowledge gap and provide elements for sustainable management of these ecosystems.

Sampling within the sites took place during January-February 2025. The quadrat method was used for floristic data collection [16]. 25 m x 25 m quadrats were laid out to record all woody species with a diameter at breast height (DBH) ≥ 10 cm. In total, thirty (30) 625 m² quadrats were laid out in the study area, equivalent to fifteen (15) 25 m x 25 m quadrats at each site. All individuals with a diameter at breast height (DBH) ≥ 10 cm were identified and measured using a DBH measuring tape at 1.30 cm above the ground. The distance between quadrats was 10 m for better sampling. Species identified in situ were collected and preserved for confirmation or identification at the National Herbarium in Yaoundé.

2.3. Floristic composition of the different marshes in the study area

2.3.1. Floral diversity

Floristic diversity refers to the number of species present in a community or stand, including rare species. In this study, species richness, the Shannon index, Pielou 's evenness index, and Simpson's index were used to assess the biodiversity of the wetlands.

2.3.2. Specific richness

The species richness of an ecosystem or community, generally denoted S, is the number of species or taxa found there, regardless of the number of individuals or the mass represented by each taxon [6]. Accumulation curves using the rarefaction method allow us to estimate the cumulative species richness based on observed data, taking into account the sampling effort. Rarefaction curves, which reflect the sampling effort of the inventoried flora, are obtained using the R software via the survey/species matrix, which provides the abundance and species richness based on the surveys of each marsh [17].

2.3.3. Shannon-Wiener Diversity Index H'

Weaver diversity index measures the structural or informational diversity of communities and takes into account the richness and relative abundance of species in its calculation. This index makes it possible to quantify the heterogeneity of biodiversity in a study environment and thus to observe changes over time [7]. It is expressed in bits per individual and generally ranges from 1 to 5 bits.

$$H' = -\sum Pi \times \log_2 Pi$$

Where: Pi = Ni/N (Ni = the number of individuals of species i and N = the total number of individuals n of all species). For H' between 0 and 2.5, it can be assumed to be low; for H' between 2.6 and 3.9, it can be assumed to be medium; and for H' between 4 and 5, it can be assumed to be high.

2.3.4. Pielou 's Equity (R)

It reflects the degree of diversity achieved relative to the theoretical maximum. Pielou 's principle states that plants both reflect and create diversity through their composition and structure [14]. This index allows us to assess the homogeneous or disparate distribution of species in different surveys. It is calculated using the following formula:

$R=H'/(\log_2 S)$

Pielou 's evenness index; S: total number of species; H': Shannon-Weaver index. Pielou 's evenness index ranges from 0 to 1. It tends towards 0 when almost all the population is concentrated in one species and towards 1 when the species have the same abundance; this is then referred to as a balanced environment.

2.3.5. Simpson's Index

Simpson's index (D') represents the number of individuals of a given species (Ni) as a ratio to the total number of individuals (N). The value of this index tends towards 0 to indicate maximum diversity and towards 1 to indicate minimum diversity [14]. Simpson's index D is:

$D' = \sum Ni\ (Ni-1) / N(N-1)$ where $D = \sum Ni2$

2.3.6. Sorensen similarity index

Sorensen's similarity index assesses the floristic affinity between two ecological environments. It is greater than 50% when there is floristic affinity between two environments and less than 50% otherwise. It is calculated using the following formula:

$R=H'/(\log_2 S)$

With (a = number of species in environment A, b = number of species in environment B and c = number of species common to both ecological environments). It allows us to understand the similarities between plant communities [14].

2.4. Structural characteristics of the stand

2.4.1. Population density

The average density indicates the average number of individuals of the species per unit sample [18] and was calculated using the following formula:

$D=n/S$

With, D: density (stems/ha); n: number of stems present on the sampled area and S: sampled area (ha).

2.4.2. Diametric structure of the stand

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It allows us to determine the level of disturbance or conservation of a biotope. The woody species inventoried in each site were distributed according to diameter classes with an amplitude of 10.

2.4.3. Basal area of associated woody plants

Basal area corresponds to the cross-section of a tree and allows for a better visualization of the area occupied by a species or family. It is calculated using the following formula:

$St=\pi Di^2/4$

With St = basal area (m2 /ha) Di is the diameter (m) of the tree, $\pi = 3.14$.

The density and basal area values obtained in each 625 m^2 were extrapolated to the hectare using an expansion factor (EF) [18].

FE = 10,000 m^2/Surface of the small square (m^2).

2.4.4. Importance Value Index

The Importance Value Index (IVI) by species and/or family accumulates relative density (DR), relative dominance (DoR), and relative frequency (FR), and essentially reflects the position of each species and/or family relative to all other species and/or families. According to [19], a species is ecologically dominant when its IVI > 10.

