

REVIEWER'S REPORT

Manuscript No.: IJAR- 58812

Title: **Impact of Climate Dynamics on Socio-Economic Activities and Natural Resources of the Benin Coastline.**

Recommendation:

Accept as it is

Accept after Major revision.....

Accept after minor 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 addresses an important and relevant issue concerning the effects of climate variability and change on socio-economic activities and natural resources along the Benin coastline. The study combines documentary research, field observation, participatory approaches, and a questionnaire survey of 100 purposively selected respondents. It examines agriculture, fishing, salt production, sand extraction and tourism, and subsequently interprets the findings using the Pressure-State-Impact-Response (PSIR) framework.

The manuscript has a useful applied perspective and contains valuable field observations, photographs, a seasonal activity calendar, a sensitivity matrix and an adaptation framework. The identification of crops (68%), population health (62%), fish resources (60%) and coastal morphodynamics (60%) as highly exposed components provides potentially useful information for coastal management.

However, **substantial methodological clarification and revision are required before the manuscript can be considered for publication.** The principal concerns relate to the climate-data methodology, sampling design, construction and validation of the sensitivity/impact indices, distinction between perceived impacts and measured climate impacts, and several inconsistencies in terminology and interpretation.

Minor Comments

1. The climate-data methodology is insufficiently described

The manuscript makes important quantitative statements about temperature change, including an increase from **27.1 °C during 1953–1989 to 27.8 °C during 1990–2015.**

However, the Methods section does not adequately explain:

- the source of the temperature data;
- the meteorological stations used;
- the spatial representativeness of the data for the entire coastline;
- whether the values are annual means, seasonal means or station averages;

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- the statistical method used to identify climate trends;
- whether rainfall trends were quantitatively analysed;
- whether homogeneity and missing data were assessed.

This is a Minor weakness because the title specifically concerns **climate dynamics**, but the manuscript primarily demonstrates climate impacts through respondents' perceptions rather than through a quantitative analysis of climate time series.

Recommendation: Provide a dedicated subsection describing the climate dataset, stations, observation period, data quality control, statistical trend analysis and rainfall/temperature indices.

2. The manuscript should distinguish measured climate change from perceived climate change

The study combines historical temperature information with questionnaire responses concerning climate risks. However, these represent different types of evidence.

For example, the manuscript reports that respondents identified rising temperatures, heavy rainfall/flooding, drought, dry spells, evaporative pressure and violent winds as important risks.

These findings demonstrate **perceived climate-related risks**, but they do not independently demonstrate that each hazard has increased in frequency or intensity.

The manuscript should clearly distinguish:

Observed climate trends

from

Observed environmental impacts

from

Perceived climate impacts by respondents.

This distinction is particularly important for statements such as “climatic deterioration” and “climate variability results in weak fish and agricultural yields.”

3. The sampling methodology requires substantial clarification

The survey involved **100 purposively selected participants**, including community intellectuals, economic operators, farmers' organisation leaders, elders, tourism stakeholders, environmental technicians and coastal-management officials.

However, the manuscript does not provide the distribution of these respondents.

The authors should provide:

- number of respondents from each municipality;
- number involved in each economic activity;
- sex distribution;
- age categories;
- occupational categories;
- years of experience;
- educational/background characteristics, where relevant;
- criteria used for participant selection;
- justification for the sample size of 100.

Because purposive sampling was used, the findings cannot automatically be generalized to the entire Benin coastal population.

The manuscript itself acknowledges the limitation of the 100-person sample.

4. The statement “92% of respondents” needs clarification

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The abstract states that **92% of respondents reported that the activities were affected by climate dynamics.**

Later, Section 3.1 states that the five main activities were identified by **100% of respondents**, while Section 3.2 again refers to surveys involving **92% of the population engaged in socio-economic activities.**

The distinction between these percentages is not sufficiently clear.

The authors should explicitly state:

- What question produced the 92%?
- What question produced the 100%?
- Was the denominator always 100 respondents?
- Were any respondents excluded from particular questions?

This should be corrected throughout the manuscript.

5. The calculation of the exposure and impact indices must be explained

Table 2 presents numerical scores from **1 to 5** and converts them into percentages, with categories from low to high.

For example:

- Coconut groves: 28%
- Mangroves: 42%
- Water resources: 51%
- Fish resources: 60%
- Crops: 68%.

However, the manuscript does not adequately explain the mathematical procedure used to calculate these indices.

The authors should provide an explicit equation, for example:

Exposure/Impact Index = [Σ observed scores / maximum possible score] $\times$ 100

if that is indeed the method used.

