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REVIEWER'S REPORT

Manuscript No.: IJAR-51475

Date: 09-05-2025

Title: Assessing and predicting drought vulnerability of Jessore district in Bangladesh with Markov Chain model

Recommendation:	Rating	Excel.	Good	Fair	Poor
Accept as it is YES Accept after minor revision Accept after major revision Do not accept (<i>Reasons below</i>)	Originality				
	Techn. Quality				
	Clarity				
	Significance				

Reviewer's Name: Tahir Ahmad

Reviewer's Decision about Paper:

Recommended for Publication.

Comments (Use additional pages, if required)

Reviewer's Comment / Report

Abstract: Evaluation

The abstract provides a clear and concise overview of the study. It effectively emphasizes the importance of drought in the context of Bangladesh's agriculture sector and introduces the Markov Chain model as the analytical framework. The use of long-term historical rainfall data (1961–2020) is well noted, along with the methodology involving interval segmentation and application of drought index analysis. The results are summarized succinctly, highlighting both historical trends and the future outlook (2021–2030), noting an expected increase in occasional drought.

The inclusion of key findings—such as chronic drought during earlier decades and a shift toward occasional drought due to climate change—adds depth. Overall, the abstract sets the

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scope and significance of the study well, though it uses some repetitive or loosely structured sentences that may be streamlined for clarity.

Introduction: Evaluation

Context and Relevance

The introduction successfully situates the problem within a broader climatic and regional context. The linkage between global climate change and localized drought impacts in South Asia, specifically western Bangladesh, is articulated effectively. Citing past studies and historical droughts provides evidence of the recurring nature and severity of drought in Jessore and the wider region.

Definition and Conceptual Background

The introduction gives a good theoretical grounding by discussing various types of drought meteorological, agricultural, hydrological, and socioeconomic—and referencing relevant literature. Definitions of agricultural drought and the role of climate variables such as precipitation, evapotranspiration, and soil moisture are clearly explained.

Significance of Study

The rationale for the study is well justified. The acknowledgment that drought has received relatively less research attention compared to floods and cyclones in Bangladesh strengthens the relevance of the work. The historical framing of drought occurrences and the emphasis on a predictive approach using a statistical model underscore the study's importance for future planning and mitigation.

Clarity and Structure

The structure of the introduction is logical, moving from general climate trends to regional impacts and the specific problem in Jessore. The inclusion of empirical references strengthens the credibility of the statements. The paragraphing is appropriate, and the narrative flows

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smoothly from one idea to another. Some references are somewhat dated but still contextually appropriate given the historical nature of drought analysis.

Methodological Framework (as inferred from the abstract and introduction)

The methodology, while not explicitly detailed in the excerpt, is inferred from the abstract. The approach includes:

- Cleaning and processing daily rainfall data from 1961–2020.
- Conversion into multiple time intervals (5, 7, 10, and 30 days).
- Use of Microsoft Excel and R software for data analysis.
- Application of the Markov Chain model to assess transition probabilities.
- Prediction of drought probabilities for 2021–2030 using the drought index.

The methodological choices are suitable for drought prediction and assessment. The decision to analyze data across different time intervals allows for a nuanced view of short-term and long-term drought trends. Use of a threshold value (7 mm) provides a concrete basis for defining dry and wet days.

Preliminary Results and Discussion (as inferred)

The summary of findings indicates a shift in drought characteristics over time in Jessore. Early decades experienced chronic droughts (especially during 1961–1970), whereas the current and forecasted patterns suggest more moderate or occasional droughts—likely due to climate variability or change.

The use of first-order transition probability matrices (TPMs) within the Markov framework seems to reveal useful temporal patterns. The analysis provides insight into the evolving nature of drought vulnerability, with implications for agricultural planning and water resource management.

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Keywords: Evaluation

The keywords are mostly appropriate but contain a minor typographical error: "Markon chain" should read "Markov chain." The keywords otherwise align well with the study content.

Overall Assessment

This study addresses an important issue—drought vulnerability in a climate-sensitive and agriculturally dependent region. It is well grounded in climatological and hydrological theory and makes good use of statistical modeling to explore past and future drought trends. The focus on a specific region (Jessore district) offers localized insights that can inform regional planning and risk mitigation.

The abstract and introduction demonstrate a clear understanding of the topic, and the use of long-term data strengthens the reliability of the analysis. The historical overview, methodological outline, and reference to key literature support the study's credibility and relevance.

The report appears to be well-structured, technically sound, and relevant for policymakers, researchers, and practitioners concerned with climate adaptation and agricultural resilience in Bangladesh.