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Ecological Status and Phytoplankton Structure of a Coastal Lagoon in South-Western Benin Prior to Dredging of the Mono-Aheme-Couffo Complex

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Abstract

The lack of recent data on the ecological status and phytoplankton structure of the coastal lagoon of south-western Benin is a major obstacle to assessing the impacts of dredging on the Docloboué-Avlo section. This study characterises that status from physico-chemical parameters and the phytoplankton community, measured in February 2025 (before the start of dredging work) at eight stations (P1 - P8). Water quality was assessed against SEQ-EAU thresholds; phytoplankton structure was analysed by microscopy, diversity indices (Shannon H', Pielou J', Simpson D), the Diatom/Cyanophyte ratio (D/C) and Principal Component Analysis (PCA). The results reveal poor to critical water quality: widespread hypoxia (DO: 0.03 - 3.19 mg/L), high organic loads (BOD_5: 184 - 318 mg/L; COD: 248 - 409 mg/L) and variable salinity (5.66 - 19.33 PSU). The PCA reveals a gradient of mineralisation and oxygenation. The inventory records 46 taxa (4 classes, 24 families), dominated by cyanophytes (71.8%); diversity is low to moderate (H': 1.22 - 4.01 bits) and the D/C ratio indicates critical eutrophication at P8 (D/C = 0.07). This study confirms an advanced state of degradation and justifies rigorous environmental monitoring throughout the dredging works.

