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First analysis of the physicochemical composition of the waters of Lake Kankossa, Mauritania

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Abstract: In many countries, population growth, rapid urbanization, industrialization, and the irrational use of fertilizers and pesticides are severely disrupting natural environments, leading to an imbalance in ecosystems and generating physico-chemical and biological pollutants in receiving aquatic environments, and changing their uses, such as drinking water collection, livestock watering, and bathing. The objective of our study is to analyze the spatial and temporal variations in the physicochemical properties of Lake Kankossa waters. The study is based on four sampling campaigns conducted over a two-year period, between 2017 and 2021, covering seven representative sampling points: Exploitation, ElVak, ElHakem, Essak, Harth Ewlad Emin, ElHachya, and ElBir. The parameters analyzed are: pH, temperature, turbidity, suspended solids, conductivity, major ions, calcium, magnesium, sodium, potassium, nitrate, nitrite, sulfate, and chloride. Recorded temperatures range from 24 to 25.1 °C in March and October, and from 32 to 38.7°C in September and April. The pH is slightly neutral to very alkaline, varying between 7.28 and 10.93, sometimes reaching 11. Recorded conductivity values fluctuate between 158 and 460 μS/cm during humid periods and decrease to between 210 and 377 μS/cm during dry periods. Average turbidity and suspended solids (SS) levels peak during winter (134–148 mg/L and 317.5 NTU).

Keywords: *Kankossa, Lake, Mauritania, Physical chemistry, Pollution, River, Waters.*

1. Introduction

In Mauritania, surface runoff depends on precipitation and exhibits high spatial variability [1, 2]. In general, Mauritania's water resources are limited and subject to extreme cyclical variations [3]. Similarly, the water quality situation is far from satisfactory [4].

In many countries, population growth accompanied by rapid urbanization is causing significant disruption to natural environments [5]. Industrialization, the irrational use of fertilizers and pesticides, and a lack of public awareness of environmental protection all lead to an imbalance in the ecosystem and generate pollutants that can affect the physicochemical and biological quality of receiving aquatic environments [6] as well as alter their uses, such as water collection and swimming [7].

Lake Kankossa has experienced several dry spells in recent years (1987, 1990, 2016, 2017) during its low water period, due to siltation and low rainfall in the Kankossa watershed. The lake is fed by several other ponds and/or river branches in the watershed, such as Lake Karokoro, Lake Lahraj, Lake Loubkherée, and Lake Ajar.

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Our current study in the Kankossa region aims to explore the hydrobiology of the lake's waters. The study is based on monitoring indicators of the physicochemical quality of the water and determining seasonal fluctuations in these parameters between the low water period and the flood period.

2. Environment, Materials, and Methods

2.1. Study Site

Lake Kankossa is located in the middle of the Kankossa Moughataa, west of the Assaba Province. The lake is approximately 25 km long, depending on the season and 5 km wide at its widest point, between latitudes 15°51'N and 16°02'N and longitudes 11°28'W and 11°35'W. The southern part of this area already merges with Guidimagha, to which the village of Ehl Matalla (15°52'36"N, 11°34'28"W) belonged before the last administrative redistribution of the area (Figure 1; Table 1).

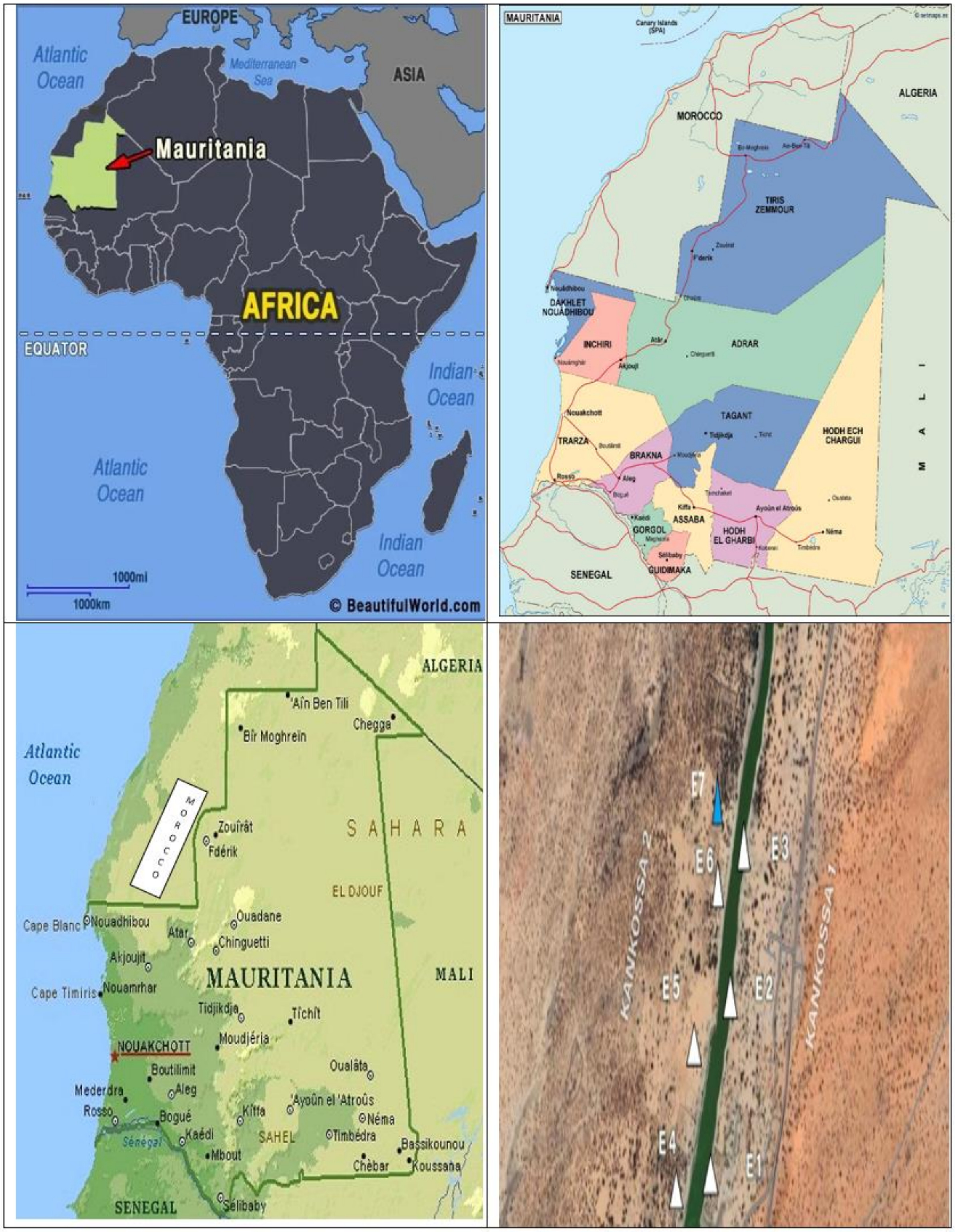

Figure 1.
Geographical delimitation of Mauritania and Lake Kankossa.

