

JOURNAL OF COASTAL AND HYDRAULIC STRUCTURES

Review and rebuttal of the paper

Lessons learned from Evacuation and Emergency Measures during the summer 2021 floods in the Netherlands

Kolen et al.

Editor handling the paper: Miguel Esteban

The reviewers remain anonymous.

Reviewer A:

The submitted manuscript investigates evacuation behavior in the Netherlands during the major floods of July 2021. Unfortunately, despite the existence of numerous publications related to this flood, this manuscript overlooks the majority of them. As a result, it does not effectively highlight its novelty or utility in comparison to existing research.

Answer: This paper is part of a special issue on the flood 2021 event, this paper only focuses on evacuation response. We have added more context about the 2021 event, as well as literature about the event so the paper can be read individually.

The manuscript presents various pieces of information about flood evacuation; however, this information is not provided in an organized manner. As a result, the text appears to be simply a collection of unstructured data, diminishing its utility and effectiveness. Moreover, due to the lack of analysis on the compiled information, the lessons drawn in the conclusions are not sufficiently substantiated. This absence of thorough examination leads to conclusions that lack both objectivity and a foundation in robust evidence, thereby undermining their generalizability.

Answer:

1) The main purpose of the research was a rapid assessment to collect data (with regard to evacuation) of the event in the 3 months after the event. So therefore we have a focus on the collection and description of the data and support the observation of the reviewer on this. We made the rapid assessment purpose more explicit in the paper (also a comment made by reviewer B). We also restructured the complete paper and added several section about the event itself, maps, the emergency preparation and basic literature.
2) We added a review on existing literature of evacuation and policy (emergency preparedness) to the document with a focus on te Limburg area. This contributes to a better understanding of te observation and to support the lessons learned. The authors however hesitate to define lessons learned for the decision making process itself because other factors are involved. We only gathered and analysed the information and reflected on this. Official crisis management and policy evaluation is done by the water board and safety regions.

The manuscript includes many place names without sufficient explanation, which may challenge readers unfamiliar with the Netherlands (e.g., the place names depicted in Figure 3 are too small to read easily). The use of English in the manuscript is also marred by numerous grammatical mistakes and awkward phrasings.

Answer: We added and improved the maps in the paper. First we present an overview map which shows the location of the Meuse, Geul en de location of St Pieter. We have 4 detailed maps which are presented later in the paper next to the timeline. These maps also holds the names of all location. In addition we improved English.

Additionally, the manuscript suffers from inexplicable use of yellow hatching and contains residual comments, presumably from the manuscript's preparation phase. These shortcomings significantly compromise the overall quality of the manuscript. Given these concerns, the reviewer must conclude that the manuscript does not meet the required publication standards and recommend that it not be considered for publication in its current form.

Answer: These comments en yellow parts should not have been part of the manuscript (of course).

Reviewer B:

The paper describes the evacuation process and lessons learned during the summer 2021 floods in the Netherlands. The analysis is based on social media and official information. These lessons are important for future planning of emergency response. The paper is well written and the topic is of interest to the journal. The novelty aspect of the paper is not written in the abstract, and this reviewer thinks that the novelty of the paper deals with collecting information from different sources and analyzing the facts during and after the inundation to draw lessons for future events. The objective of the paper is clearly written in the introduction section. However, the structure of the paper should be improved to be more understandable to non-Dutch readers.

Answer: The novelty of this research is added to the abstract. We also changed the title to make it clear that the study is a rapid assessment.

- The documents have several comments from the authors, so the manuscript could not be the final version. Could it be?

Answer: These comments in yellow parts should not have been part of the manuscript (of course).

- The introduction section should include more background regarding the Dutch warning system and the development of this system over the years, thus readers can better understand the good or bad performance during the present event. Previous events or similar events in other places may be interesting too.

Answer: We added more literature about early warning and evacuation, we also added a section which describes the emergency preparation in the Netherlands and improvements made in the last decades. However it still is difficult to define the actual level of preparedness in a quantitative way.

