

REVIEWER'S REPORT

Manuscript No.: IJAR- 59227

Title: Macrobenthos: Bio-indicators of Aquatic Pollution and Ecosystem Health- A Systematic Review.

Recommendation:

Accept as it is

Accept after Moderate revision.....

Accept after Major revision

Do not accept (*Reasons below*)

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

Reviewer Name: Dr. ANAPANA GOPAL

Reviewer's Comment for Publication.

1. General Comments

The manuscript addresses an important and relevant topic concerning the use of macrobenthic organisms as bio-indicators of aquatic pollution and ecosystem health. The manuscript provides a broad overview of the ecological importance of macrobenthos and compiles studies from different geographical regions. The authors have searched multiple databases and report that 58 articles were selected for review. However, the manuscript currently does not meet the methodological and reporting standards expected for a **systematic review**. The literature-search methodology is insufficiently described, the criteria for article selection are not provided, and there is no transparent screening or quality-assessment procedure. In addition, the manuscript is largely descriptive and requires a stronger critical synthesis of how macrobenthos function as indicators, which indices or metrics are most commonly used, their advantages and limitations, and how environmental confounding factors affect interpretation.

Several terminology, taxonomic, grammatical, citation, and reference-formatting issues are also present. Therefore, **substantial revision is required before the manuscript can be considered for publication.**

2. Moderate Comments

2.1 Systematic-review methodology requires substantial improvement

The manuscript is titled "**A Systematic Review**," but the methodology currently describes only that searches were conducted in Google Scholar, ScienceDirect, Scopus, and Web of Science and that 58 articles were selected.

The authors should provide:

- Exact search dates.
- Publication period covered by the search.
- Complete search strings/Boolean operators used for each database.

REVIEWER'S REPORT

- Inclusion and exclusion criteria.
- Screening procedure.
- Duplicate-removal procedure.
- Number of records initially identified.
- Number screened by title/abstract.
- Number assessed in full text.
- Reasons for exclusion.
- Final number of included studies.
- Data-extraction procedure.
- Method used to assess methodological quality/risk of bias.
- PRISMA flow diagram, if the manuscript is intended as a systematic review.

Without these details, the review cannot be independently reproduced.

2.2 The manuscript needs a stronger synthesis rather than a literature listing

The manuscript contains a large table summarizing study locations, environmental matrices, organisms and references. However, the review mainly lists previous studies rather than critically synthesizing their findings.

For example, Table 1 includes studies from Spain, Malaysia, India, Indonesia, Egypt, Bangladesh, China, Nigeria, Ghana and other regions.

The authors should synthesize:

- Which macrobenthic groups are most frequently used as indicators.
- Which community parameters are most commonly measured.
- Which pollution types are most effectively detected.
- Differences between freshwater, estuarine and marine applications.
- Species-level versus community-level indicators.
- Strengths and limitations of diversity, abundance, biomass and biotic indices.
- Environmental factors that may confound bio-indicator responses.

A systematic review should provide **patterns, comparisons and conclusions from the collected literature**, rather than primarily presenting a catalogue of studies.

2.3 Definition of macrobenthos should be standardized

The manuscript states that macrobenthos are organisms ranging from 0.5 to 4.0 mm and that they are retained in 0.5–1 mm mesh.

This definition requires clarification because size thresholds and mesh sizes vary among studies and aquatic systems. The authors should provide a scientifically defensible operational definition and clearly distinguish:

- Macrobenthos
- Macroinvertebrates
- Meiobenthos
- Microbenthos
- Epifauna
- Infauna

The manuscript currently uses these terms somewhat interchangeably.

2.4 Environmental confounding factors need greater attention

The manuscript correctly acknowledges that macrobenthic communities are influenced by sediment grain size, water depth, dissolved oxygen and organic enrichment.

However, these factors need to be incorporated into the central discussion. A change in macrobenthic abundance or diversity cannot automatically be attributed to

REVIEWER'S REPORT

pollution because natural environmental gradients can strongly influence community structure.