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Table 1.
GPS coordinates of the sampling points and the nature of the sample.

Nature of the sample				GPS coordinates
Waters		**Sediments**		
01	E1-KAN	01	S1-KAN	N 15°56. 254 W 11°31. 686
02	E2-KAN	02	S2-KAN	N 15°56. 293' W 11°31. 360'
03	E3-KAN	03	S3-KAN	N 15°56. 321' W 11°31. 247'
04	E4-KAN	04	S4-KAN	N 15°56. 434' W 11°31. 184'
05	E5-KAN	05	S5-KAN	N 15°56. 450' W 11°31. 214'
06	E6-KAN	06	S6-KAN	N 15°56. 392' W 11°31. 281'
07	E7-KAN			N 15°56. 317' W 11°31. 709'

2.2. Study Methods

2.2.1. Water Sampling

Seven stations, E1 to E7, distributed along Lake Kankossa (**Figure 1; Table 1**), were selected to ensure accessibility and to reflect the actual characteristics of the lake's surface waters in the study area. The samples were taken from seven representative stations: Exploitation, ElVak, ElHakem, Essak, Harth Ewlad Emin, ElHachya, and ElBir.

2.2.2. Water Sampling and Analysis

Along Lake Kankossa and throughout the study region, water samples were collected during both wet and dry periods (September, October, March, and April). The wet period includes intense rainfall and severe flooding (Figures 2 to 6).

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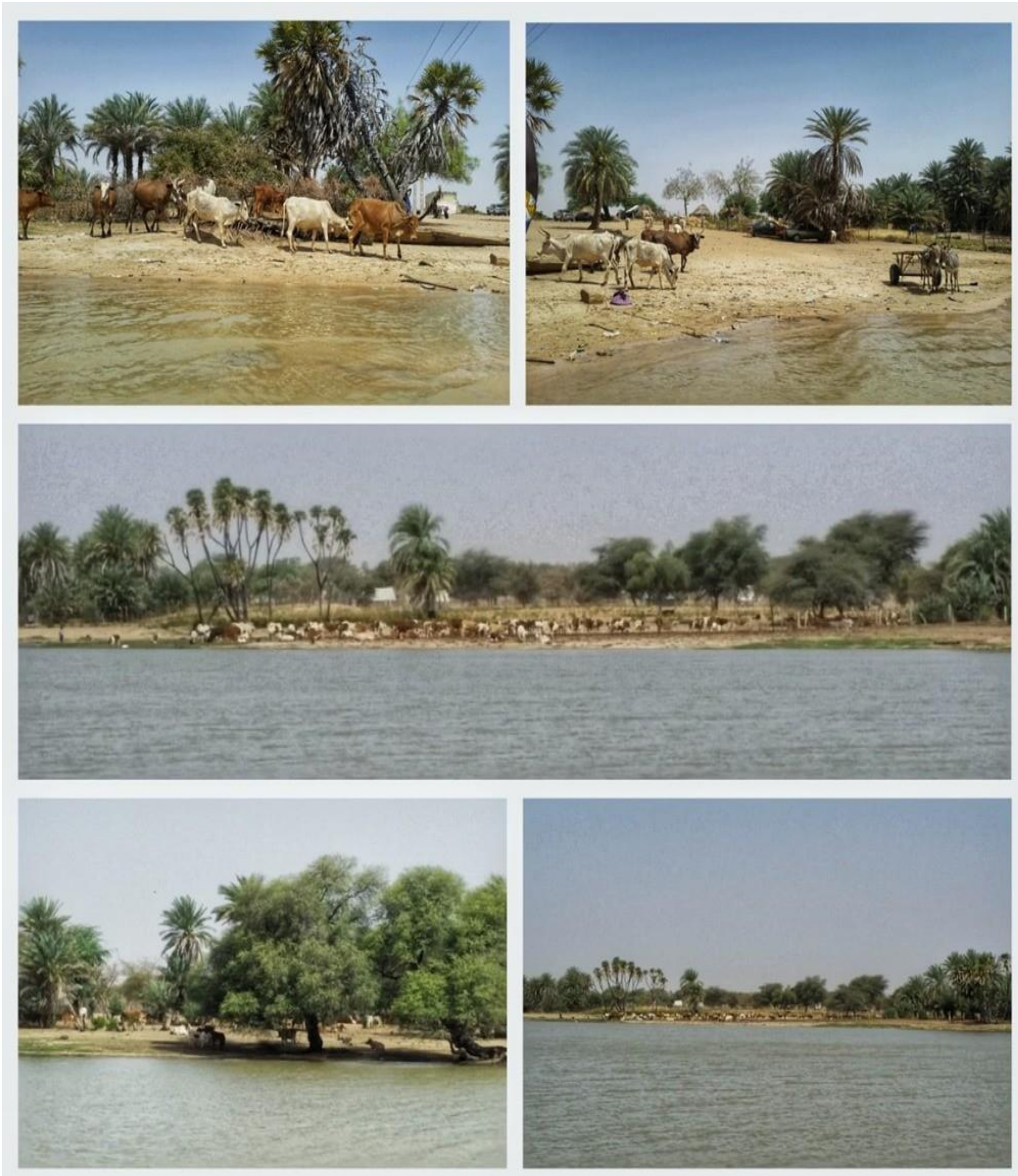

Figure 2.
Illustration of the landscapes of Lake Kankossa.

At each sampling point, the samples were stored in plastic bottles, which had been previously rinsed with water from the station. The bottles were then transported to the laboratory in a cooler maintained at a temperature of 4°C.

Figure 3.
Water samples were taken from Lake Kankossa.

The temperature is measured "in situ" using a mercury thermometer graduated to 1/10 from 0 to 50°C. The temperature, the hydrogen potential (pH), and the electrical conductivity (EC) are determined in the field using a CONSORT-Model 835 multi-parameter analyzer.

Suspended solids (SS) are determined by filtration of a volume of water through a 0.45 µm cellulose filter according to Rodier [8]. Calcium and magnesium are determined by complexometry with EDTA in the presence of eriochrome black T. Chlorides are determined by volumetric analysis in an acid medium (HNO_3) using a mercuric nitrate solution in the presence of a pH indicator.

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Figure 4.
On-site analyses in the field "in situ".

Nitrates and nitrites were analyzed colorimetrically using a Beijing 722 S UV-Visible spectrophotometer. Nitrates and nitrites were determined by distillation in the presence of a catalyst, magnesium oxide, and Devarda's alloy, respectively. NO_2^- and NO_3^- were collected in a boric acid solution and finally determined using H_2SO_4.

Sulfates ($SO4^{2-}$) were determined colorimetrically by precipitation of sulfate ions in the presence of barium chloride in a hydrochloric medium in the form of barium sulfate. Sodium (Na^+) and potassium (K^+) were examined by flame spectrophotometry.

Turbidity is an organoleptic parameter and an expression of the optical property of water to absorb or scatter light. It is due to the more or less cloudy condition of the water, caused by the presence of fine

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suspended matter such as silt, clay, microorganisms, etc. Turbidity is measured by nephelometry and is expressed in NTU (Nephelometric Turbidity Units). The maximum permissible value (MAV) is approximately 5 NTU. The maximum recommended value (MRV) is 1 NTU. It is preferable for turbidity to be less than 1 NTU to ensure effective disinfection.