- The introduction should also have a short description of the physics of the event. Origin, extension, causes, etc.

Answer: We added a general description of the event and an overview map. At first we did not add this information to the paper because the paper was part of a special edition which also holds lots of other papers about the same event. Reviewer A made the same comment. We improved the manuscripts on this.

- A short description of the structure of the paper should be added to the last paragraph of the introduction

Answer: This is added at the end of section 1.

- Figure 1 is difficult to understand without an explanation of the warning system and a description of the event. I believe this figure is more suitable for results rather than introduction.

Answer: We added a figure of the entire water system in section 1 as a part of the description of the event. We added 4 detailed maps which are presented in section 4 to support the timeline of evacuation.

- The caption of Figure 1 says "...(after ENW, 2021)" What is ENW? It has not been described previously.

Answer: We explained about ENW in the paper, the Export Network Water. See also <https://www.enwinfo.nl/>

- I strongly recommend a new high-quality figure of the study area, which should include a general map of Europe, Netherlands, and the affected area. This figure should also have the names of rivers, cities, and valleys mentioned in the following sections (Figure 3 is really bad, consider replacing it). In addition, the figure should have the weather or discharge stations.

Answer: Figures have been added, including the discharge station St Pieter.

- I strongly recommend adding a new section called study area or study area description, such that more information related to the physical parameters of the area and the event can be described. Therefore, the reader can better understand the impact of the current event. This section can include a more complete description of the area including names of towns and cities affected by the events, which are also mentioned in the following sections. The new Figure 1 with the maps would be suitable for this purpose. You can also add records of water discharge in available stations to better understand the event.

Answer: We added a general description of the event and a map in section 1. This was not part of the first submission because we assumed that this information was known because this paper is part of a special edition about this event. We have added the information so the paper can be read separately from the other papers.

- The methodology mentions the source of information only, but no description of the analysis is given. What kind of method will you apply to analyze all the available information?

Answer: We have collected all the data, and reflected to existing assumptions for this area about evacuation. We made the current state of preparation more explicit so this is more clear in the paper.

- Line 4 page 3, what's the meaning of LC-LS?

Answer: We explained about LCMS in the paper, this is a information system used by al crisis management partners.

- The list of social media sources could be in a table with information regarding the owner and date of access. Some of the links are not available.

Answer: We added the period of data collection. It is correct that some of these links are not available anymore. We also discuss this in paper. It shows the need for rapid data collection because the information is 'gone' soon.

- Line 21 page 4. Why the title "different rivers", I know you are analyzing different rivers, but the title says nothing.

Answer: This is changed in restructuring the manuscript.

- Lines 22 to 32 page 4. The information given here is more suitable for a section called "Study area description", since most of the information is a description.

Answer: This is changed in restructuring the manuscript.

- Figure 3 should be changed and improved. Consider replacing it with a new figure as mentioned in previous comments.

Answer: We assume that this point is about the figure with the map of Limburg. This figure has been improved (see other comments).

- Line 8 page 5. Where is Geul Valley in the figure?

Answer: We added the names to figure 1.

- Line 13-14 page 5. Where is Juliana Kanal in the figure?

Answer: We added the names to figure 4-7.

- Line 23 page 5, where are Meuse and Roer Valleys located?

Answer: We added the names to figure 1.

- Line 18 page 5, where is Limburg on the map?

Answer: figure 1 is Limburg, we mentioned this in the title of the figure.

- Line 15 page 8, Two elements of uncertainty...?

Answer: A typo, we improved English in the entire paper.

- Line 25 page, should it be Figure 4?

Answer: We restructured the manuscript, and updated all numbers.

- Line 5 page 10, where is St Pieter located?

Answer: We added St Pieter to the map of figure 1.

- Figure 4. Would it be possible to compare these results with the actual record?

Answer: The main point for this paper is the uncertainty in the forecast because all evacuation decision are made based on these forecasts, we mention the maximum value of the discharge. In the paper of Stijker et al (part of the special session) the hydrological situation is discussed in more detail.