Keywords

Coastal Lagoon, Phytoplankton, Dredging, South-Western Benin

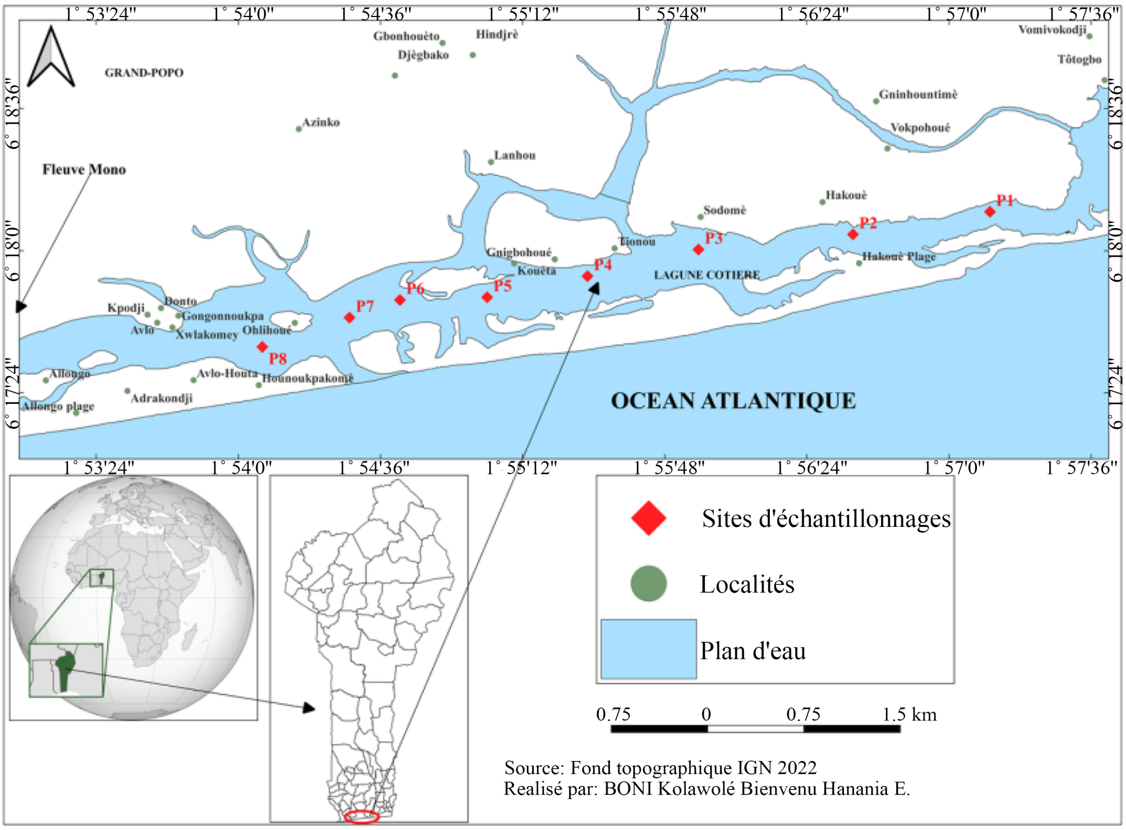
1. Introduction

Lagoon ecosystems are dynamic interfaces between continental and marine environments, characterised by high biological productivity and ecosystem services that are essential to riparian populations (Pérez-Ruzafa et al., 2024: p. 1). The fluvio-lagoonal complex of south-western Benin, listed as Ramsar Site 1017 (Brun et al., 2018: p. 129) of international importance, is subject to strong anthropogenic pressures, organic pollution, nutrient enrichment and siltation, that durably compromise its ecological balance (Chouti et al., 2017: p. 131). The accelerated siltation linked to terrigenous sediment inputs and to activities within the catchment aggravates this picture (Bamisso, 2022: p. 308), promoting hyper-eutrophication, the collapse of oxygenation and the depletion of fishery resources (Viaho et al., 2020: p. 72). The degradation is structured by the interaction between the freshwater inputs of the Mono River, regulated by the Nangbéto dam, and seawater intrusions through the Bouche du Roy, generating a longitudinal salinity gradient (Oyede et al., 2009: p. 75). Phytoplankton, being both the base of trophic networks and a sensitive bioindicator of environmental disturbance, constitutes a privileged tool for assessing the ecological status of tropical lagoons (Cabrita, 2014: p. 163). To counter this degradation, the rehabilitation of Lake Ahémé and its channels, including dredging operations, was initiated in order to restore hydrological connectivity, navigation and water depth. However, such works may temporarily disturb the phytoplankton structure through the resuspension of sediments and the modification of light conditions (Fernandes et al., 2023: p. 1). The present study aims to characterise the physico-chemical status and to analyse the phytoplankton structure in order to establish a baseline prior to the works.

2. Study Area

The study was conducted in the coastal lagoon of south-western Benin, approximately 65 km long and covering an area of 55 km^2.

The studied section, the Docloboué-Avlo dredging zone, covers about 7 km in length and 260 hectares, located between 6˚29' and 6˚30'N and 1˚91' and 1˚94'E (**Figure 1**). Depths range from 0.4 to 1.70 m in the dry season and from 1.10 to 3.40 m in the rainy season. The hydrological regime results from the combined influence of the Mono River (Nangbéto dam) and seawater intrusions through the Bouche du Roy, creating a strong longitudinal gradient of salinity, nutrients and oxygenation.



Source: IGN topographic base map, 2022.

Figure 1. Location of the study area.

3. Materials and Methods

3.1. Sampling Stations

Within the framework of this study, eight measurement stations (P1 to P8) were defined (Table 1).

Table 1. Sampling stations.

Station	Longitude	Latitude
P1	1˚57'10.80"E	6˚18'10.80"N
P2	1˚56'34.80"E	6˚18'03.60"N
P3	1˚55'55.20"E	6˚17'60.00"N
P4	1˚55'30.00"E	6˚17'52.80"N
P5	1˚55'04.80"E	6˚17'49.20"N
P6	1˚54'39.60"E	6˚17'49.20"N
P7	1˚54'28.80"E	6˚17'42.00"N
P8	1˚54'07.20"E	6˚17'34.80"N

3.2. Units

The survey was carried out in February 2025 (09:00 - 12:00, low tide). The parameters measured in situ comprised: transparency (Secchi disk), temperature, pH (WTW 340i), conductivity, salinity, turbidity, TDS, dissolved oxygen (DO) and the O_2 saturation rate (AQUAREAD AP-2000 multiparameter probe). Laboratory analyses covered BOD_5 (OxiTop respirometric method), COD (ISO 15705:2002, closed-tube method) and TSS (filtration and differential weighing). Phytoplankton was sampled using a 20 µm mesh plankton net (30 cm radius opening) by a single 10 m horizontal tow at each station. The tow distance was used to calculate the volume of water filtered, allowing phytoplankton abundance to be expressed as individuals/L. The concentrated sample (250 mL) collected in the cod end was preserved with 5% Lugol's solution, and phytoplankton taxa were identified by microscopic examination using standard taxonomic keys.

3.3. Data Analysis

Water quality was assessed against the thresholds of the SEQ-EAU (Water Quality Assessment System; MEDD & Agences de l'Eau, 2003: p. 1), presented in **Table 2**. Phytoplankton abundance (A, individual/L) was computed as:

$$A = n \times \frac{V_2}{V_1} \quad (1)$$

where n is the number of individuals counted in 1 mL, V_1 the total volume filtered by the net (L), and V_2 the concentration volume (mL). The Shannon-Weaver index:

$$H' = -\sum_{i=1}^{n} \left[\left(\frac{ni}{N} \right) \log 2 \left(\frac{ni}{N} \right) \right] \quad (2)$$

Pielou's evenness:

$$J = \frac{H}{\log_2 S} \quad (3)$$

and Simpson's dominance index:

$$D' = \sum_{i=1}^{n} \left[\left(\frac{ni}{N} \right) \right]^2 \quad (4)$$

where S is the number of species, were calculated per station. The frequency of occurrence F:

$$F = 100 \times \frac{F_i}{F_t} \quad (5)$$

(where F_i is the number of samples containing species i and F_t the total number of samples taken) was calculated for each taxon. Following the scale proposed by Charbonnel et al. (1995), four species groups were distinguished according to the value of F: (75% - 100%) permanent species; (50% - 74.9%) frequent species; (25% - 49.9%) occasional species; (0% - 24.9%) rare species. The D/C (diatom/cyanobacteria) ratio served as a trophic indicator, with values > 1 indicating diatom dominance, whereas values < 1 suggest cyanobacterial dominance and conditions potentially associated with eutrophication (James & Zhang, 2008). PCA was performed to explore the relationships between physico-chemical variables and the abundance of the main taxa.

Table 2. SEQ-EAU water-quality assessment grid (MEDD & Agences de l'Eau, 2003: p. 1).