Figure 5.
UV/Visible photometric chemical analyses.

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Figure 6.
Laboratory analyses of waters.

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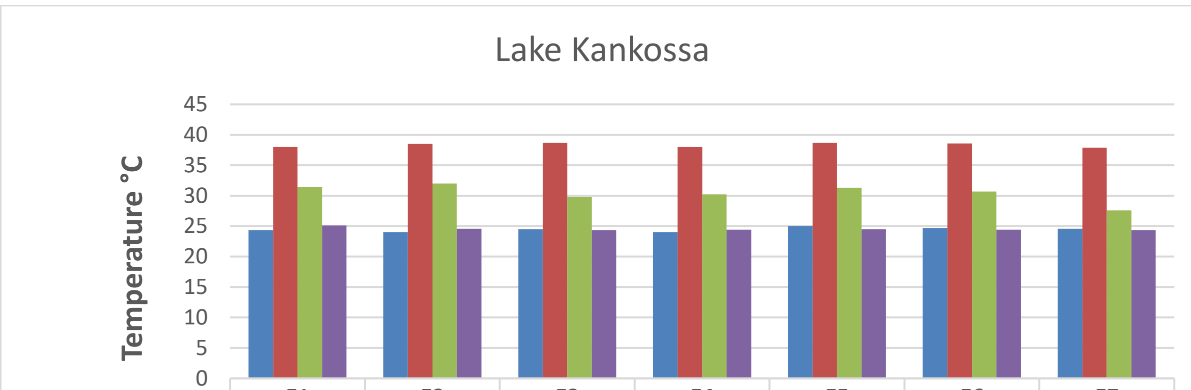
The nephelometry method is based on comparing the intensity of light diffracted (Tyndall effect) by the sample with that of a reference standard under the same wavelength conditions and angle between the incident and diffracted beam. The intensity of the diffracted light is valid provided that the suspended particles are not absorbent.

3. Results and Discussion

Samples were taken from seven representative points on the lake, covering areas used for domestic, agricultural, and pastoral purposes. Sampling campaigns were carried out during four key periods: the cold dry season (March 2017), the hot dry season (April 2021), and the wintering periods (September 2017, October 2021).

3.1. Water Temperature

In the study area of Lake Kankossa, the recorded temperatures (Figure 7) oscillate between 24°C (station E2 and E4) and 25.1°C (station E1) in March and October, and between 32°C (E2) and 38.7°C (E3) in September and April. These variations follow the temperature of the climate of the region. With measured water temperatures, Lake Kankossa therefore belongs to the bad class according to Moroccan standards [6, 9].



	E1	E2	E3	E4	E5	E6	E7
T°C-March	24.3	24	24.5	24	25	24.7	24.6
T°C-September	38	38.5	38.7	38	38.7	38.6	37.9
T°C-April	31.4	32	29.8	30.2	31.3	30.7	27.6
T°C-October	25.1	24.6	24.3	24.4	24.5	24.4	24.3

Figure 7.
Spatio-temporal variations in temperature.

pH is a measure of the acidity of water, which indicates the concentration of hydrogen ions ($H+$). The pH scale ranges from 0 (very acidic) to 14 (very alkaline), with a median value of 7 representing a neutral solution at 25°C.

The pH of water measures its acidity or alkalinity and is crucial for the proper functioning of aquatic organisms. A pH that is too low (acidic) or too high (alkaline) can disrupt aquatic flora and fauna and affect human activities, including water consumption.

The observed values (Figure 8) reveal that the pH is very basic to slightly neutral. The pH varies between 7.28 (in E1) and 10.93 (in E3), and 11 (in E2). This is probably due to the rocks and soils surrounding the lake.

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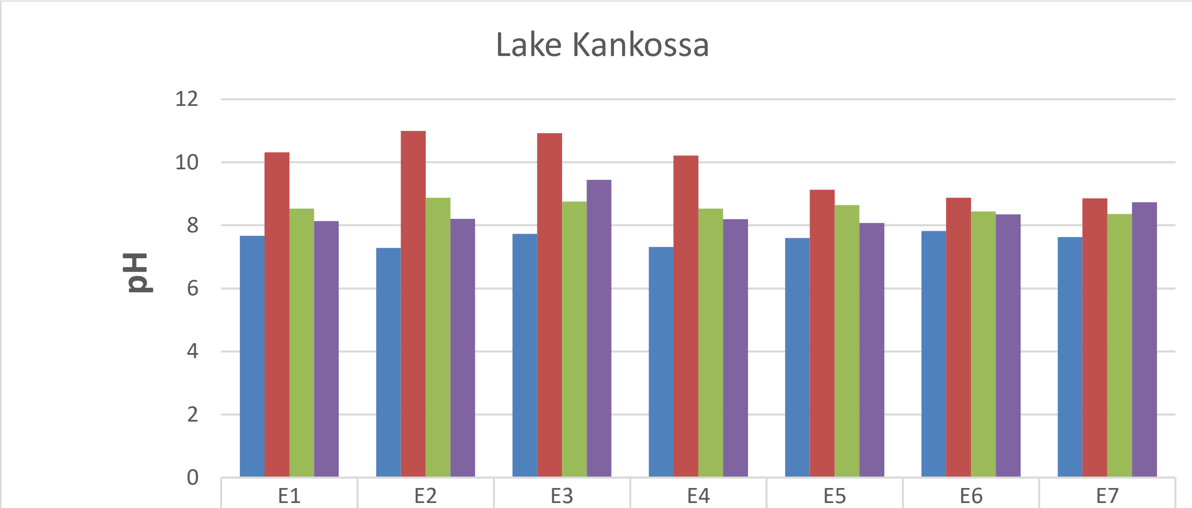

	E1	E2	E3	E4	E5	E6	E7
pH-march	7.67	7.28	7.73	7.32	7.6	7.82	7.63
pH-september	10.32	11	10.93	10.22	9.13	8.88	8.86
pH-april	8.53	8.88	8.76	8.53	8.64	8.44	8.36
pH-october	8.14	8.21	9.45	8.2	8.08	8.35	8.74

Figure 8.
Spatio-temporal variations in the pH of the waters of Lake Kankossa.

3.2. Electrical Conductivity

Measuring conductivity provides a good assessment of the degree of mineralization of water, where each ion acts through its concentration and specific conductivity. The average recorded conductivity values (Figure 9) show that they fluctuate between 158 µS/cm and 460 µS/cm during wet periods. These low levels are due to dilution by rainfall. During dry periods, electrical conductivity intensities decrease and vary between 210 µS/cm and 377 µS/cm, still not exceeding the Moroccan standard for surface water (2700 µS/cm) [9]. This indicates low mineralization, mainly attributed to rock dissolution.