The review should discuss the influence of:

- Sediment grain size
- Salinity
- Temperature
- Dissolved oxygen
- Depth
- Hydrodynamics
- Organic matter
- Nutrient enrichment
- Habitat type
- Seasonal variation
- Natural disturbance

This is particularly important when interpreting macrobenthos as pollution indicators.

2.5 Bio-indication versus general ecological importance should be separated

Section 3 discusses several ecosystem services, including bait and aquaculture support, seafood production, genetic resources, raw materials, nutrient cycling and sediment stabilization.

Although these functions are relevant to macrobenthos ecology, the section is somewhat disconnected from the central purpose of the review.

The authors should explain how these ecosystem functions relate specifically to **bio-indication and ecosystem-health assessment**, or reduce this section and focus more strongly on biomonitoring.

2.6 Important distinction between pollution indicators and ecosystem-health indicators

The manuscript frequently treats macrobenthos as indicators of both “pollution” and “ecosystem health.” These concepts should be distinguished.

Macrobenthic community structure can respond to pollution, but also to habitat alteration, hydrological changes, sediment characteristics and natural environmental variation. The authors should therefore avoid implying that every observed community change represents pollution.

A conceptual framework showing:

Environmental stressor → environmental response → macrobenthic response → indicator/metric → ecological interpretation

would substantially improve the manuscript.

2.7 Conclusion contains a scientifically confusing statement

The conclusion states that macrobenthic invertebrates provide a more accurate understanding of aquatic conditions than chemical and microbiological information and then refers to “short-term fluctuations.”

This statement requires moderate revision.

Earlier in the abstract, the authors emphasize the ability of macrobenthos to reflect **long-term environmental stress** because of their relatively long life cycles and sedentary nature.

Thus, the manuscript contains an apparent contradiction between **long-term environmental integration** and **short-term fluctuations**.

REVIEWER'S REPORT

The authors should carefully revise this section and avoid claiming that biological indicators are inherently superior to chemical or microbiological monitoring. These approaches are generally complementary.

3. Table 1 – Moderate Revision Required

Table 1 is potentially useful and contains a substantial number of studies, but it requires considerable editorial and scientific improvement.

Issues include:

- Inconsistent taxonomic formatting.
- Inconsistent capitalization.
- Scientific names should consistently be italicized.
- Some taxonomic names appear to require verification.
- Some organism names are presented at species level, while others are only at family/order level.
- The environmental parameters are not consistently categorized.
- Study objectives are heterogeneous and difficult to compare.
- There is no column indicating the type of pollution/stressor.
- There is no column indicating the bio-indicator metric or index used.
- There is no column summarizing the principal finding.

A more informative table could include:

Stud y	Ecosyste m	Stressor/Pollutan t	Macrobenthi c group	Indicator metric/inde x	Major findin g	Referenc e
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This would transform the table from a literature list into an analytical synthesis.

4. Literature Search and Selection

The statement that **58 articles were selected** needs to be supported by a transparent selection process.

The authors should add a PRISMA-style flow diagram showing:

Identification → Screening → Eligibility → Inclusion

They should also explain whether conference proceedings, theses, book chapters and review papers were included or excluded. This is particularly important because the reference list contains different publication types, including journal articles, conference proceedings, technical reports and theses.

5. Reference Quality and Accuracy

The manuscript contains a reasonably broad reference list, including recent literature from 2024–2026. However, several references themselves contain editorial notes such as **“VERIFY journal metadata,” “VERIFY proceedings details,” “VERIFY publisher/editor metadata,”** and **“VERIFY DOI/indexing.”**

These verification notes must be removed before publication after the references have been checked.

The authors should:

- Verify every DOI.
- Verify journal title, volume, issue and page/article number.
- Ensure every in-text citation appears in the reference list.
- Ensure every reference-list entry is cited in the manuscript.
- Standardize reference formatting.