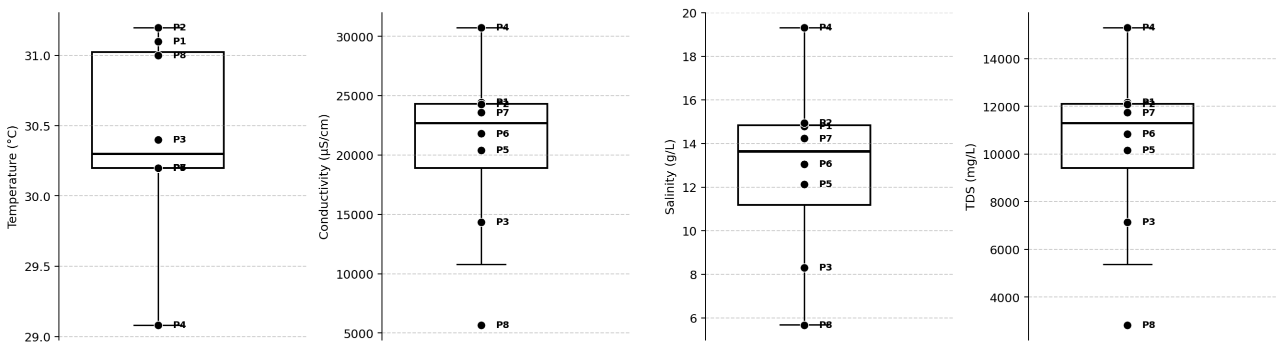
Appreciation	Very good	Good	Fair	Poor	Critical
Dissolved oxygen (mg/l O_2)	8	6	4	3	
Oxygen saturation (%)	90	70	50	30	
BOD5 (mg/l O_2)	3	6	10	25	
COD (mg/l O_2)	20	30	40	80	
SS (mg/l)	25	50	100	150	
Turbidity (NTU)	15	35	70	100	
SECCHI transparency (cm)	200	100	50	25	
pH	8	8.5	9	9.5	

4. Results

4.1. Physico-Chemical Characterisation of the Water

4.1.1. Temperature, Salinity and TDS

Figure 2 illustrates the distribution of the four mineralisation parameters along the spatial gradient.



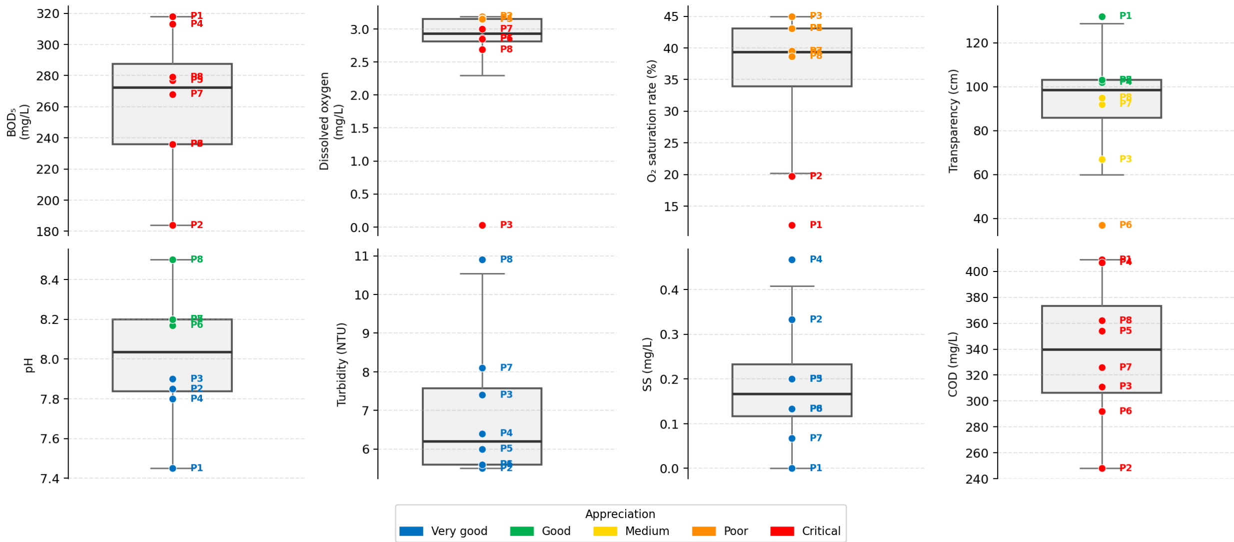
Source: Field data 2025.

Figure 2. Distribution of temperature, conductivity, salinity and TDS.

Temperature was relatively homogeneous in space, averaging 30.42 ± 0.69˚C. Values ranged from a minimum of 29.08˚C at P4 to a maximum of 31.2˚C at P2, reflecting stable thermal conditions. Conductivity averaged 20,661 ± 7598 µS/cm, with a minimum of 5660 µS/cm at P8 and a maximum of 30,760 µS/cm at P4, following a decreasing gradient P4 > P1/P2 > P7/P6 > P5 > P3 > P8. Salinity followed the same trend, averaging 12.80 ± 4.22 PSU, with a minimum of 5.66 PSU at P8 and a maximum of 19.33 PSU at P4, indicating a marked marine influence at the downstream stations (P1 - P4) and a predominance of fresh water at the upstream stations (P7 - P8). TDS confirmed this trend, averaging 10,285 ± 3781 mg/L, with a minimum of 2821 mg/L at P8 and a maximum of 15,311 mg/L at P4.