IVI (Species) = Relative Density + Relative Dominance + Relative Frequency

2.5. Data Analysis

The inventory data were entered, recorded, and then processed using Excel and R 3.1.3 software. R was also used to perform Principal Correspondence Analysis (PCA) to establish correlations between the different parameters studied. The means of the different parameters (basal area and density) were compared using analysis of variance (ANOVA) tests. When the differences between the parameter means were significant ($p < 0.05$), post-hoc tests (Kruskal -Wallis's test) were performed to classify and determine which parameters were different.

3.0. Results

Floristic composition of the different marshes in the study area

3.1. Specific richness

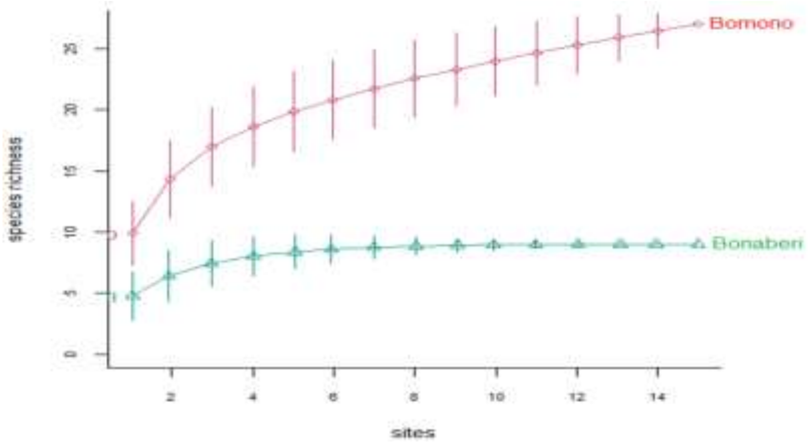

Figure 2. Accumulation curve of species in the study area.

The accumulation curves by the species rarefaction method in the Bonaberi marsh form a plateau, however, the species accumulation curve in the Bomono Ba Mbengue marsh continues to grow (Figure 2).

In total, 28 species distributed among 18 families and 25 genera were identified in the study area for a total of 30 sampled quadrats. The Bomono Ba Mbengue marsh has a higher species richness (27 species) compared to that of Bonaberi (9 species). Similarly, the families (18) and genera (25) are more diverse in the Bomono Ba Mbengue marsh compared to those of Bonaberi (8 and 9 respectively). The Shannon (2.923), Pielou (0.887), and Simpson (0.938) diversity indices are higher in the Bomono Ba Mbengue marsh compared to those of the Bonaberi marsh: 1.910 bits for Shannon, 0.869 for Pielou, and 0.812 for Simpson, respectively. The Sorensen index obtained for the two marshes in the study area is also 47% (Table 1).

Table 1. Floristic composition and diversity indices of the marshes in the study area

Sites	Specific richness	Number of genders	Number of families	Shannon	Pielou	Simpson	Sorensen
Bomono	27	25	18	2,923	0.887	0.938	47%
Bonaberi	9	9	8	1,910	0.869	0.812	
Study site	28	25	18	2,887	0.867	0.928	

3.2. Proportion of species recorded in marshy areas

Bomono Ba Mbengue marsh, the most represented species were *Macaranga spinosa*, *Alstonia boonei*, *Musanga cecropioides*, *Rauwolfia vomitoria* and *Cola acuminata* with respectively 80% followed by *Mytragyna stipulosa*, *Terminalia superba*, *Maeopsis eminii* with 66.67% respectively; of *Corynanthe pachyceras*, *Hallea stipulosa* (60.00% respectively) and *Annona sp* (53.33%). The most abundant species were *Uapaca guineensis* (10.19%), *Rauwolfia vomitoria* (8.74%), *Macaranga spinosa*, *Mytragyna stipulosa* (7.77% respectively) and *Alstonia boonei* (6.80%). Furthermore, the Importance Value index reveals ten species with high ecological value, with the leading species being *Macaranga spinosa* (96.23) followed by *Alstonia boonei* (95.32) *Uapaca guineensis* (95.13), *Rauwolfia vomitoria* (94,91), *Musanga cecropioides* (93.35), *Cola acuminata* (92.06), *Mytragyna stipulosa* (81.66), *Terminalia superba* (80.18) *Maeopsis eminii* (78.23) and of *Corynanthe pachyceras* (69,71). However, in the Bonaberi marsh the most represented species and those of high ecological value were *Alchornea cordifolia* (100.00%, 168.00), *Alstonia boonei* (73.33%, 106.25) *Musanga cecropioides* (66.67%, 92.57%) and *Mytragyna stipulosa* (53.33%, 77.77). The species present in the Bomono and Bonaberi marshes produce goods and services to the surrounding populations and the environment, such as traditional medicine (*Alstonia boonei, Ficus mucoso*, *Anthocleista schweinfurthii* …), timber and craft wood (*Sterculia rhinopetala*, *Triplochyton scleroxylon*, *Terminalia superba*) (Table 2).