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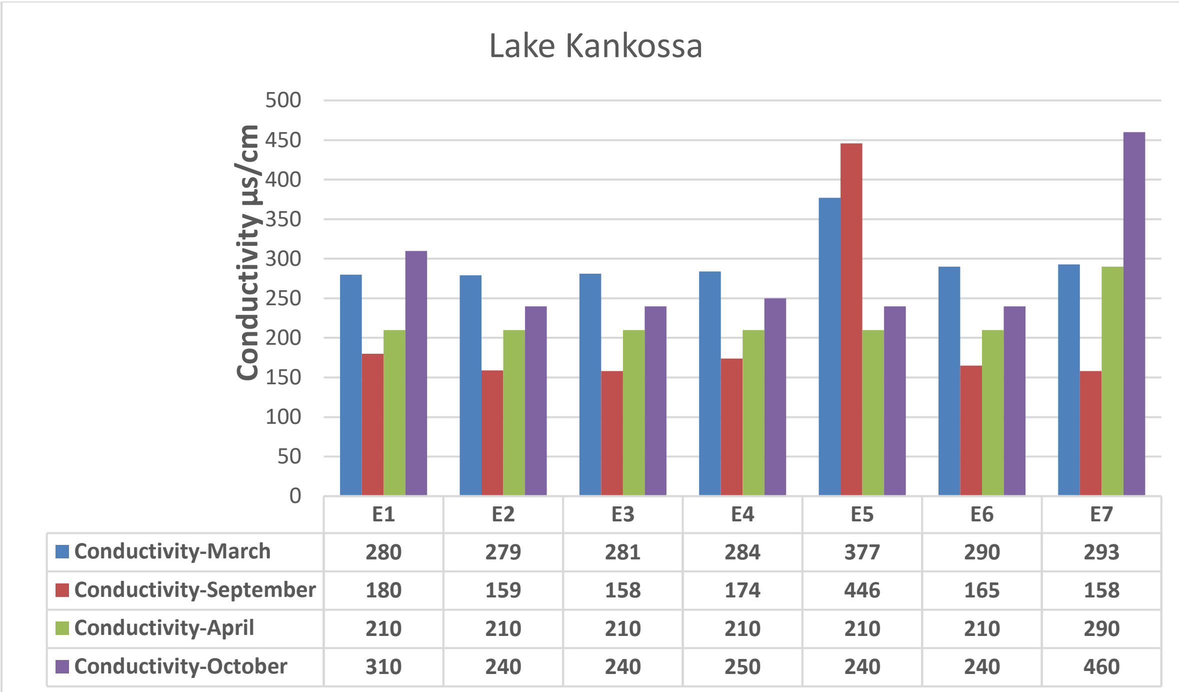


	E1	E2	E3	E4	E5	E6	E7
Conductivity-March	280	279	281	284	377	290	293
Conductivity-September	180	159	158	174	446	165	158
Conductivity-April	210	210	210	210	210	210	290
Conductivity-October	310	240	240	250	240	240	460

Figure 9.
Spatio-temporal variations of Electrical Conductivity.

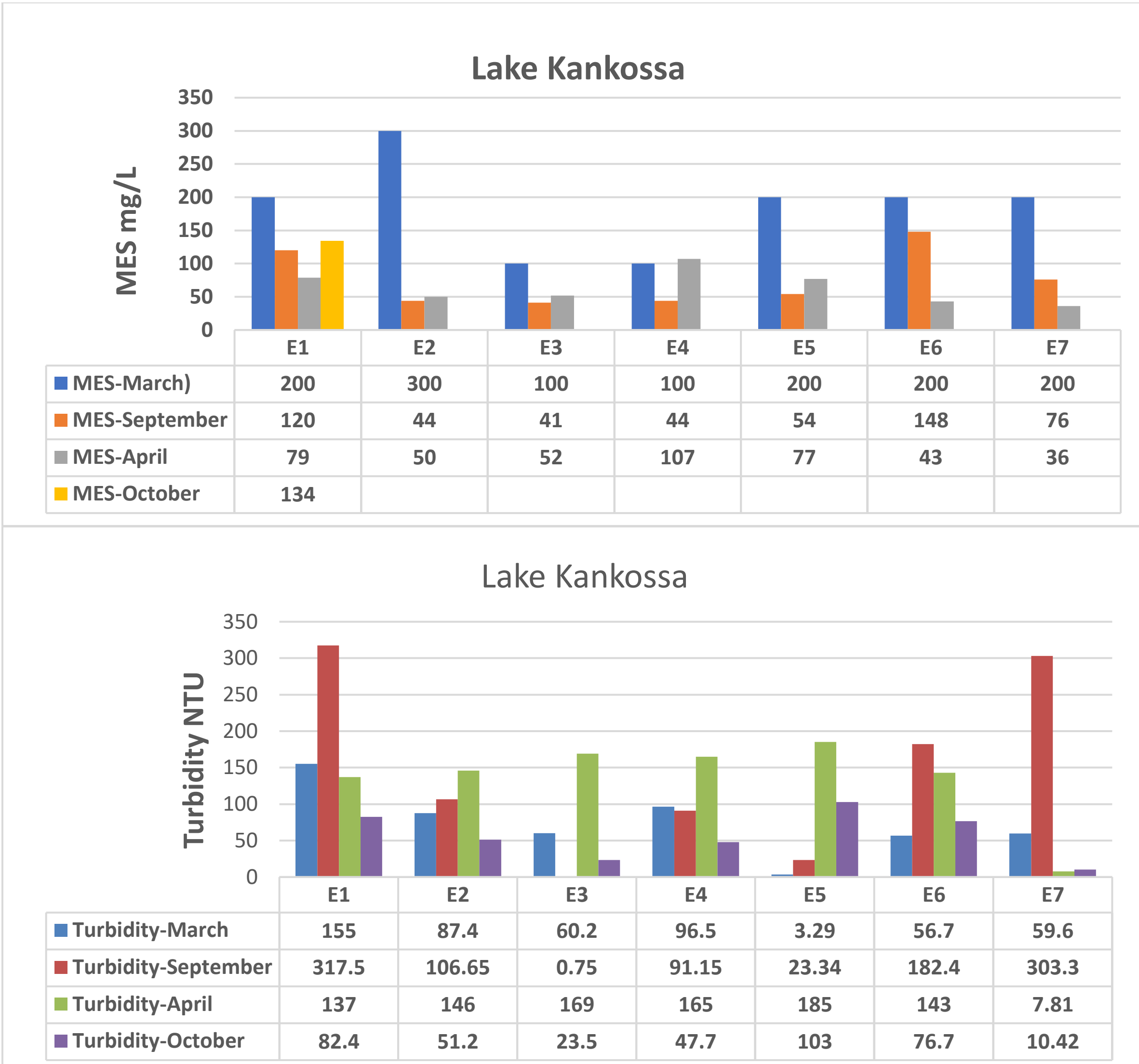
3.3. Turbidity and Suspended Solids MES

Turbidity and suspended solids (MES) are two closely related physicochemical parameters that play a central role in assessing surface water quality. Turbidity expresses the water's ability to scatter light, often caused by the presence of suspended particles such as clay, silt, organic matter, or microorganisms. It is generally measured in NTU (Nephelometric Turbidity Units). Suspended solids, on the other hand, represent the total mass of undissolved solid particles present in the water. These particles can originate from runoff, bank erosion, domestic or agricultural waste, and are responsible for a significant portion of the pollutant load in aquatic environments.