4.1.2. SEQ-EAU Quality Parameters: pH, Dissolved Oxygen, Organic Load, Turbidity, TSS and Transparency

Figure 3 presents the parameters assessed against the SEQ-EAU grid (pH, DO, saturation, transparency, turbidity, TSS, COD, BOD_5).



Source: Field data 2025.

Figure 3. Distribution of physico-chemical parameters with SEQ-EAU rating.

pH averaged 8.01 ± 0.32, with a minimum of 7.45 at P1 and a maximum of 8.50 at P8; values remained within the "very good to good" quality class according to SEQ-EAU. In contrast, the oxygenation status was of concern: DO averaged 2.62 ± 1.06 mg/L, with a minimum of 0.03 mg/L recorded at P3 and a maximum of 3.19 mg/L at P2. All values fell within the "critical" zone, except P3, P5, P6, and P8, which nevertheless remained very close to the critical threshold. The saturation rate followed the same trend (mean: 35.04 ± 12.22%; min: 12% at P1; max: 45% at P3), highlighting a generalised hypoxic stress liable to threaten the survival of aquatic fauna.

Transparency averaged 91.38 ± 33.41 cm (min: 37 cm at P6; max: 132 cm at P1), corresponding overall to a "fair" quality according to SEQ-EAU; the Secchi disk reached the bottom at stations P2, P3, P6 and P7. Turbidity averaged 6.94 ± 1.87 NTU (min: 5.50 at P2; max: 10.90 at P8) and TSS averaged 0.19 ± 0.15 mg/L (min: 0 at P1; max: 0.467 at P4), both of which were rated "very good".

COD averaged 338.63 ± 55.70 mg/L (min: 248 mg/L at P2; max: 409 mg/L at P1) and BOD_5 averaged 263.88 ± 44.24 mg/L (min: 184 mg/L at P2; max: 318 mg/L at P1), both in the "critical" zone, with stations P1 (318 mg/L) and P4 (313 mg/L) being the most heavily impacted.

4.2. Taxonomic Composition, Species Richness and Occurrence

Table 3 presents the taxonomic composition, species richness, and occurrence of phytoplankton taxa.

Table 3. Taxonomic composition, species richness and occurrence of phytoplankton taxa.

Classes	Family	Taxons	Stations								N (%)	Occurrence
			P1	P2	P3	P4	P5	P6	P7	P8		
Chlorophyceae	Chlorellaceae	*Actinastrum hantzschii*	−	−	−	−	−	−	−	+	12.50	RS
	Scenedesmaceae	*Coelastrum* sp.	−	−	−	−	−	−	−	+	12.50	RS
		Scenedesmus acuminatus	−	−	−	−	−	−	−	+	12.50	RS
		Scenedesmus quadricauda	−	−	−	−	−	−	−	+	12.50	RS
	Hydrodictyaceae	*Pediastrum boryanum*	−	−	−	−	−	−	−	+	12.50	RS
		Pediastrum duplex	−	−	−	−	−	−	−	+	12.50	RS
Cyanophyceae	Nostocaceae	*Anabaena* sp.	−	−	−	−	+	−	−	+	25.00	OS
		Anabaena spiroides	−	−	−	+	+	+	+	+	62.50	FS
		Nostoc sp.	−	−	−	+	−	−	−	+	25.00	OS
	Microcystaceae	*Microcystis* sp.	−	−	−	−	−	−	−	+	12.50	RS
	Oscillatoriaceae	*Lyngbya* sp.	−	−	+	−	−	+	+	+	50.00	FS
		Oscillatoria articulata	−	−	−	+	+	+	−	+	50.00	FS
		Oscillatoria irrigua	−	−	−	−	−	−	−	+	12.50	RS
		Oscillatoria princeps	−	−	+	+	+	+	−	+	62.50	FS
		Oscillatoria insularis	−	−	−	+	+	+	−	−	37.50	OS
Diatomophyceae	Bacillariaceae	*Bacillaria paradoxa*	−	−	−	−	+	+	−	−	25.00	OS
		Nitzschia sigmoidae	−	−	−	−	−	+	−	−	12.50	RS
	Corethraceae	*Corethron* sp.	−	−	+	+	+	−	−	−	37.50	OS
	Coscinodiscaceae	*Actinoptychus senarius*	−	−	−	−	−	+	−	−	12.50	RS
		Coscinodiscus eccentricus	+	+	+	+	+	+	+	+	100.00	PS
		Coscinodiscus nodulifer	+	+	+	+	+	+	+	−	87.50	PS
		Coscinodiscus wailesii	−	+	−	−	−	−	−	−	12.50	RS
	Chaetocerotaceae	*Chaetoceros treves*	−	+	+	+	−	+	+	+	75.00	PS
	Thalassionemataceae	*Thalassionema frauenfeldii*	−	−	+	+	+	+	−	+	62.50	FS
	Fragilariaceae	*Fragilaria Ulna*	+	−	−	−	−	−	−	−	12.50	RS
	Hemiaulaceae	*Cerataulina bergonii*	−	−	+	+	+	+	−	+	62.50	FS
		Guinardia flaccida	−	−	+	+	+	+	−	+	62.50	FS
		Guinardia sp.	−	−	+	−	−	−	−	−	12.50	RS
		Hemiaulus indicus	−	−	+	−	−	−	−	−	12.50	RS
		Hemiaulus membranaceus	−	−	+	−	−	−	−	−	12.50	RS
	Lithodesmiaceae	*Ditylum* sp.	−	−	−	+	−	+	−	+	37.50	OS
	Leptocylindraceae	*Leptocylindrus danaicus*	+	−	+	+	+	+	+	+	87.50	PS
	Melosiraceae	*Melosira* sp.	−	−	−	+	−	+	+	+	50.00	FS
	Rhizosoleniaceae	*Rhizosolenia alata*	−	−	−	+	+	−	−	+	37.50	OS
		Rhizosolenia crassa	−	−	−	−	−	−	−	+	12.50	RS