They should also explain:

- who assigned each score;
- whether scores represent respondent frequency, researcher assessment or both;
- whether all climate hazards were equally weighted;
- whether respondents were asked to score each hazard;
- whether the mean, median or mode was used;
- how missing responses were handled.

Without this information, Table 2 cannot be independently reproduced.

6. The sensitivity matrix requires methodological validation

The sensitivity matrix is one of the central quantitative components of the paper, but it appears to be based primarily on subjective scoring.

For example, crops receive an impact index of 68%, population health 62%, and fish resources and coastal morphodynamics 60%.

The authors should discuss the reliability and validity of this scoring system.

At minimum, the revised manuscript should explain:

- why a 1–5 scale was selected;
- whether the questionnaire was pre-tested;
- whether inter-rater reliability was evaluated;
- whether internal consistency was assessed;
- whether sensitivity analysis was conducted.

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If the index represents expert/participant perception rather than measured exposure, this should be explicitly stated.

7. The title suggests a broader climate-impact assessment than the data actually support

The title refers to the **“Impact of Climate Dynamics”** on socio-economic activities and natural resources.

However, the evidence is predominantly:

1. literature review;
2. field observation;
3. questionnaire-based perceptions;
4. qualitative interpretation;
5. a perception-based scoring matrix.

There is limited quantitative evidence linking specific climate variables to specific biological or economic outcomes.

For example, the conclusion states that climate variability is reflected in **weak fish and agricultural yields and falling incomes**.

Yet the manuscript does not provide actual:

- fish catch/yield data;
- agricultural production data;
- household income data;
- salt-production data;
- tourism statistics;
- long-term climate-productivity correlations.

Therefore, the conclusions should be moderated unless such quantitative data are added.

8. The causal interpretation should be moderated

The PSIR model appropriately emphasizes that climate impacts interact with pre-existing anthropogenic pressures. The manuscript itself recognizes that impacts do not arise from climate alone but also from the existing fragility and anthropogenic pressure on the coast.

This is an important strength.

However, some statements elsewhere imply a direct causal relationship between climate dynamics and socioeconomic outcomes.

The authors should consistently acknowledge other drivers, including:

- population growth;
- coastal urbanization;
- sand mining;
- fishing pressure;
- land-use change;
- infrastructure development;
- market conditions;
- governance;
- resource-access constraints.

The discussion should therefore use terms such as **“associated with,” “contributes to,” or “is perceived to influence”** where causality has not been statistically established.

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9. The seasonal calendar needs stronger empirical support

Table 1 presents seasonal periods for agriculture, fishing, salt production, sand extraction and tourism. The manuscript states that the calendar is based on the November 2025 field survey.

However, the basis for assigning activity to particular months is not explained.

The authors should indicate whether the calendar represents:

- respondent consensus;
- direct field observations;
- official records;
- literature;
- researcher interpretation.

For a scientific publication, the methodology behind the monthly classification should be transparent.

10. Some ecological statements require stronger supporting evidence

The fishing section states that seasonal changes in temperature, rainfall and salinity affect fish ecology and that fish migrate to deeper areas during the rainy season and return to the surface during the dry season.

These are potentially important ecological claims, but no direct biological measurements were collected in the present study.

The authors should either:

- provide supporting empirical data, or
- clearly identify these statements as observations/perceptions or literature-supported interpretations.

Similar caution should be applied to statements concerning mangroves, fish resources, soil fertility and coastal morphodynamics.

11. The discussion should better integrate the numerical findings

The Discussion is generally descriptive and compares the findings with previous studies. For example, it appropriately connects the high vulnerability of fish resources, coastal morphodynamics, population health and crops with previous work.

However, the discussion could be substantially strengthened by explicitly discussing:

- why crops have the highest exposure index;
- why coconut groves have the lowest;
- why heavy rainfall and rising temperatures have the highest impact indices;
- why violent winds have the lowest impact;
- how adaptation measures correspond to the highest-risk sectors.

A concise conceptual synthesis linking **hazard** → **exposure** → **vulnerability** → **impact** → **adaptation** would improve the manuscript considerably.

12. The adaptation section needs evaluation, not only description

Table 3 provides community and institutional responses, including customary fishing rules, embankments, hydro-agricultural development, agroforestry, alley cropping, fish farming and economic diversification.

These are useful observations.

However, the manuscript calls this an “**evaluation of adaptation and management measures**”, while there is little evidence of actual evaluation of their effectiveness.

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The authors should either:

- provide indicators of effectiveness, adoption and outcomes; or
- rename the section as **“Adaptation and management measures”** or **“Documented adaptation strategies.”**

This would better reflect the evidence presented.

Specific Technical and Editorial Comments

13. Study-area coordinates should be checked

The manuscript gives the study area as **6°15'–6°25' N and 1°37'–2°48' E**.