Spatial values of turbidity and suspended solids (MES) in the waters of Lake Kankossa highlight a heterogeneous distribution of particulate load across areas (Figure 10). This variation is explained by the diversity of sources of solid inputs, the nature of the substrate, local morphology, and the intensity of human use.

Points located near areas of human activity, such as the leaching of domestic waste, have significantly higher levels of turbidity and MES. These elevated values reflect substantial remobilization of sediments and an accumulation of fine particles, which can diminish the optical and biological quality of the water.

The seasonal average values of turbidity and suspended solids (MES) in the waters of Lake Kankossa have peaked during the winter periods (September and October), when heavy rainfall causes intense runoff, leading to a significant increase in solids transported to the lake. This results in high turbidity and suspended solids values, linked to soil leaching and bank erosion. On the other hand, during hot dry periods, values sometimes remain high due to the remobilization of sediments under the effect of wind or hydrodynamic agitation, but can also decrease if the external supply is limited. Similarly, the cold dry season generally presents more moderate levels, corresponding to a relative stability of hydrological conditions and less erosive activity.



	E1	E2	E3	E4	E5	E6	E7
MES-March)	200	300	100	100	200	200	200
MES-September	120	44	41	44	54	148	76
MES-April	79	50	52	107	77	43	36
MES-October	134						

	E1	E2	E3	E4	E5	E6	E7
Turbidity-March	155	87.4	60.2	96.5	3.29	56.7	59.6
Turbidity-September	317.5	106.65	0.75	91.15	23.34	182.4	303.3
Turbidity-April	137	146	169	165	185	143	7.81
Turbidity-October	82.4	51.2	23.5	47.7	103	76.7	10.42

Figure 10.
Spatio-temporal variations of Turbidity and Suspended Matter.

3.4. Calcium and Magnesium

Calcium (Ca^{2+}) and magnesium (Mg^{2+}) are two major cations that play a fundamental role in the mineralization of natural waters. Their concentrations are directly linked to the geological nature of the watershed, particularly the dissolution of carbonate rocks such as limestone and dolomites.

Calcium is generally more abundant and contributes significantly to the total hardness of the water. It also participates in the precipitation of certain compounds, such as carbonates. Magnesium, often present in smaller quantities, is also an important geochemical indicator of the weathering of silicate or dolomite rocks.

In Lake Kankossa, the joint study of these two elements provides a better understanding of the mineralization processes, the origin of the ions, as well as their spatial and temporal evolution according to climatic conditions and environmental influences.

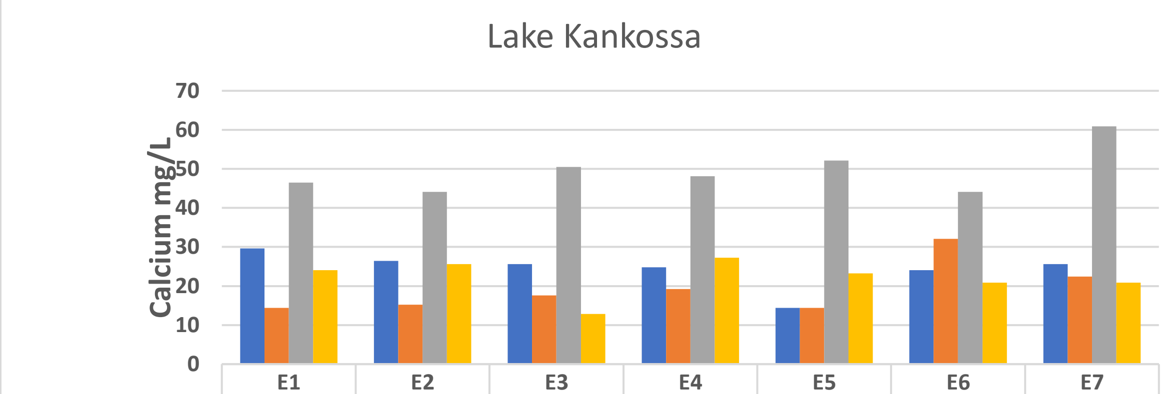
The spatial variation of calcium (Ca^{2+}) and magnesium (Mg^{2+}) at various points in Lake Kankossa reveals significant variability across sampling points. Calcium presents relatively high concentrations at all points, reflecting significant mineralization of the environment, with its limiting values recorded at the ELHACHYA and ELBIR points.

As for magnesium, its levels are generally lower but follow a similar trend, suggesting a common geochemical origin for both cations. However, some stations, such as L'Exploitation or El Hakem, display notable differences, possibly due to occasional inputs, local substrate variations, or the influence of human activities.

This spatial distribution highlights the natural dynamics of mineralization and underscores the importance of local geology in the ionic composition of the water.

Sodium (Na^+) and potassium (K^+) concentrations in the waters of Lake Kankossa vary seasonally, reflecting the influence of climatic conditions on ionic composition.

During the cold, dry season, sodium reaches relatively high values, likely due to increased evaporation and solute concentration. During the hot, dry season, its concentration decreases, possibly related to temporary dilution or a decrease in external inputs. During the rainy season, the variations are more complex. In our first samples in 2017, precipitation appeared to dilute the sodium, while in 2021, concentrations were higher, suggesting the effect of runoff and salt mobilization. Its limit value was recorded at 23.14 mg/L.



	E1	E2	E3	E4	E5	E6	E7
Ca-March	29.65	26.45	25.65	24.84	14.42	24.04	25.65
Ca-September	14.42	15.23	17.63	19.23	14.42	32.06	22.44
Ca-April	46.49	44.088	50.5	48.09	52.1	44.08	60.92
Ca-October	24.04	25.65	12.82	27.25	23.24	20.84	20.84