Table 2. Proportion of species recorded in Bomono and Bonaberi marsh

Species	Abundance (%)	Density (%)	Frequency (%)	IVI	Uses
Bomono Ba Mbengue					
Macaranga	7.77	8.46	80.00	96.23	me, fw, sa

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spinosa					
Alstonia boonei	6.80	8.53	80.00	95.32	me, fw, ve
Uapaca guineensis	10.19	11.61	73.33	95.13	me, sc, tm, fw
Rauwolfia vomitoria	8.74	6.18	80.00	94.91	me, fw
Musanga cecropioides	5.83	7.53	80.00	93.35	me, tm, sc
Cola acuminata	6.31	5.75	80.00	92.06	sc, me, sa
Mytragyna stipulosa	7.77	7.23	66.67	81.66	me, sa, fw
Terminalia superba	5.83	7.69	66.67	80.18	me, tm, fw, sa
Maeopsis eminii	6.31	5.25	66.67	78.23	tm, fw
Corynanthe pachyceras	4.85	4.86	60.00	69.71	me, fw
Hallea stipulosa	4.85	3.70	60.00	68.56	me, tm, fw
Annona sp.	5.34	4.91	53.33	63.58	sc, me, fw, sa
Annona reticulata	2.91	3.52	40.00	46.43	sc, me, fw, sa
Pouteria torta	2.43	2.49	33.33	38.25	sc, me, fw, tm
Alchornea cordifolia	5.34	3.72	26.67	35.73	me, fw
Anthocleista schweinfurthii	1.94	1.85	26.67	30.46	me, fw, so
Ficus mucuso	0.97	1.13	13.33	15.44	me, tm, tm
Tabernaemontana crassa	0.97	0.80	13.33	15.10	me, tm, sa
Carapa procera	0.97	0.78	13.33	15.08	me, tm, fw, sa
Mangifera indica	0.49	0.79	6.67	7.94	sc, fw, me, sa
Persea americana	0.49	0.66	6.67	7.82	sc, fw, me, sa
Triplochiton scleroxylon	0.49	0.61	6.67	7.76	tm, me, fw, sa
Sterculia rhinopetala	0.49	0.44	6.67	7.59	tm, so, fw
Annona senegalensis	0.49	0.41	6.67	7.56	sc, me, fw, sa
Elaeis guineensis	0.49	0.38	6.67	7.54	sc, me, so, fw
Trema orientalis	0.49	0.38	6.67	7.54	me, tm, so
Entada africana	0.49	0.34	6.67	7.49	me, so, fw

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Bonaberi					
Alchornea cordifolia	34.48	33.52	100.00	168.00	me, fw
Alstonia boonei	15.52	17.40	73.33	106.25	me, tm, sa
Musanga cecropioides	12.93	12.97	66.67	92.57	me, tm, so
Mytragyna stipulosa	12.07	12.37	53.33	77.77	me, sa, fw
Entada africana	6.03	4.11	46.67	56.82	me, so, fw
Fucus sp	6.03	6.45	40.00	52.48	me, tm, fw
Anthocleista schweinfurthii	6.90	5.06	33.33	45.29	me, fw, so
Ficus mucuso	3.45	4.21	20.00	27.66	me, fw, so
Persea americana	2.59	3.92	20.00	26.50	sc, fw, me, sa

3.3. Structural characteristics of the stand

3.3.1. Density of the woody stand

The density and basal area obtained in the study area were 172 ± 60 stems/ha and 12.84 ± 7.28 m² /ha, respectively. However, the mean values for density and basal area of the woody stand obtained in the different marsh areas did not follow a normal distribution (according to the Shapiro- Wilk normality test). The non-parametric Kruskal-Wallis's test shows that, regardless of the parameter, the two sites are statistically different ($p \leq 0.05$). Therefore, the results show that there is a significant difference between the species density, basal area of species in the Bomono Ba Mbengue marsh (220±49 stems/ha and 18.70±5.71 m² / ha respectively) and that of the species density and basal area in the Bonaberi marsh (124±14 stems/ha and 6.97±1.88 m²/ha respectively) (Figure 3).

