Responses to Reviewers

Reviewer #1:

The authors presented a study on flood relief logistics planning based on Geographic Information System (GIS) analysis and resource allocation optimization models in the Shanghai area. They explored the effectiveness and fairness of resource distribution in managing flood crises under 100-year and 1000-year flood scenarios. They found that the current capacities of emergency flood shelters (EFSs) and emergency reserve warehouses (ERWs) are adequate for a 100-year flood but insufficient for a 1000-year flood scenario, and highlighted the need for greater resource investments to address potential shortages. In general, this study is interesting and has practical significance. Most parts of the manuscript are well structured and expressed. This study would be helpful for the community of disaster management and urban planning. However, the current manuscript needs a major revision before it is published in this journal.

We greatly appreciate the invaluable and constructive feedback provided by Reviewer #1. Our responses are highlighted in blue italic. We have acted upon all the points raised. The comments were very useful in improving the overall quality and readability of the manuscript.

Comment 1: The paper presents a well-integrated framework for flood relief logistics that combines Geographic Information Systems (GIS) and optimization models. However, the validation of these models is primarily limited to a case study without comparisons to actual event data or established models. Comparing the proposed model outputs with historical flood events or the results from established models would significantly enhance the manuscript's robustness. I suggest the authors to add a discussion in the last part.

Thank you for your valuable feedback on our paper. The issue of model validation you pointed out is indeed important. We have added a discussion in the final section highlighting the need for such validation and indicating the direction for future work. Specifically, we have added the sentence as follows:

line 445-447: 'Third, this study has not yet included formal validation of the proposed models. Future work should prioritize comparing model outputs with historical flood event data or other models to enhance the robustness.'

Comment 2: The manuscript briefly mentions specific details about the optimization methods used, such as the NSGA-II algorithm and parameter setting withoutin-depth explanations. Providing detailed descriptions of these methods would enhance the reproducibility of the paper and offer a clearer understanding for readers with specialized knowledge.

Thank you very much for the suggestion. We have added the sentence as follows:

Line 347-353: 'NSGA-II (Non-dominated Sorting Genetic Algorithm II) is an advanced multi-objective evolutionary algorithm that maintains population diversity across generations through non-dominated sorting and promotes uniform distribution of solutions along the Pareto front using a crowding distance measure. As a mature and widely applied method for solving complex multi-objective problems, NSGA-II is included in the MATLAB Optimization Toolbox. The parameters used in this study are summarized in the following table:'

Table 4. NSGA-II Parameters Table

Parameter	*Population Size*	*Maximum Number of Iterations*	*Pareto Fraction*	*Crossover Probability*
Value	*500*	*3,000*	*0.4*	*0.8*

Comment 3: More comprehensive details regarding the data sources used in this study would be beneficial. Clarifying the availability and accessibility of these data for other researchers or planners, as well as disclosing any proprietary or restricted data, would enhance the transparency and applicability of the research.

Thank you very much for your comment. Regarding the data sources used in this study, we have provided more comprehensive details. The emergency shelter data for Shanghai, which can be publicly accessed, was provided by the Shanghai Emergency Management Bureau and is available at https://gfdy.sh.gov.cn/yjbncs/. This information has been noted in line 280 of the revised manuscript.

Specifically, the remaining datasets include:

1) *The future flood inundation scenarios in Shanghai under the climate scenarios used in this study were previously established by the authors (Yin et al., 2020).*
2) *The community census data and road network data for Shanghai were provided by Shanghai Municipal Bureau of Statisticsa and Key Laboratory of the Ministry of Education at East China Normal University.*
3) *The data for the emergency warehouse locations were supplied by our collaborating institution, the Shanghai Emergency Management Bureau.*

These datasets are not open-source. We have ensured that the necessary permissions have been obtained for their use in this study.

Comment 4: The manuscript mostly cited is relatively old. It is recommended to add more recent researches that would update and enhance its relevance to current disaster management and urban planning challenges.

Thank you very much for your comment. We added the references to include recent studies in the fields of disaster management and urban planning as follows:

Line 55-60: 'Moreover, The New Urban Agenda outlines actions to strengthen cities' capacities to reduce disaster risks and mitigate their impacts (Habitat III, 2017). The Making Cities Resilient 2030 (MCR2030) initiative advocates for incorporating climate risk projections into disaster risk reduction and resilience strategies (UNDRR, 2022). Yin et al. (2024) demonstrate the improved performance of risk-informed, strategic evacuation planning in advance of coastal flooding. Additionally, the IPCC highlights the critical role of humanitarian responses and local disaster management in disaster risk reduction (IPCC, 2023).'

We also added some references in revised manuscript as follows:

Lines 33-34: 'Over the past two decades, the number of major flood events has more than double, claiming approximately 1.2 million lives and impacting over 4.03 billion people. (Mizutori and Guha-Sapir, 2020).'

Lines 45-46: 'Disaster risk management systems face increasing challenges in adapting to evolving risk profiles (IPCC, 2023).'

Comment 5: The language of this paper needs to be further refined since some language expressions are not accurate, and the expression in some places is too redundant.

Thank you very much for your suggestion. In the updated version, we refined the manuscript to correct redundant expressions and inaccuracies throughout the text.

Comment 6: The captions of figures and table can remove "the". Data sources and model parameter variables are best represented by tables.

Thank you very much for your comment. We appreciate your valuable suggestion. In the revised manuscript, we have removed "the" from all figure and table captions and added additional table as follows.

Table 1. Data Sources Information.

Data Type	*Source*	*Description*
Flood Inundation Maps	*Yin et al. (2020)*	*Simulated coastal flood inundation scenarios for 100-year and 1000-year return periods under RCP 8.5 scenario.*
Road Network	*Key Laboratory of the Ministry of Education at East China Normal University.*	*Comprises approximately 243,000 road sections with attributes including name, type, function, direction, and length.*
Demographic	*Shanghai Municipal Bureau of Statistics*	*Detailed demographic information at the community level.*
Emergency Warehouse	*Shanghai Emergency Management Bureau*	*Includes 169 emergency warehouses.*
Emergency Shelter	*Shanghai Emergency Management Bureau*	*Includes 117 emergency shelters divided into three classes.*

Table 4. NSGA-II Parameters Table

Parameter	*Population Size*	*Maximum Number of Iterations*	*Pareto Fraction*	*Crossover Probability*
Value	*500*	*3,000*	*0.4*	*0.8*

Comment 7: The authors selected two scenarios of 100-year and 1000-year for comparison. Does it fully consider the differences in other scenarios ? For example, 500-year, will it affect the results ? It is suggested to add some discussion.

Thank you very much for your comment. We chose these two scenarios primarily because they represent situations where supply either exceeds or falls short of demand. In the case of a 1000-year flood scenario, where supply is insufficient, decision-makers may need to consider the fairness of resource allocation. Therefore, we proposed a bi-objective allocation model to address this issue and provide guidance for decision-makers.

A 500-year flood event would involve different population needs, leading to different allocation outcomes. However, given that the 100-year and 1000-year scenarios adequately represent the supply-demand dynamics that decision-makers encounter in resource allocation, we focused on these two scenarios to demonstrate the application of our allocation model.

While we did not explore the results for other scenarios in this paper, future research involving the optimization of emergency resource locations for multiple recurrence periods will consider more scenarios.