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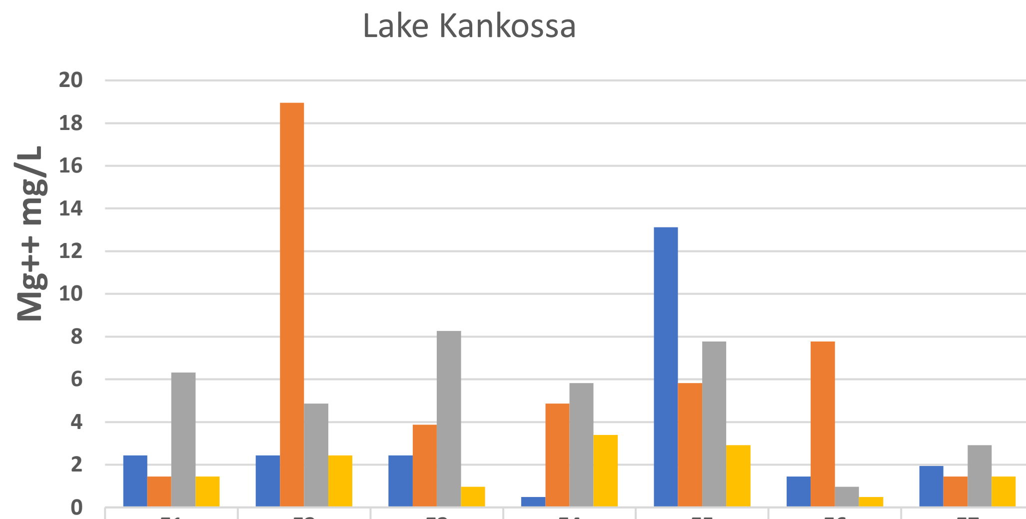
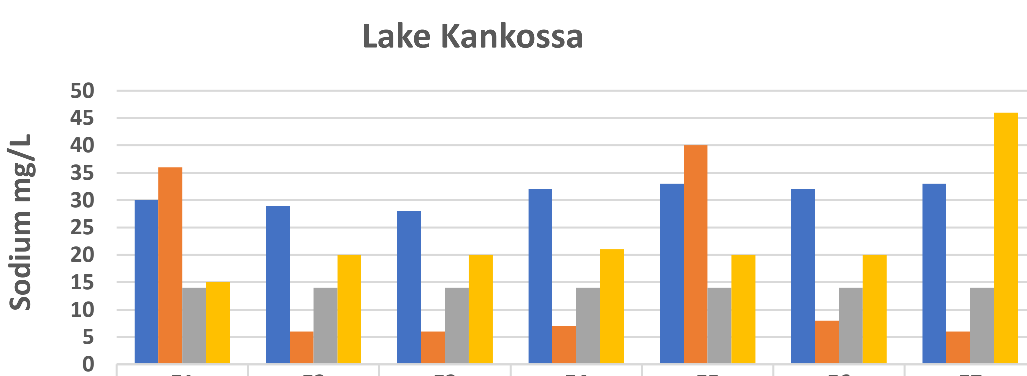


	E1	E2	E3	E4	E5	E6	E7
Mg-March	2.43	2.43	2.43	0.48	13.12	1.45	1.94
Mg-September	1.45	18.95	3.88	4.86	5.83	7.77	1.45
Mg-April	6.31	4.86	8.26	5.83	7.77	0.97	2.91
Mg-October	1.45	2.43	0.97	3.4	2.91	0.48	1.45

Figure 11.
Spatio-temporal variations of Calcium and Magnesium.

Potassium levels remained generally stable throughout the seasons, with slight increases during the winter, when they reached a value of 6 mg/L, possibly linked to increased biological activity or the addition of decomposed organic matter.



	E1	E2	E3	E4	E5	E6	E7
Na+ -March	30	29	28	32	33	32	33
Na+-September	36	6	6	7	40	8	6
Na+-April	14	14	14	14	14	14	14
Na+-October	15	20	20	21	20	20	46

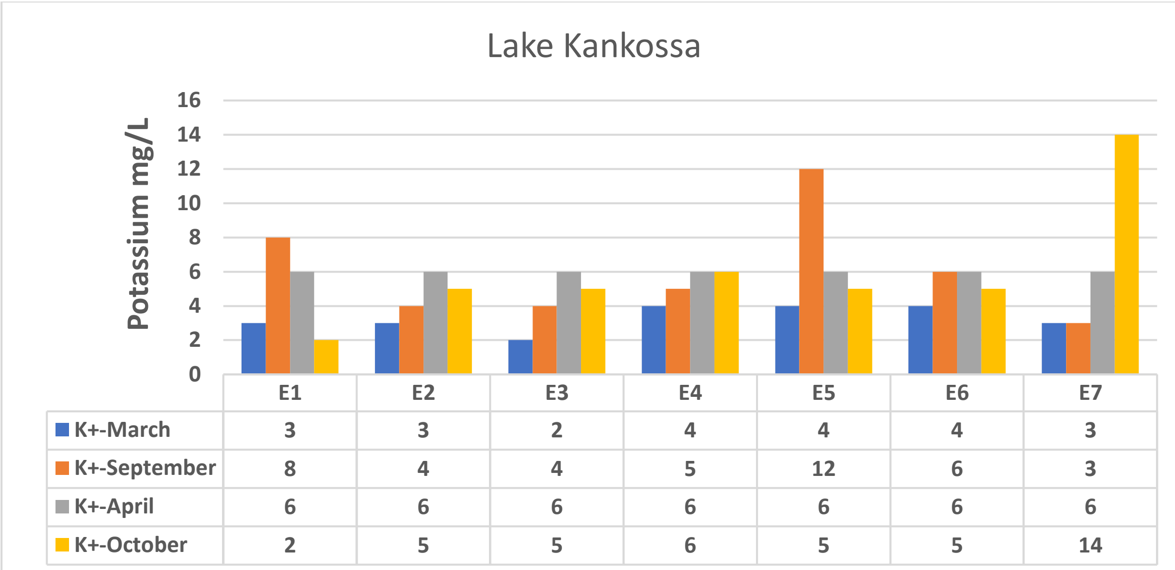
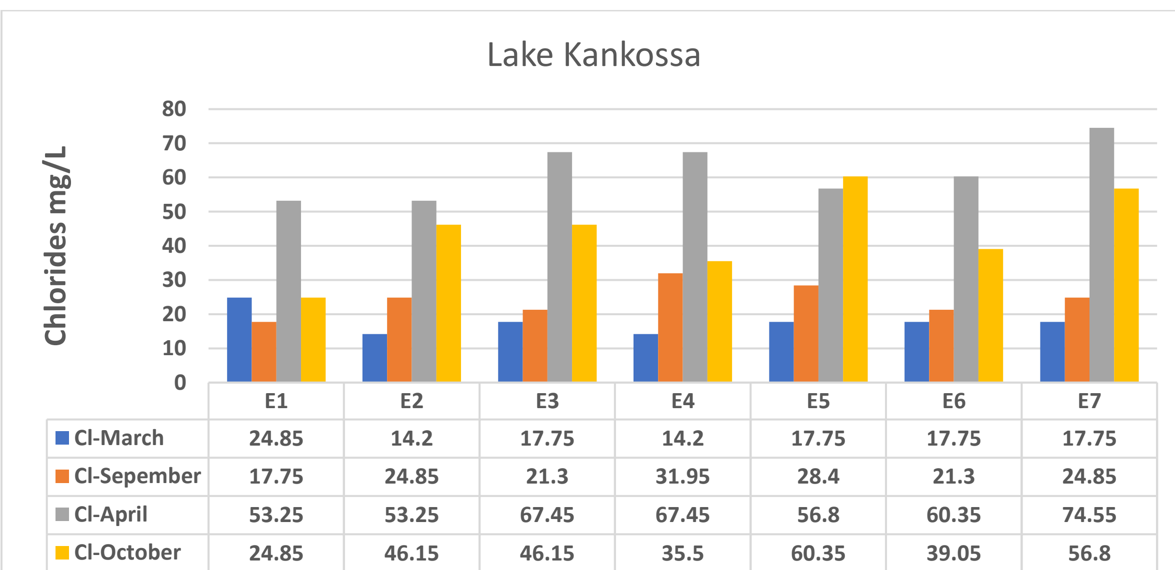


Figure 12.
Spatio-temporal variations of Sodium and Potassium.