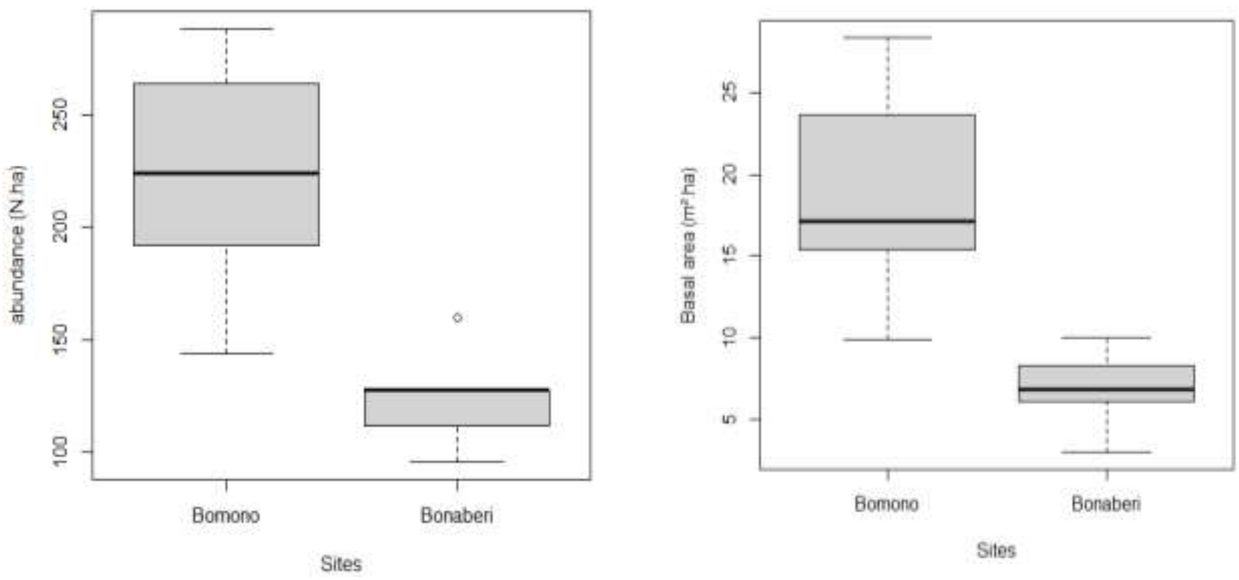

Figure 3. Average density and basal area of species in the two marshes

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3.3.2. Diametric structure of the woody stand according to classes

The diameter structure curve of woody plants in both sites, as well as for the study area, has a bell-shaped profile. The number of individual trees in the Bonaberi swamp increases from the 10-20 cm diameter class to the 20-30 cm diameter class, which has the highest concentration of individuals with 57 stems/ha, and then decreases to the 40-50 cm diameter class with 34 individuals, remaining constant in the other classes with 16 individuals. In contrast, in the Bomono Ba Mbengue swamp, the 30-40 cm diameter class has the highest concentration of individuals with 118 out of the 220 inventoried, then decreases from the 40-50 cm diameter class with 29 individuals to the 50-60 cm diameter class with 20 individuals (Figure 4).

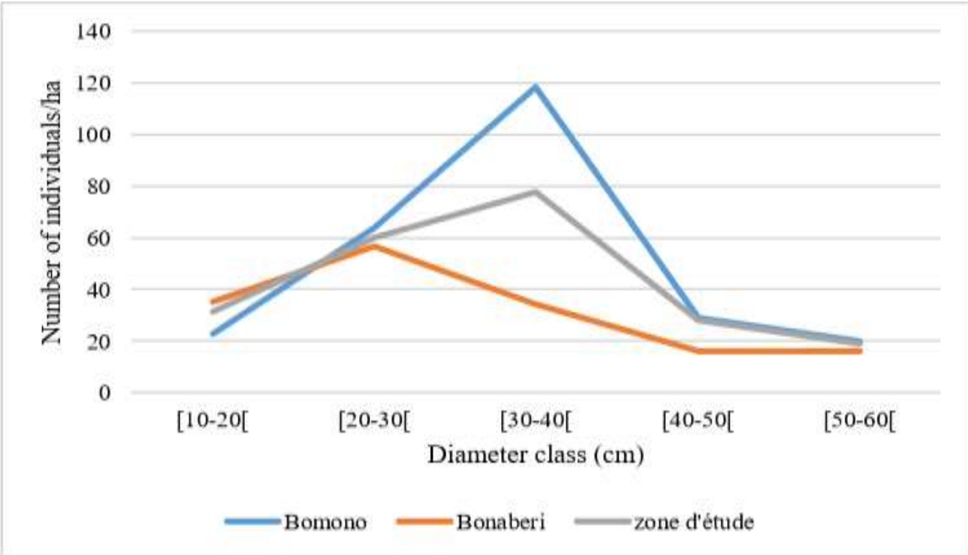

Figure 4. Distribution of individuals according to diameter classes.

3.3.3. Families most represented in the study area

The flora of the Bonaberi marsh is dominated by the families Euphorbiaceae (34%), Apocynaceae (15%), Urticaceae (13%), Rubiaceae (12%) and Moraceae (9%) while that of Bomono Ba Mbengue is dominated by the families Rubiaceae (17%), Apocynaceae (16%), Euphorbiaceae (13.6%), Phyllanthaceae (10.2%) and Annonaceae (8.7%) (Figure 5).