Continued

	Pleurosigmataceae	*Gyrosigma balticum*	+	+	+	−	−	−	−	+	50.00	FS
		Gyrosigma sp.	−	−	−	−	−	−	+	−	12.50	RS
		Pleurosigma direct	−	−	+	+	+	+	−	+	62.50	FS
		Pleurosigma normanii	−	−	+	+	+	+	+	+	75.00	PS
	Naviculaceae	*Navicula lyra*	−	−	−	+	+	+	−	−	37.50	OS
	Eunotiaceae	*Eunotia* sp.	−	−	−	+	+	+	+	−	50.00	FS
	Stephanodiscaceae	*Cyclotella meneghiniana*	−	−	+	−	+	−	+	+	50.00	FS
	Tabellariaceae	*Asterionella* sp.	−	−	+	+	+	−	−	+	50.00	FS
Dinophyceae	Ceratiaceae	*Ceratium breve*	−	+	−	−	−	−	−	−	12.50	RS
		Ceratium fusus	−	−	+	+	−	−	−	−	25.00	OS
	Protoperidinaceae	*Protoperidinium breve*	+	−	+	+	+	−	−	−	50.00	FS
		Species richness	6	6	20	23	21	21	11	29	Total: 46 Species	

Source: Field data 2025. (+) = presence; (−) = absence; N (%) = frequency of presence; PS: permanent species; FS: frequent species; OS: occasional species; RS: rare species.

The phytoplankton inventory (**Table 3**) records 46 species distributed across 4 classes and 24 families. The Diatomophyceae (diatoms) constituted the most diverse class, with 28 species belonging to 16 families (60.9% of total richness). The Cyanophyceae comprised 9 species in 3 families; the Chlorophyceae 6 species in 3 families; and the Dinophyceae 3 species in 2 families. Species richness per station ranged from 6 species at P1 and P2 to 29 species at P8.

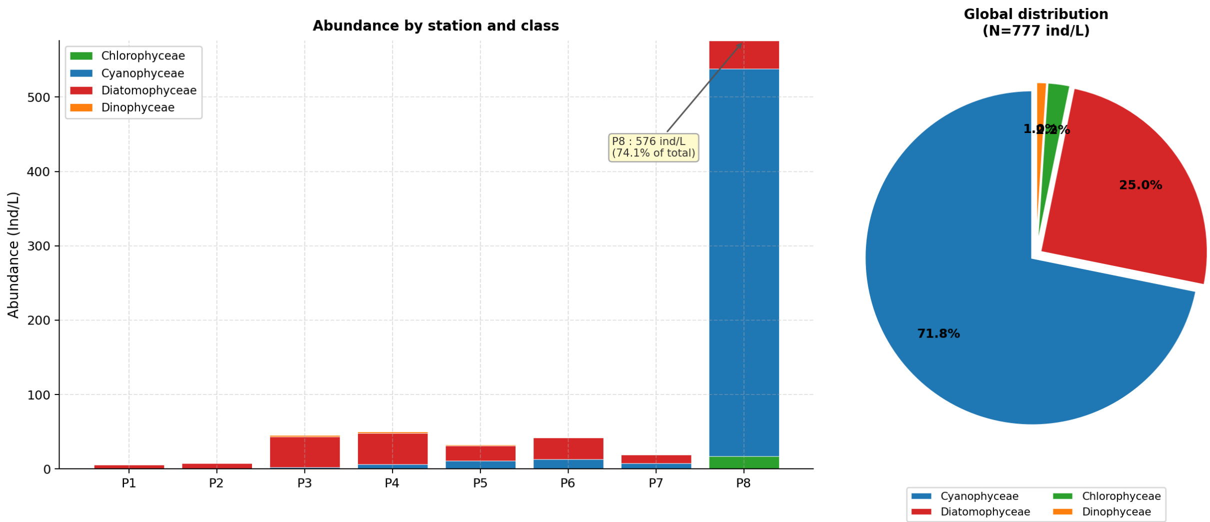
The occurrence analysis distinguished four categories (**Table 3**). Rare species totalled 17: 6 Chlorophyceae, all confined to P8; 2 Cyanophyceae; and 9 Diatomophyceae. Occasional species numbered 8: 2 Cyanophyceae, 5 Diatomophyceae and 1 Dinophyceae. Frequent species formed the richest group, with 16 species: 4 Cyanophyceae, 11 Diatomophyceae and 1 Dinophyceae. Permanent species numbered 5, all of them diatoms.

