

REVIEWER'S REPORT

Manuscript No.: IJAR- 58288

Title: Evaluation de la qualité physicochimique des eaux des forages des quartiers Bantounka et Nassouroulaye, Commune de Lambanyi Conakry.

Recommendation:

Accept as it is

Accept after minor revision.....

Accept after major revision

Do not accept (*Reasons below*)

Rating	Excel.	Good	Fair	Poor
Originality		✓		
Techn. Quality		✓		
Clarity			✓	
Significance			✓	

Reviewer Name: **ANAPANA GOPAL**

Reviewer's Comment for Publication.

General Comments

The manuscript evaluates the physicochemical and microbiological quality of groundwater obtained from domestic boreholes located in the Bantounka and Nassouroulaye districts of Lambanyi Commune, Conakry. Thirteen boreholes were sampled during two field campaigns (September 2024 and June 2025), and the collected samples were analyzed for physicochemical parameters, major ions, dissolved metals, and microbiological contamination. Hydrochemical facies were determined using the Piper diagram, while correlation analysis and Principal Component Analysis (PCA) were applied to interpret the hydrochemical processes controlling groundwater quality.

The study addresses an important public health and environmental issue because groundwater serves as the principal source of domestic water in many rapidly urbanizing regions where centralized drinking water infrastructure is inadequate. The manuscript presents useful analytical data; however, several aspects related to methodology, statistical analysis, interpretation, language quality, and presentation require substantial improvement before publication.

Content and Originality Strengths

- Addresses an important issue concerning groundwater quality and public health.
- Combines physicochemical and microbiological analyses.
- Includes hydrochemical facies classification using Piper diagrams.
- Applies multivariate statistical analysis (correlation matrix and PCA).
- Discusses both natural and anthropogenic sources of groundwater contamination.
- Provides valuable baseline data for groundwater management in Conakry.

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Weaknesses

- The novelty of the study is only moderate because similar groundwater quality assessments have been widely reported.
- The manuscript does not clearly identify its scientific contribution beyond local characterization.
- The research objectives and hypotheses should be stated more explicitly.
- The implications for groundwater management could be discussed in greater depth.

Technical Quality

Strengths

- Sampling covered two monitoring campaigns.
- A wide range of physicochemical parameters and trace elements were analyzed.
- Standard laboratory instruments (HACH DR6000 and ICP-OES) were employed.
- Piper diagram, correlation analysis, and PCA enhance interpretation of hydrochemical processes.

Minor Concerns

1. Sampling Design

Only **13 boreholes** were investigated.

The manuscript should justify whether this sample size adequately represents groundwater quality across the study area.

Additional information should be provided regarding:

- borehole depth,
- construction characteristics,
- pumping duration before sampling,
- surrounding land use,
- distance from potential pollution sources.

2. Microbiological Analysis

Only a limited number of samples appear to have undergone microbiological analysis.

The manuscript should clearly explain:

- why microbiological analyses were restricted,
- sampling frequency,
- quality assurance procedures,
- detection limits,
- analytical protocols.

3. Statistical Analysis

Although correlation analysis and PCA were performed, additional statistical analyses would strengthen the manuscript.

The authors should consider including:

- significance testing (p-values),
- confidence intervals,
- cluster analysis,
- Water Quality Index (WQI),
- factor analysis,
- regression analysis where appropriate.

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4. Hydrochemical Interpretation

The Piper diagram successfully identifies two hydrochemical facies.

However, the discussion should better explain:

- groundwater evolution,
- recharge mechanisms,
- water-rock interaction,
- geochemical processes controlling groundwater chemistry.

Methodology

Strengths

- Sampling procedures are generally described.
- Field and laboratory analyses follow accepted methods.
- Instrumentation is appropriately identified.
- Minor chemical and microbiological parameters are included.

Weaknesses

Several methodological details require clarification:

- preservation procedures,
- analytical quality control,
- calibration methods,
- duplicate analyses,
- detection limits,
- analytical precision,
- software used for statistical analyses.

The reproducibility of the study would benefit from these additions.

Results and Discussion

Strengths

- Results are presented systematically.
- Physicochemical parameters are compared with WHO standards.
- Piper diagram interpretation is appropriate.
- Correlation matrix provides useful information regarding relationships among water quality parameters.
- PCA identifies spatial variability among boreholes.
- Microbiological findings highlight potential public health risks associated with *Escherichia coli* contamination.

Weaknesses

Interpretation

Several interpretations remain descriptive.

The discussion should better explain:

- sources of groundwater acidity,
- nitrate contamination pathways,
- seasonal influences,
- aquifer characteristics,
- urbanization impacts.

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Comparison with Previous Studies

The manuscript should include more comparisons with similar groundwater studies conducted in:

- West Africa,
- Guinea,
- neighboring countries,
- tropical urban environments.

Water Quality Assessment

The inclusion of a Water Quality Index (WQI) would substantially improve the practical value of the study.

Language and Presentation

Minor Issues

The manuscript requires extensive English/French language editing.

Common problems include:

- grammatical errors,
- inconsistent tense,
- punctuation mistakes,
- repeated wording,
- formatting inconsistencies,
- spacing issues.

Several sentences require restructuring to improve scientific readability.

Structure and Organization

Strengths

- The manuscript follows a logical scientific structure:
 - Introduction
 - Materials and Methods
 - Results
 - Discussion
 - Conclusion
- Figures and tables support the interpretation of results.
- The Piper diagram and PCA plots are useful for hydrochemical interpretation.

Weaknesses

- Figure numbering should be checked for consistency.
- Some figure captions require more detailed explanations.
- Several graphs should include larger fonts and improved resolution.
- Correlation plots could be combined into a more concise presentation.
- Some tables contain formatting inconsistencies.

References and Citations

Strengths

- References include relevant groundwater quality studies.
- WHO drinking water standards are appropriately cited.
- Both regional and international literature are included.

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Weaknesses

- More recent literature (2023–2026) should be incorporated.
- Several references require DOI information.
- Citation formatting should follow the journal's style consistently.
- Additional references on groundwater quality assessment, PCA applications, Water Quality Index, and urban groundwater contamination would strengthen the manuscript.

Specific Recommendations

Abstract

- Include key numerical results.
- Mention the principal statistical analyses.
- Clearly state the major conclusions.

Introduction

- Strengthen the research gap.
- Include more recent groundwater quality literature.
- Clearly define the study objectives and hypotheses.

Materials and Methods

- Provide additional details on sampling design.
- Describe quality assurance and quality control procedures.
- Explain statistical software and analytical methods.

Results

- Include statistical significance levels.
- Present Water Quality Index (WQI) calculations if possible.
- Compare seasonal variations quantitatively.

Discussion

- Expand hydrogeochemical interpretation.
- Compare findings with recent international studies.
- Discuss implications for groundwater management and public health.

Conclusion

- Summarize the major findings quantitatively.
- Clearly distinguish between chemical and microbiological suitability.
- Provide practical recommendations for groundwater monitoring, sanitation improvement, and water treatment before domestic consumption.

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Overall Recommendation

The manuscript presents valuable information regarding the physicochemical and microbiological quality of groundwater in an urban area where domestic boreholes constitute an important source of drinking water. The integration of hydrochemical facies analysis, correlation analysis, and Principal Component Analysis provides a useful framework for interpreting groundwater quality. Nevertheless, the manuscript requires substantial improvements in methodological description, statistical analysis, hydrogeochemical interpretation, language quality, and discussion of public health implications. Addressing these issues would considerably enhance its scientific quality and practical significance.

Final Decision

Minor Revision