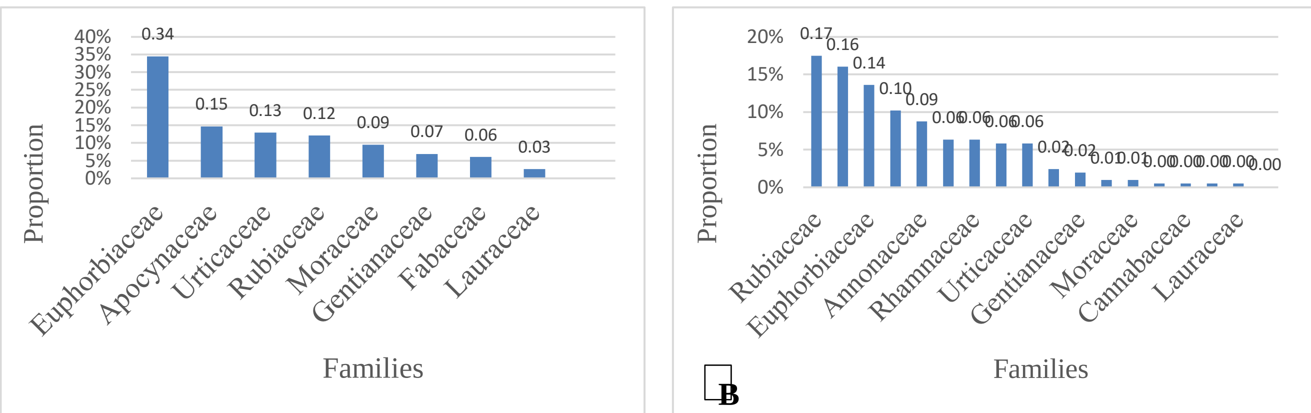

Figure 5. Families most represented in the marshes of Bonaberi (A) and Bomono (B).

3.4. Correlation between the parameters obtained in the study area

Principal Component Analysis (PCA) synthesizes information from the various diversity indices for density and basal area obtained in the different wetlands (Figure 6). In this study, the PCA axes show a total contribution of 86.18% (59.15% for axis 1 and 27.03% for axis 2). However, within this correlation circle, axis 1 not only encompasses all parameters but is also positively correlated with the Pielou, Shannon, and Simpson indices, species richness, density, and basal area. A strong positive correlation is also observed between the different diversity indices and between basal area and density.

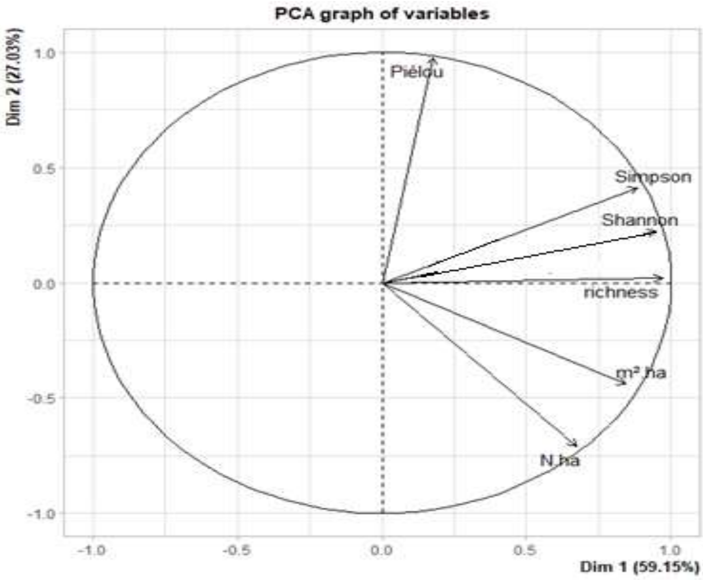

Figure 6. PCA applied to the different parameters obtained in the marshes.