4.3. Phytoplankton Abundance

Figure 4 illustrates the variations and distribution of phytoplankton abundance by class and station.

Analysis of the figure reveals a spatial heterogeneity of abundance. Total abundance amounted to 777 individuals/L, but this value masks an extreme concentration at station P8 which, with 576 individuals/L, accounted on its own for 74.1% of total abundance. At the opposite extreme, P1 (6 individuals/L) and P2 (8 individuals/L) displayed the lowest densities. The intermediate stations P3 - P7 showed moderate and relatively homogeneous abundances (19 to 50 individuals/L).

The overall distribution reveals a strongly unbalanced community structure: Cyanophyceae dominated with 558 individuals/L (71.8% of total abundance), driven essentially by the family Oscillatoriaceae and more particularly by Lyngbya sp. (481 individuals/L at P8 alone, i.e. 63.45% of total abundance). The Diatomophyceae constituted the second group, with 194 individuals/L (25.0%), concentrated mainly at stations P3 - P6. The Chlorophyceae (17 individuals/L, 2.2%) were present exclusively at P8, probably favoured by the low salinity and the nutrient richness of that site. The Dinophyceae, with only 8 individuals/L (1%), remained marginal and limited.

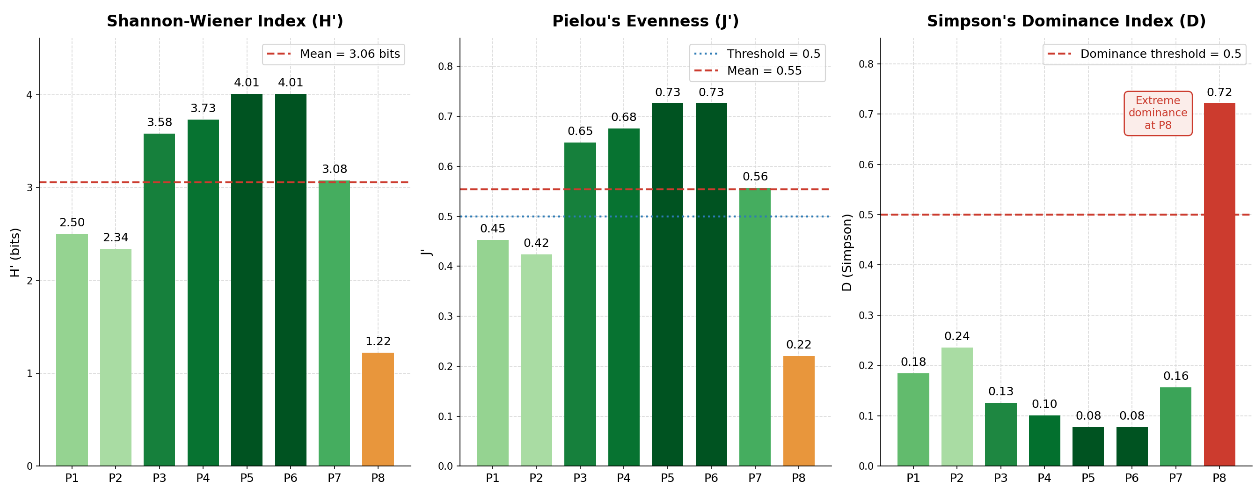


Source: Field data 2025.

Figure 4. Distribution of abundance by class and station.

4.4. Diversity Indices

Figure 5 presents the three ecological indices (Shannon H', Pielou J', Simpson D) calculated for each station to assess diversity.



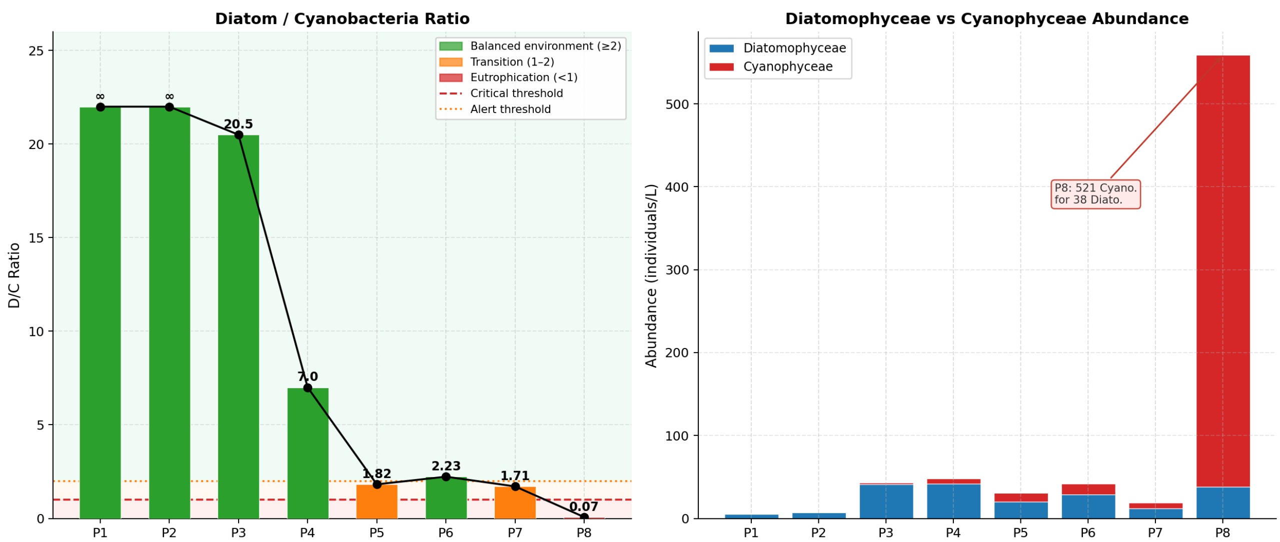
Source: Field data 2025.