3.5. Chlorides and Sulfates

Chlorides (Cl^-) and sulfates (SO_4^{2-}) are major anions in natural aquatic systems, reflecting both the geological origin of the watershed and potential anthropogenic influences. Their concentrations can result from the dissolution of evaporitic rocks, such as gypsum or halite, or from intense evaporation, particularly in arid and semi-arid regions such as Kankossa.

Chlorides, in high proportions, reflect the progressive salinization of the water, while sulfates are often associated with leaching and deep circulation. Their excessive accumulation can impair the quality of water intended for human consumption.



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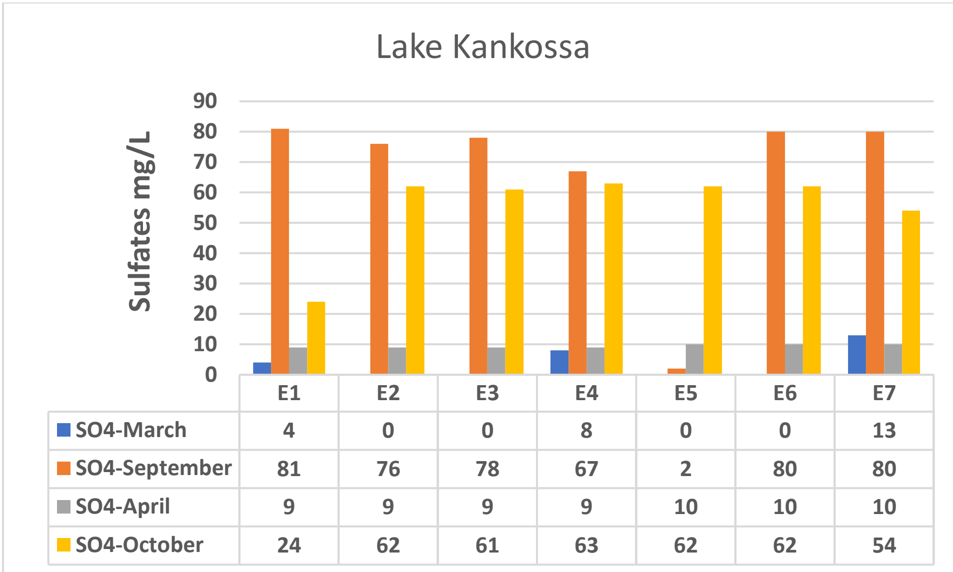

Figure 13.
Spatio-temporal variations of Chlorides and Sulfates.

The average spatial variation of chlorides (Cl^{-}) and sulfates (SO_4^{2-}) in the waters of Lake Kankossa (Figures 12 and 13) highlights significant variability between different locations. Chloride concentrations are generally moderate to low, with peaks observed at certain points likely subject to high evaporation or anthropogenic inputs (wastewater, soil leaching). Similar to what was recorded at Harth Ewlad Emin and Elbir, this distribution suggests progressive salinization of the lake in these localized areas.

Sulfates, although present in lower concentrations, also exhibit variability between sampling points (Figure 13). These differences could result from the geological nature of the substrate or the infiltration of sulfate-laden waters.

3.6. Nitrogen Elements

These nitrogenous elements are indications of serious pollution. Nitrates, with the formula NO3−, are salts of nitric acid. Nitrates constitute the final stage of nitrogen oxidation and represent the form of nitrogen with the highest oxidation state present in water. Their concentrations in natural waters range between 1 and 10 mg/L. The presence of nitrates in water indicates pollution from agricultural sources (fertilizers), urban sources (dysfunction of sanitation networks), or industrial origins. They are also the main causes of eutrophication in aquatic environments.

They can cause the formation of nitrites and nitrosamines, which are responsible for two potentially pathological phenomena: methemoglobinemia and a risk of cancer. The nitrite ion (NO2-) is the main source of inorganic nitrogen found in natural waters. The nitrite ion readily oxidizes to nitrate ion and is therefore rarely found in significant concentrations in natural waters. Nitrites are toxic to the human body. They are powerful oxidants that have the ability to transform hemoglobin into methemoglobin, rendering the blood incapable of transporting oxygen to the tissues. Such effects have been observed in many animal species.

The presence of significant quantities of nitrites degrades water quality. Ammonia refers to both ionized (ammonium ion, NH^{+}) and non-ionized (NH_3) forms. Ammoniacal nitrogen is quite common in water and usually reflects an incomplete degradation process of organic matter. It constitutes one of the links in the nitrogen cycle. Ammonia is a water-soluble gas, but depending on pH conditions, it transforms either into an uncombined compound or into an ionized form. The presence of ammoniacal nitrogen in relatively large quantities can indicate pollution from human or industrial discharges (chemical, fertilizer, nitrogen, coke, ice, textile industries, etc.).

According to the World Health Organization (WHO) [10], the permissible limits are set at 50 mg/L for nitrates, 3 mg/L for nitrites, and 0.5 mg/L for ammonium. Monitoring these levels allows for the assessment of water quality and the identification of sources of nitrogen pollution in Lake Kankossa.