4.0. Discussion

4.1. Floristic composition of the different marshes in the study area

The floristic inventory carried out in the Bomono Ba Mbengue and Bonaberi marshes revealed that the Bomono Ba Mbengue marshes are more diverse, with a species richness of 27 species, compared to the Bonaberi marshes, which only have 9 species. This indicates that these marshes are more stable than those of Bonaberi. which are highly degraded. These results confirm those of [20], which showed that the more diverse an ecosystem, the more stable it is. Furthermore, the results obtained show that, unlike the species accumulation curve of Bonaberi, which represents almost all the inventoried species, that of Bomono Ba Mbengue does not seem to reflect this total diversity, since, according to their accumulation curve, the plateau indicating all the inventoried species continues to grow. This shows that further sampling efforts could be made in the Bomono marshes and would certainly lead to the discovery of new species. Moreover, the species richness obtained in the study area (28) remains lower than that obtained (125 species) by [11] in the Lokoli swamp forest in Benin, which shows that the Bomono and Bonaberi marsh areas are currently in a state of advanced degradation. The Shannon diversity index (2.92 bits), the Pielou index (0.89), and the Simpson index (0.94) are higher in the Bomono Ba Mbengue marshes compared to those obtained in the Bonaberi marshes (1.91 bits, 0.87 and 0.81 respectively). The higher index values in the Bomono Ba Mbengue marshes would indicate good diversity and an even distribution of individuals within these marshes. In the case of the Bonaberi marshes, this could be explained by the fact that, due to the strong selectivity of the marshy environment, there is low species richness and a poor distribution of species [2, 21]. The diversity indices obtained in the study area are lower than those obtained by [12], who worked on floristic diversity and the structure of plant communities in the Lower and Middle Ouémé Valley in Benin, where their Shannon indices ranged from 3.35 to 4.39 bits. These indices are also lower than those obtained by [6] in the marshy areas of the city of Yaoundé. The Sorensen index (47%) between the two swamps is less than 50%, indicating a low similarity in the floristic composition of these two types of swamp. This can be seen in the different species found. Indeed, in the Bomono Ba Mbengue swamp, the Importance Value Index reveals ten species of high ecological value led by *Macaranga spinosa* (96.23) followed by *Alstonia boonei* (95.32) *Uapaca guineensis* (95.13), *Rauwolfia vomitoria* (94,91), *Musanga cecropioides* (93.35), *Cola acuminata* (92.06), *Mytragyna stipulosa* (81.66), *Terminalia superba* (80.18), *Maeopsis eminii* (78.23) and *Corynanthe pachyceras* (69,71). However, in the Bonaberi marsh, the most represented species (high frequency) and those with high ecological value were *Alchornea cordifolia* (100.00%, 168.00), *Alstonia boonei* (73.33%, 106.25) *Musanga cecropioides* (66.67%, 92.57%) and *Mytragyna stipulosa* (53.33%, 77.77%). This higher diversity in the Bomono Ba Mbengue marshes is thought to stem from biotopic conditions favorable to the development and diversification of plant communities [8]. Some species found in these marshes provide ecosystem services of great interest to surrounding populations, such as: traditional medicine (Alstonia *boonei, Ficus mucoso*, *Anthocleista schweinfurthii* …), timber and craft wood (*Sterculia rhinopetala, Triplochyton scleroxylon, Terminalia superba)*. Fruit trees such as *Persea americana, Mangifera indica are also found* and Non-Timber Forest Products (NTFPs) such as *Cola accuminata, Annona reticulata.*

4.2. Structural characteristics of the stand

From a floristic perspective, the most represented families in the Bonaberi marsh are Euphorbiaceae (34%), Apocynaceae (15%), Urticaceae (13%), Rubiaceae (12%), and Moraceae (9%), while those of Bomono Ba Mbengue are represented by the Rubiaceae (17%), Apocynaceae (16%), Euphorbiaceae (13.6%), Phyllanthaceae (10.2%), and Annonaceae (8.7%) families. The presence of the Urticaceae family is represented by *Musanga cecropioides* in the Bonaberi swamp shows that it is a disturbed or degraded site compared to that of Bomono Ba Mbengue. The families obtained in the two sites are different from those obtained by [22] in the Forest Management Unit (FMU) 00-004 in Littoral-Cameroon where Meliaceae were the most represented families (30.26%), and from those obtained by [6] in the marshy areas of the city of Yaoundé where the flora was dominated by Asteraceae and Fabaceae.

The high density (220 ± 49 stems/ha) and basal area (18.70 ± 5.71 m^2 / ha) values in the Bomono Ba Mbengue marsh are explained by the fact that the gaps are rapidly colonized by fast-growing species compared to the Bonaberi marsh, which is directly adjacent to households and industries. The density and basal area values obtained in both marshes are higher than those obtained by [23] for the *Sporobolus* plant community *pyramidalis* and *Andropogon gayanus* in the Agonvè swamp forest and its associated environments in southern Benin. However, the density obtained in the Bomono swamp is similar to that obtained (231 ± 114.92 stems/ha) by [24] in the different vegetation types of the reserve ecological of Borotou -Koro in the Centre-West of Ivory Coast.

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The diameter structure of the woody species in the study area shows a bell-shaped curve, indicating a balanced individuals with a dominance of medium-diameter individuals, particularly in the 30-40 cm diameter class, which concentrates nearly 80 individuals. This structure is similar to the bell-shaped structure obtained by [25] in the Forest Reserve of the Peleforo Gon Coulibaly University of Korhogo, they showed that the bell-shaped structure indicates stand types characterized by trees of similar ages and therefore with relatively small diameters. This shape also reflects a better representation of intermediate classes compared to extreme classes. It is a sign of an environment undergoing regeneration [26]. However, it differs from the "L"-shaped structure obtained by [7] in the swamps of Yaoundé and its surroundings. It also differs from the inverted "J"-shaped structure characteristic of disturbed environments with good regeneration potential, obtained by [27] in the Kiénké -Sud and Deng-Deng Forest reserves in Cameroon. The different diameter structures obtained by the various authors could be explained by the considered diameters, as well as the climatic, edaphic, and anthropogenic factors specific to each area [28].