- Line 22 page 10, Figure 5, What's the meaning of the light blue box in the second column

Answer: Good question. To be honest, we do not know. We mention this in the paper as well.

- Line 21 page 13, Figure 5 again? What's the source of the figure?

Answer: This picture is removed, it was just an example and the source is not known.

- Line 2 page 14, "The emergency measures were *realised* based...", taken?

Answer: We checked all English.

- Line 2 page 15, Where is this location on the map? Source of the picture?

Answer: This picture is removed, it was just an example and the source is not known.

- Line 21 page 17, visited 24/0/2023, date incorrect.

Answer: Corrected.

Reviewer B:

- 1) In general, the manuscript demonstrates a clear effort to respond to previous reviewer comments, including improving structure, adding detailed maps, and enhancing the description of the study area. The explicit framing of the study as a rapid assessment effectively sets realistic expectations and aligns the findings with the scope of the analysis. In addition, The paper provides practical recommendations for emergency planning and highlights key lessons learned from the 2021 flood event. Moreover, New maps and figures significantly enhance the clarity of the manuscript and aid readers in visualizing the affected areas and evacuation measures.

Answer. Thanks for the comments. We agree, the previous review helped us to be more specific about the added value of the manuscript.

- 2) While the descriptive elements are thorough, the manuscript could further delve into: a) Specific reasons behind the successes or failures of emergency responses. b) Comparative analysis with international standards or case studies to strengthen the global relevance of the findings.

Answer. This is an interesting question. To evaluate the emergency measures data is needed about the operation itself and the local circumstances. We added a reflection using a model of Lendering (2016) developed to analyse the effectiveness of emergency management.

- 2) Although more literature has been incorporated, the theoretical and empirical context could be expanded to reinforce the paper's novelty and contribution to disaster management studies.

Answer. We agree that lessons have to be learned of this event. However we focused mainly on data collection. If we want to reflect to on for example the effective of disaster management we should also analyse the preparation in advance. This is part of the official evaluations. We added a section about emergency measures and how to define the effectiveness.

- 3) The manuscript highlights discrepancies between forecast data and communication but lacks a synthesis of actionable lessons to mitigate these issues in future events.

Answer. We indeed only mention the discrepancies, we also show the uncertainty in the forecast. We hesitate to define actionable lessons because this also part of the official evaluation done by the waterboard and safety region. We focus on the collection of information.

- 5) Minor grammatical errors and awkward phrasing remain. A professional language editor could enhance the manuscript's readability and Flow

Answer. We improved the manuscript for English.

- 6) Some figures and tables lack comprehensive captions. Clearly define all abbreviations and terms to ensure accessibility for international readers unfamiliar with Dutch systems

Answer. We checked all figures, and gave a description if needed.

- 7) It could be necessary to comment about any ethical concerns related to the use of social media and public data sources.

Answer. We used only social media accounts owned by governmental organization, we did not mention names.

- 8) It would be interesting to know future studies or methodologies to build upon the limitations and findings of this rapid assessment.

Answer. We agree, it would be interesting to evaluate the added value of these rapid assessments. What we already see is that a lot of information is already hard to get, ef the information on the blogs by the emergency services and waterboards.

Recommendation: Revisions Required

Reviewer C:

This paper presents a nice overview of the emergency measures and evacuation response during the 2021 floods in the Netherlands. The paper is well written, with a clear structure, and is very informative. The lessons learnt are interesting, and very much in line with the scope and mission of the journal. This reviewer recommends its publication following a number of minor corrections. This reviewer hopes the authors will take all these recommendations and modify the manuscript accordingly, and no further round of review is necessary.

Comments

-Many phrases lack clarity or are written in poor English. This reviewer has attempted to provide suggestions on how these sentences can be improved, in the document attached.

Answer: Thanks for the suggestion, it improved the manuscripts.

-The document attached also has a number of comments that the authors should clarify.

Answer: We gave more specific information per comment. All of them could be explained.

-Page 3. The list of sites used should be moved to an appendix.

Recommendation: Accept (after minor revisions)

Answer: We placed the list of social media in an appendix.