REVIEWER'S REPORT

- Correct author-name formatting.
- Verify taxonomic names against authoritative taxonomic sources.
- Check references cited for specific factual claims.

6. Taxonomic and Scientific Nomenclature

Several scientific names in Table 1 appear inconsistently formatted. For example, names such as *Limnodrilus hoffmeisteri*, *Streblospio benedicti*, *Corbicula fluminea* and other taxa should be consistently italicized and checked for spelling.

The authors should perform a complete taxonomic verification because accurate species identification is particularly important in a review focused on biological indicators.

7. Important Bioassessment Approaches Need Better Coverage

The manuscript mentions population density, biomass, species composition and diversity indices.

However, the review would be considerably stronger if it systematically compared the moderate approaches used for benthic bioassessment, including:

- Diversity-based metrics
- Dominance/evenness measures
- Biotic indices
- Tolerance-based approaches
- Functional feeding groups
- Taxonomic composition
- Abundance/biomass relationships
- Functional diversity
- Multimetric approaches

The authors should explain the ecological meaning, advantages and limitations of each approach rather than simply mentioning them.

8. Figures and Visual Presentation

The manuscript would benefit from at least one **conceptual figure** showing the role of macrobenthos in aquatic biomonitoring.

For example:

Pollutants / habitat disturbance → changes in water and sediment quality → response of sensitive and tolerant taxa → changes in abundance/diversity/community structure → ecological assessment

The existing manuscript is heavily text- and table-oriented. A conceptual graphical synthesis would improve its scientific communication.

9. Language and Presentation

There are numerous grammatical, spacing and sentence-construction problems throughout the manuscript.

Examples include:

- “environmental changes.Macroenthos”
- “Due to their abundance and ease of collection, different tolerance levels...”
- “macroenthos are serving as an ideal bio-indicator”
- “macroenthosprovide”
- “actas vital biological indicators”

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REVIEWER'S REPORT

- “marinemacroenthos taxawidely”
- “attempts to provide”
- “relationship among the macroenthos communities with environmental drivers”

These issues are visible throughout the manuscript, including the abstract, introduction and Table 1.

A thorough professional English-language and technical copy-editing process is recommended.

10. Abstract

The abstract provides the general rationale and importance of macroenthos but does not adequately describe the systematic-review methodology or major findings.

It should include:

- Background
- Objective
- Databases searched
- Search period
- Number of studies included
- Major thematic findings
- Key conclusions
- Practical implications

Currently, the abstract mainly explains the biological characteristics of macroenthos and states that the study is a comprehensive review.

11. Conclusion

The conclusion should be rewritten based on the actual evidence synthesized from the 58 studies.

It should specifically identify:

1. What macroenthic characteristics make them useful indicators.
2. Which environmental stressors are most commonly assessed.
3. Which metrics are most frequently used.
4. Major limitations of macroenthic bioassessment.
5. The importance of combining biological, chemical and physical measurements.
6. Future research priorities.

The present conclusion is too general and contains statements that are stronger than the evidence presented.

12. Overall Assessment

The manuscript covers a relevant and important subject and has the potential to become a useful review of macroenthos as indicators of aquatic pollution and ecosystem health. The authors have assembled literature from multiple geographical regions and included a substantial reference base. The database-search approach and compilation of 58 studies provide a useful starting point.

However, **the manuscript requires substantial methodological, scientific, structural and language revisions**, particularly because it is presented as a systematic review. The lack of transparent study-selection methodology, absence of a systematic-review flow diagram, limited critical synthesis, insufficient discussion of

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REVIEWER'S REPORT

confounding environmental variables, incomplete reference verification and numerous language/taxonomic inconsistencies currently limit its scientific rigor.

Final Recommendation: MODERATE REVISION

The manuscript should be reconsidered after the authors have substantially revised the systematic-review methodology, strengthened the critical synthesis, verified the scientific and bibliographic information, improved the tables and figures, and undertaken comprehensive language editing.