Indeed, the diversity and structure of woody stands in both wetlands are influenced by closely linked diversity indices. In the present context, this result indicates that, given the intensification of human activities affecting wetlands in the Coastal Region, it is essential that biodiversity conservation mechanisms be implemented to prevent the loss of this significant biodiversity potential, as emphasized by the Sustainable Development Goals.

░5.0. Conclusion

The objectives of this study were to identify differences in floristic composition and woody plant community structure in two marshes located in the districts of Dibombari and Douala IV. Floristically, the Shannon and Simpson's Evenness Index values obtained showed high species richness in the Bomono Ba Mbengue marshes compared to Bonaberi. The calculated Sorensen index value is less than 50%, indicating low floristic affinity between the two marshes. This low floristic affinity could be explained by strong anthropogenic pressure exerted on the Bonaberi marshes. The diameter structure of the woody plants in both marshes has a bell-shaped appearance, showing that the individuals are well-balanced, with a dominance of medium-diameter individuals, particularly in the 30-40 cm diameter class, which has the highest concentration of individuals. Moreover, this bell-shaped structure is a sign of an environment that is undergoing reconstruction. Thus, these marshes, which are in full reconstitution, require that measures be taken (regulation of human activities such as controlling urbanization) to guarantee better conservation and sustainable management of the floristic potential of these wetlands.

░6.0. Recommendations

The study explains that although the vegetation cover of wetlands has been significantly altered due to pressure from the rapid population growth on resources, some rare patches of swamp forest still remain and must be preserved as they constitute reservoirs of rare species.

Thus, these marshes require that measures be taken such as:

(i) regulation of human activities such as controlling urbanization, (ii) intensive agriculture; (iii) ecological restauration such as reforestation; and (iv) awareness and education of local communities on the importance of wetlands.

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Competing Interests Statement

The authors declare no competing financial, professional, or personal interests.

Consent for publication

The authors declare that they consented to the publication of this study.

Authors' contributions

All the authors made an equal contribution in the Conception and design of the work, Data collection, Drafting the article, and Critical revision of the article. All the authors have read and approved the final copy of the manuscript.

Ethical approval and consent to participate

This study does not contain any studies with human or animal subjects performed by any of the authors.

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References

[1] Wendsom, O.O., Gomgnimbou, A.P.K., Santi, S., Ilboudo, D., & Toguyeni, A. (2019). Quantification of biomass and carbon storage of the forest massif of the National School of Water and Forestry of Dindéresso, Houet Province, Burkina Faso. International Journal of Biological and Chemical Sciences, 13(7): 3276–3288.

[2] Gueye, M.T., Bop, D., Ndoye, A., & Sorlini, S. (2022). Impacts of lake pollution in the Pikine Technopole area on the risk of extinction of aquatic species. International Journal of Progressive Sciences and Technologies, 33(2): 260–271.

[3] Hmeyada, A.M.V., Yarba, L., Aliyenne, A., Moulay, M.B.A., & Abdellahi, A.M. (2024). Floristic diversity and socio-economic importance of the wild flora of the Bougary pond (Assaba, Mauritania). ESI Preprints.

[4] Levison, J., Larocque, M., Fournier, V., Gagné, S., Pellerin, S., & Ouellet, M. (2013). Dynamics of a headwater system and peatland under current conditions and with climate change. Hydrological Processes, 28(17).

[5] Onana, J.M. (2018). Mapping of Cameroon's ecosystems. International Journal of Biological Sciences, 12(2): 940–957.

[6] Fobane, J.L., Moussoune, J., Kono, L., Chimi, P.M., Nkoula, M.M.V., Zekeng, J.C., Onana, J.M., Mala, W.A., & Mbolo, M.M. (2023). Evaluation of aboveground biomass of plant communities in marshy areas of the city of Yaoundé. World Wide Journal of Multidisciplinary Research and Development, 9(06): 74–84.

[7] Mbarga, B.M.A., Endele, P.P., Kono, L.D., & Zenkeng, J.C. (2017). Impact of anthropization on the structural and ecological characteristics of woody stands in the marshes of the city of Yaoundé and its surroundings (Cameroon). Cameroon Journal of Biological and Biochemical Sciences, 25: 33–44.

[8] Kono, L.M., Essono, D.M., Ambombo, M.E., Mbarga, B.M.A., & Biye, E.H. (2020). Influence of biotopic factors on carbon stock of herbaceous marshes of the city of Yaoundé (Cameroon) and its surroundings. Afrique Science, 16(6): 1–13.

[9] Mouhamadou, T.G., Dame, B., Sabrina, S., Aissatou, N., & Gueye, O. (2023). Impacts of water resource quality on the biodiversity of the aquatic ecosystem of Lake Technopole and on agricultural products in this wetland area of Pikine (Dakar, Senegal). International Journal of Biological and Chemical Sciences, 17(1): 173–191.