Figure 5. Shannon (H'), Pielou (J') and Simpson (D) indices by station.

Phytoplankton diversity decreased progressively from P1 to P8, revealing an increasing eutrophication gradient that culminated in extreme cyanophyte dominance and a severe ecological imbalance at the global scale. The Shannon-Weaver index (H') ranged from 1.22 bits at P8 to 4.01 bits at stations P5 and P6. Pielou's evenness (J') varied from 0.22 (P8) to 0.73 (P5, P6). These values show that the downstream stations P1–P2 already exhibited a degree of imbalance, amplified to an extreme at P8 (J' = 0.22). Only stations P5 and P6 approached a relative equilibrium, benefiting from a functional community structure. Simpson's dominance index (D) conveyed the same reality inversely: it rose from 0.25 (P2) to 0.80 (P8), indicating that 80% of the individuals at P8 belonged to a handful of dominant species.

4.5. Diatom/Cyanophyte Ratio

Figure 6 presents the D/C ratio and the compared abundances by station.



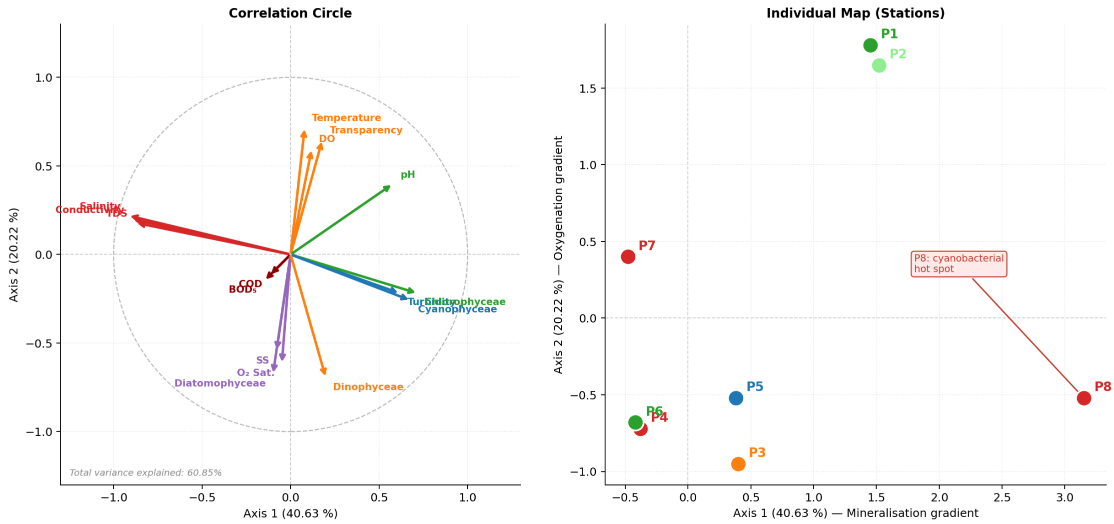
Source: Field data 2025.

Figure 6. D/C ratio by station (left) and compared abundances (right).

The D/C (diatom/cyanobacteria) ratio indicates a progressive shift from diatom dominance at stations P1 and P2 (D/C = ∞) to cyanobacterial dominance from P5 onwards, reaching a minimum value of 0.07 at P8. This pattern suggests conditions potentially associated with eutrophication, although this inference is based solely on phytoplankton community composition, as nutrient concentrations and chlorophyll *a* were not measured. The observed trend is supported by the absolute abundances, where station P8 stands out with 521 individuals/L of Cyanophyceae against only 38 individuals/L of diatoms.

4.6. Principal Component Analysis (PCA)

Figure 7 presents the results of the PCA performed on the full set of physicochemical and biological variables of the eight stations.



Source: Field data 2025.

Figure 7. Principal component analysis (PCA).

The PCA explains 60.85% of the total variance and reveals two environmental gradients structuring the distribution of the stations. Axis 1 (40.63%) opposes a mineralisation pole (conductivity, salinity and TDS) associated with stations P1 and P2 to an algal-proliferation pole grouping pH, turbidity, Cyanophyceae and Chlorophyceae, confirming that salinity is the main abiotic factor controlling the structure of the phytoplankton assemblage. Axis 2 (20.22%) reflects a gradient of oxygenation and water clarity, distinguishing the life-favourable conditions (temperature, transparency, DO) of stations P1 and P2 from the more turbid conditions associated with Diatomophyceae, Dinophyceae and TSS that characterise stations P3 and P4. The proximity of the organic-load variables (BOD_5, COD) to the origin indicates a homogeneously high organic pollution across the whole section. In the individuals' plane, P8 isolates itself radically at the far right of Axis 1 as a major cyanobacterial hotspot, while P1 and P2 occupy the opposite pole and P3 and P6 form an intermediate, diatom-structured group, confirming the existence of a continuous and progressive ecological gradient along the lagoon section.

