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REVIEWER'S REPORT

Manuscript No.: IJAR-55543

Title: Flood Magnitude and Dynamics in the Ungauged Velabisht River Basin, Albania, Based on RainfallÂ–Runoff Modeling,

Recommendation:

Accept as it is .....

Accept after minor revision.....

Accept after major revision .....

Do not accept (*Reasons below*) .....

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

Reviewer Name: Dr Thirunahari Ugandhar

Detailed Reviewer's Report

General Evaluation

The manuscript presents a detailed and well-structured hydrological study focused on flood magnitude estimation in the ungauged Velabisht River basin, Albania, using a semi-distributed HEC-HMS rainfall–runoff modeling framework. The topic is relevant and timely, particularly for regions where hydrometric data are scarce. The methodological approach is appropriate, clearly described, and consistent with established hydrological practices. The results provide useful insights for flood risk assessment and hydraulic design in ungauged basins.

Title

The title is clear, informative, and accurately reflects the study's objectives, methodology, and study area. It successfully communicates the focus on flood magnitude, dynamics, and rainfall–runoff modeling in an ungauged basin.

Minor suggestion:

Ensure consistent formatting and remove unnecessary numbering or spacing.

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Abstract

The abstract is comprehensive and effectively summarises the background, methodology, key results, validation approach, and practical implications of the study.

Suggestions:

- Consider including one or two quantitative results (e.g., peak discharge values for major return periods) to strengthen the impact.
- Minor language refinement would improve readability but is not critical.

Introduction

The introduction provides a strong theoretical background and clearly explains the challenges associated with flood estimation in ungauged basins. The relevance of rainfall–runoff modeling and the suitability of the HEC-HMS model are well justified. The objectives are clearly stated and logically derived from the identified research gap.

No major revisions are required.

Materials and Methods

The methodology is described in sufficient detail to allow reproducibility. The use of DEM-based basin delineation, precipitation frequency analysis using the GEV distribution, Curve Number method for loss estimation, NRCS synthetic unit hydrograph for runoff transformation, and Muskingum–Cunge routing is appropriate for an ungauged basin.

Strengths:

- Clear justification for model selection and parameterization
- Appropriate use of GIS for spatial parameter estimation
- Logical construction of design storm hyetographs

Minor suggestions:

- Improve clarity and formatting of equations, especially those related to precipitation reduction and basin lag time.
- Briefly discuss uncertainty associated with assumed parameter values, particularly CN and routing parameters.

Results

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The results are clearly presented and logically interpreted. The generation of complete flood hydrographs for multiple return periods is a major strength. The comparison with hydrological analogy-based estimates provides an independent plausibility check and enhances confidence in the model outputs.

Suggestion:

- Improve table formatting and ensure consistency between reported values in tables and the text.

Discussion

The discussion effectively interprets the modeling results and acknowledges key assumptions, particularly the equivalence of rainfall and flood return periods and the linearity of the unit hydrograph approach. The explanation of discrepancies between modeled and analogy-based peak flows is scientifically sound and well reasoned.

Minor suggestion:

A short subsection explicitly addressing model uncertainty and limitations would further strengthen this section.

Conclusion

The conclusions are well supported by the results and clearly summarize the main findings and practical implications. The emphasis on the need for hydrometric monitoring is appropriate and forward-looking.