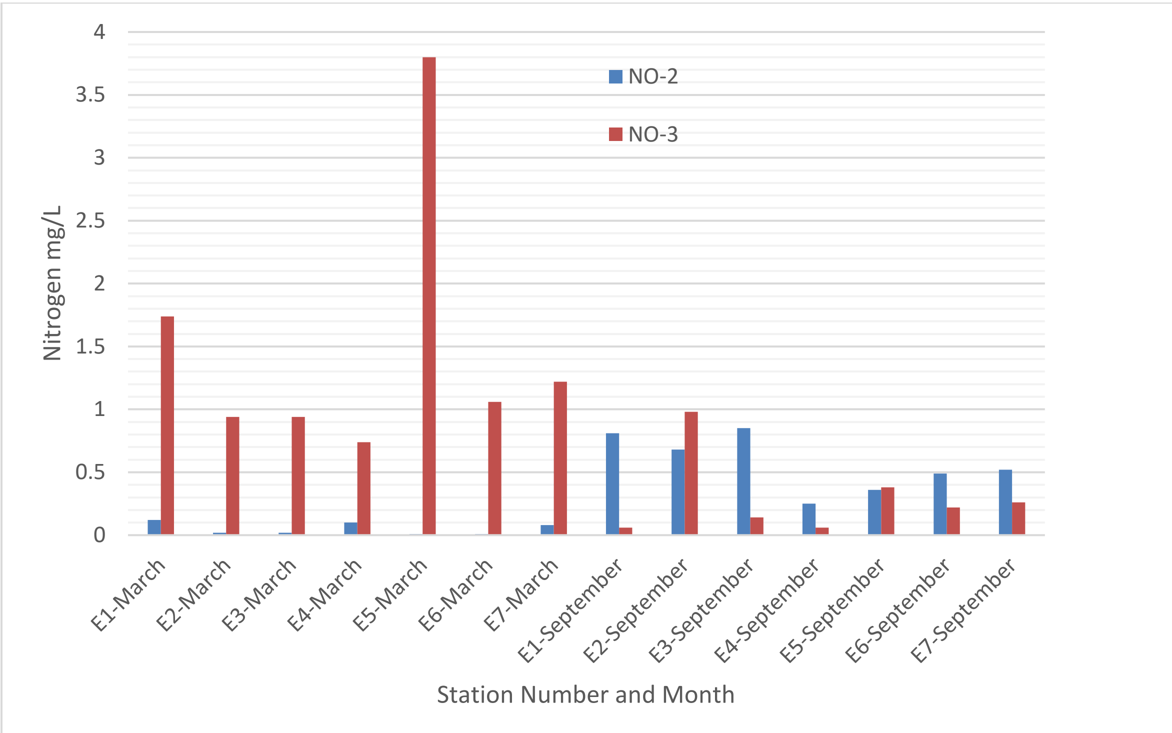

Figure 13.
Spatio-temporal variations of nitrogen elements.

4. Discussion

Access to quality water is currently a major challenge in Sahelian regions, where dwindling resources, human pressures, and the effects of climate change are converging to exacerbate water vulnerability. In Mauritania, a Sahel-Saharan country, water resources are extremely limited and unevenly distributed. Most of the territory lacks permanent watercourses, with the exception of the Senegal River in the south. Groundwater remains the main source of supply, while surface water, such as temporary ponds and lakes, is poorly studied and vulnerable to pollution. This reality is particularly acute in landlocked regions such as Kankossa, where surface water is a cornerstone of daily survival.

Lake Kankossa, located in the Assaba province, is one of the few freshwater bodies used locally for domestic, agricultural, and pastoral needs. Despite its importance, this lake had never been systematically characterized scientifically prior to this research. This study thus constitutes the first rigorous scientific approach aimed at assessing the physicochemical quality of its waters, in a context marked by major logistical, human, and environmental constraints. Each sampling campaign was carried out at the cost of significant effort, in challenging field conditions, illustrating the deep commitment to this mission.

Through this study, we assessed the physicochemical quality of the waters of Lake Kankossa by analyzing samples taken between 2017 and 2021 at seven stations spread around the lake. Analyses

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focused on temperature, pH, turbidity, suspended solids (SS), conductivity, and major ions (Na^+, K^+, Ca^{2+}, Mg^{2+}, Cl^-).

The results obtained highlighted a globally heterogeneous water quality, with values of turbidity, MES, conductivity, and certain ions (Na^+, Cl^-, Mg^{2+}) exceeding the potability standards recommended by the WHO. A remarkable seasonal and annual change was observed, revealing a hydrological dynamic sensitive to external inputs, in particular runoff, uncontrolled domestic uses, and the absence of natural filtration mechanisms.

The average pH and temperature values at the seven sampling points around Lake Kankossa reveal significant heterogeneity in physicochemical conditions. This variability can be attributed to soil type, solar exposure, anthropogenic inputs, and local hydrological dynamics. These values are:

At the "L'exploitation" point, the average pH value recorded is 8.66, while the average temperature is 29.7°C.

At the "El Vak" point, the average pH is 8.84, and the average temperature reaches 29.8°C.

At "El Hakem," the pH rises to 9.21, and the average temperature is 29.3°C. At the "Essak" point, the average pH is 8.57, and the temperature is 29.1°C. For Harth Ewlad Emin, the average pH values are 8.36, and the temperature is 29.9°C.

At El Hachya, the measurements indicate a pH of 8.37 and a temperature of 29.6°C.

Finally, at El Bir, the average pH is 8.40, with a temperature of 28.6°C.

5. Conclusion

The aim of this study was to conduct a detailed analysis of the physicochemical quality of Lake Kankossa's waters. We examined the main spatial and temporal dimensions of this essential aquatic resource. The study was based on four sampling campaigns carried out over a two-year period from 2017 to 2021, covering seven sampling points representative of different areas of the lake.

The parameters analyzed encompass both physical (pH, temperature, turbidity, suspended solids, conductivity) and chemical (major ions, sulfates, nitrogen) aspects. The interpretation of the results was structured around several axes: spatial variation between stations, seasonal variation according to climatic periods, and annual variation based on chronological data.

In the absence of national standards for drinking water quality in Mauritania, the World Health Organization (WHO) [10] standards were used as a reference for interpreting the results. The comparison of the overall results is presented in Table 4 (Annexes) with the WHO standards.

Particular emphasis was placed on comparing the results obtained with the potability standards established by the World Health Organization (WHO). Thus, this first assessment constitutes a significant contribution to the understanding of the hydrochemical functioning of **Lake Kankossa** and provides objective elements to support any strategy for sustainable management or development of this water resource for domestic, agricultural, or industrial use.

These results indicate a chemical balance influenced by local factors such as sunlight, human activities, and the specific characteristics of each area of the lake.

Transparency:

The authors confirm that the manuscript is an honest, accurate, and transparent account of the study; that no vital features of the study have been omitted; and that any discrepancies from the study as planned have been explained. This study followed all ethical practices during writing.

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References

[1] MATUHE (Ministère de l'Aménagement du Territoire de l'Eau et de l'Environnement), *Report on the state of the environment in Morocco (REEM)*, 2nd ed. Rabat, Morocco: Observatoire National de l'Environnement du Maroc, 2001.

[2] L. Benaabidat, "Characterization of the Sebou watershed: Hydrology, water quality, and geochemistry of thermal springs," PhD Thesis in Hydrology at FST-Saïs, 2000.

[3] DRPE, *2004 national report on water resources in Morocco*. Rabat, Morocco: UN Water-Africa / DRPE, 2004.

[4] Direction Générale de l'Hydraulique, *Action and capacity-building processes; water and the environment*. Rabat, Morocco: Direction Générale de l'Hydraulique, 1996.

[5] A. Agoumi and A. Debbarh, *Water resources and watersheds in Morocco: 50 years of development (1955-2005)*. Rabat, Morocco: Direction Générale de l'Hydraulique, 2006.

[6] D. Belghyti *et al.*, "Groundwater management for sustainable production of drinking water quality in Maâmora," presented at the 2nd International Conference on Water and Society, 4–6 September 2013, New Forest, UK. WIT Press. WIT Transactions on Ecology and the Environment, 2013.

[7] Office National de l'Eau Potable (ONEP), *Drinking water supply, pollution threats*. Rabat, Morocco: Office National de l'Eau Potable, 1999.

[8] J. Rodier, *Water analysis: Natural water, wastewater, seawater*, 8th ed. Paris, France: Dunod, 1996.

[9] Comité Normes et Standards (CNS), *Standards and norms committee*. Rabat, Morocco: Ministère de l'Environnement du Maroc, 1994.

[10] World Health Organization (WHO), *Guidelines for drinking-water quality: Fourth edition incorporating the first addendum*. Geneva: World Health Organization, 2017.