5. Discussion

The physico-chemical results reveal a contrasting quality gradient between stations. These findings are based on a single baseline survey conducted the dry season (February 2025) and therefore represent the environmental conditions prevailing at the time of sampling. The pH (7.45 - 8.50), close to neutral to basic, is comparable to values reported by Chouti et al. (2017: p. 137) for the same lagoon. The temperature, homogeneous around 30˚C, confirms thermal conditions favorable to phytoplankton, consistent with observations by Viaho et al. (2020: p. 78). Conductivity and TDS, however, were elevated at P1, P2, and P4, reflecting a high dissolved ion load linked to marine intrusion and anthropogenic activities, possibly resulting from evaporation concentrating salts (Wetzel, 2001: p. 738). Salinity follows the same trend, reflecting marine intrusion through the Bouche du Roy modulated by the Mono River regime (Amoussou, 2010: p. 243), a factor that Sun et al. (2023: p. 1) identify as a determinant of species richness in fluvio-estuarine environments, a finding supported by the PCA in the present study.

BOD_5 and COD indicate severe organic pollution potentially of domestic origin (Smith et al., 1999: p. 182), with waste and fecal matter deposits along the banks constituting a major cause identified as a priority issue in Lake Ahémé and its channels (Bamisso, 2022: p. 311). This organic overload induces chronic hypoxia (DO as low as 0.03 mg/L; saturation 35.04%), favoring tolerant species such as certain cyanobacteria (Akodogbo et al., 2024: p. 1). Reduced transparency, despite low SS and turbidity classified as "very good" under the SEQ-EAU system (MEDD & Agences de l'Eau, 2003: p. 1), reflects turbidity of biological origin (Bocodaho et al., 2020: p. 2621). Although water transparency ranged from good to moderate, the very low suspended solids concentrations contrast with the high BOD_5 and COD values and the occurrence of severe hypoxia. This may indicate that oxygen depletion was primarily associated with organic pollution rather than with high particulate loads.

Biologically, the richness of 46 taxa, modest compared to the 141 recorded in Lake Nokoué (Agblonon et al., 2022: p. 18196), remains consistent with the constraining environmental conditions of the corridor. The strong representation of Diatomophyceae (60.9%) confirms the combined dominance of Diatomophyta and Cyanophyta as an indicator of eutrophication in tropical lagoons (Hoang et al., 2024: p. 3). Recognized as reliable indicators of trophic status along a defined gradient (Salmaso et al., 2006: p. 167), diatoms here, through their 5 permanent species, constitute a stable core of resilience and post-dredging recolonization (Kelly & Whitton, 1995: p. 433).

Regarding abundance, Cyanophyceae accounted for 71.8% of the total phytoplankton abundance, indicating a marked numerical dominance over the other phytoplankton groups. Such dominance is commonly associated with warm, nutrient-enriched aquatic environments, where cyanobacteria gain a competitive advantage at temperatures above 23˚C (Winder & Sommer, 2012: p. 7). The high abundance of the genus *Oscillatoria* is consistent with elevated organic matter concentrations (Adjahouinou et al., 2012: p. 1946), while the occurrence of *Microcystis* sp. at P8 deserves attention because some species of this genus are capable of producing microcystins. Although P8 exhibited a relatively high species richness (29 taxa), its lower Shannon diversity index indicates that the community was numerically dominated by a limited number of cyanobacterial taxa, resulting in an uneven distribution of individuals among species (Poniewozik & Lenard, 2022: p. 3832). Finally, the D/C ratio below 1 at P8 indicates cyanobacterial dominance, a community structure commonly associated with eutrophic conditions (Paerl et al., 2007: p. S88), although this interpretation is based solely on phytoplankton community composition, as nutrient concentrations and chlorophyll *a* were not measured during the baseline survey. If not properly managed, dredging may further promote cyanobacterial proliferation through sediment resuspension and nutrient release (Pérez-Ruzafa et al., 2024: p. 1).

As this assessment is based on a single baseline survey conducted before the start of the dredging works, the results should be interpreted as a snapshot of the lagoon conditions at the time of sampling rather than as representative of its overall ecological status. Monitoring across different seasons and throughout the pre-dredging, dredging and post-dredging phases will be necessary to confirm these patterns and assess their temporal evolution.

6. Conclusion

This study provides a detailed baseline of water quality and phytoplankton community structure in the Mono-Ahémé-Couffo complex prior to dredging, based on a single survey conducted in February 2026. The results confirm a degraded ecological state and chronic hypoxia. Salinity and organic load emerge as the main factors controlling phytoplankton structure. Dredging, if carried out without precautions, risks amplifying these imbalances by promoting sediment resuspension and nutrient release. It is therefore imperative to implement a continuous ecological monitoring program during and after the works, including physico-chemical, phytoplanktonic, and sedimentological parameters.

Conflicts of Interest

The authors declare no conflicts of interest regarding the publication of this paper.

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