[10] Pagès, J., Andrefouet, S., Delesalle, B., & Prasil, V. (2001). Hydrology and trophic state in Takapoto Atoll lagoon: Comparison with other Tuamotu lagoons. Aquatic Living Resources, 14: 183–193.

[11] Adomou, A.C., Mama, A., Missikpode, R., & Sinsin, B. (2009). Mapping and floristic characterization of the swamp forest of Lokoli (Benin). International Journal of Biological and Chemical Sciences, 3(3): 492–503.

[12] Honvou, S.H.S., Aboh, B.A., Sewade, C., Teka, O., Gandonou, B.C., Oumorou, M., & Sinsin, B. (2021). Floristic diversity, structure and distribution of plant communities in transhumance grazing areas in the Lower and Middle Ouémé Valley in Benin. International Journal of Biological and Chemical Sciences, 15(1): 81–96.

[13] Kolka, R.K., Murdiyarso, D., & Kauffman, J.B. (2016). Tropical wetlands, climate, and land-use change: Adaptation and mitigation opportunities. Wetlands Ecology and Management, 24: 107–112.

[14] Priso, R.J., Promesse-ssie, M.Y., Biye, E.H., Idole, O.F.A., Taffouo, V.D., & Din, N. (2017). Influence of industrial wastewater in Douala city on growth, chlorophyll and cadmium level of Vigna unguiculata of economic importance. Ecology and Evolutionary Biology, 2(5): 87–95.

[15] National Participatory Development Program. (2012). Dibombari Municipal Development Plan of the Municipality of Dibombari. Pages 180.

[16] Zapfack, L., Noiha, N.V., Dziedjou, K., Zemagho, P.J., & Fomete, L.N.T. (2013). Deforestation and carbon stocks in the surroundings of Lobéké National Park (Cameroon) in the Congo Basin. Environment and Natural Resources Research, 3(2): 78–86.

[17] Colwell, R.K., Mao, C.X., & Chang, J. (2004). Interpolating, extrapolating, and comparing incidence-based species accumulation curves. Ecology, 85: 2717–2727.

[18] Brown, S., & Pearson, T. (2005). Exploring the carbon sequestration potential in classified forests of the Republic of Guinea. Winrock International, Pages 39.

[19] Reitsma, R.F. (1988). Forest vegetation of Gabon. Wageningen Agricultural University Papers, 88(1): 1–142.

[20] Lal, J.B. (1991). Conservation and sustainable management of forest ecosystems as genetic resources. Congress Forester Mondial, 2: 521–529.

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[21] Oka, N., Ndzai, S.F., & Koubouana, F. (2023). Floristic diversity of degraded forests in the Nyanga Forest Management Unit (FMU), located in Southwest Republic of Congo. European Scientific Journal, 19(27): 281.

[22] Kenne, L.T., Marie, C.S.M., & Bertine, T. (2022). Structure and regeneration of woody stands in Forest Management Unit (FMU) 00-004 in the Littoral-Cameroon. Cameroon Journal of Experimental Biology, 16(1): 27–35. https://doi.org/10.4314/cajeb.v16i1.4.

[23] Dossou, M.E., Lougbégnon, O.T., Houessou, G.L., Teka, S.O., & Tente, A.H.B. (2012). Phytoecological and structural characterization of plant communities in the swamp forest of Agonvè and its associated environments in Southern Benin. Journal of Applied Biosciences, 53: 3821–3833.

[24] Pagadjovongo, A.S., Koffi, M., Konan, E.K., & Kouhounatchoho, A.K. (2025). Structure and carbon stock of different vegetation types in the Borotou-Koro Ecological Reserve in Central-Western Côte d'Ivoire. Biotechnology, Agronomy, Society and Environment, 29(2): 94–105.

[25] Pagadjovongo, A.S., Dramane, S., Adjoua, B.K., & Koffi, A.Y. (2023). Vegetation structure and carbon sequestration potential of the Forest Reserve of the Peleforo Gon Coulibaly University of Korhogo (Northern Côte d'Ivoire). VertigO – The Electronic Journal in Environmental Sciences. https://doi.org/10.4000/vertigo.40569.

[26] Silué, P.A., Koffi, K.A.D., Kouassi, K.E., & Kouakou, A.A.M. (2021). Wooded area of the Lokoli Eco-farm (Sinématiali, Northern Côte d'Ivoire): A case of ecological compensation. International Journal of Advanced Research: 466–473.

[27] Ambara, J., Kadiri, S.B., Mvondo, A.Z., & Kenfack, P.N. (2021). Dynamics of diametral structures and carbon sequestration in Pericopsis elata (Harms) Van Meeuven resulting from various silvicultural methods and treatments. Geo-Eco-Trop, 45(2): 271–282.

[28] Jiagho, E.R., Zapfack, L., & Jumo, K.C.U.A. (2019). Distribution and dynamics of woody flora on the periphery of Waza National Park (Cameroon). VertigO – The Electronic Journal in Environmental Sciences, 19(3): 1–25.