The unusually broad longitude range should be verified against the actual geographical extent of the Benin coastline and the map.

The authors should also provide:

- total coastline length/area covered;
- municipalities included;
- a clear study-area boundary.

14. Figure numbering is inconsistent

The manuscript has:

- **Figure 1: Geographical location of the Benin coastline**
- later another **Figure 1: Analytical model of the links between climate, socio-economic activities, and natural resources**.

The second figure should be renumbered as **Figure 2**, or the numbering should otherwise be corrected.

This is an important formatting issue because it can confuse readers and interfere with cross-referencing.

15. The PSIR figure should be improved

The PSIR diagram is conceptually useful, but the graphical presentation can be improved.

The revised figure should clearly distinguish:

Pressure → State → Impact → Response

and show how:

- climate variability/change;
- coastal fragility;
- socio-economic vulnerability;
- environmental sensitivity;
- community adaptation;
- institutional strategies

are connected.

The current diagram contains considerable text and could be made more visually concise.

16. The manuscript should use “climate variability and change” more consistently

The paper alternates among:

- climate dynamics;
- climate variability;
- climate change;

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- climatic deterioration;
- eco-climatic changes.

These terms are related but not identical.

The authors should define **“climate dynamics”** at the beginning and use the terminology consistently throughout.

17. The conclusion contains some overgeneralized statements

The statement that the coastal region is marked by a **“dysfunction of its socio-economic system”** is strong and somewhat broad.

The evidence presented supports substantial vulnerability and disruption of selected activities, but “dysfunction” implies a much broader systemic failure.

A more scientifically cautious formulation would be:

“The findings indicate substantial climate-related vulnerability and disruption of several socio-economic activities along the Benin coastline.”

18. References require careful checking

The reference list contains several formatting and bibliographic issues.

Examples include:

- inconsistent spacing around punctuation;
- inconsistent journal formatting;
- apparent typographical errors;
- “State Doctoral thsesis”;
- “West Africa::The case”;
- inconsistent DOI presentation;
- incomplete bibliographic information for some references.

The authors should verify every reference against the original publication and apply the target journal's reference style consistently.

19. Language editing is required

The manuscript contains several grammatical and typographical problems.

Examples include:

- “the results of the analyzes were carried out with the PSIR model”;
- “Benincostline” in the keywords;
- “According to Ozer et al. (2017) measured...”;
- inconsistent spacing around punctuation;
- inconsistent use of hyphens;
- awkward constructions such as “climatic deterioration.”

The manuscript would benefit substantially from **professional English language editing by a proficient scientific English editor**.

Strengths of the Manuscript

Despite the above concerns, the manuscript has several strengths:

1. **Relevant and timely topic** for coastal climate-risk management.
2. Covers both **natural resources and socio-economic activities**.
3. Includes field-based observations rather than relying exclusively on secondary literature.
4. Uses a multidisciplinary approach combining climate, environment and socio-economic dimensions.

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5. The five major activities—agriculture, fishing, salt production, sand extraction and tourism—are clearly identified.
6. The sensitivity matrix provides a useful framework for prioritizing vulnerable components.
7. The adaptation section captures both **community-based and institutional responses**.
8. The PSIR framework provides a useful conceptual structure connecting climate pressure, environmental state, impacts and responses.
9. The manuscript appropriately acknowledges limitations associated with the sample size and qualitative nature of the perception indicators.

Recommended Revision Priorities

I recommend that the authors address the following **in this order**:

Essential revisions

1. Provide complete climate-data sources and methodology.
2. Explain the sampling design and respondent distribution.
3. Explain exactly how the exposure and impact indices were calculated.
4. Distinguish measured climate trends from respondent perceptions.
5. Moderate causal claims that are not supported by quantitative evidence.
6. Clarify the 92% versus 100% respondent results.
7. Improve the evaluation of adaptation measures.
8. Correct figure numbering and cross-referencing.
9. Verify the study-area coordinates and map.
10. Thoroughly edit the English language and references.

Recommended additions

- Add a table describing respondent characteristics.
- Add equations for exposure and impact indices.
- Add a table showing the number of respondents by activity/location.
- Provide quantitative climate trends if climate datasets are available.
- Include a clearer limitations subsection.
- Strengthen the discussion of how climate hazards interact with anthropogenic pressures.

Final Recommendation

Decision: MINOR REVISION

The manuscript has **good scientific and practical potential**, particularly because it integrates climate risks, natural resources, socioeconomic activities and adaptation strategies along the Benin coastline. The field survey and PSIR framework provide a useful foundation. However, the current version does not yet provide sufficient methodological detail to fully support its quantitative indices and some of its broader causal conclusions.