Natural Hazards and Earth System Sciences Discussions

Nat. Hazards Earth Syst. Sci. Discuss., author comment AC5
https://doi.org/10.5194/nhess-2022-136-AC5, 2022
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Reply on RC5

Wei Li et al.

Author comment on "Spatial Distribution of Vulnerability to Extreme Flood: in provincial scale of China" by Wei Li et al., Nat. Hazards Earth Syst. Sci. Discuss., https://doi.org/10.5194/nhess-2022-136-AC5, 2022

The paper "Spatial Distribution of Vulnerability to Extreme Flood: in provincial scale of China" concerns an interesting research topic that is the spatial variability of vulnerability to floods. Nevertheless, despite the good intentions, the paper does not face the problem with the necessary accuracy to reach reliable results, and does not explain enough neither methodology nor results.

I believe that this manuscript needs strong improvement to bring it up to an international level, in terms of both language and scientific approach, and from my point of view it should be rejected.

Main problems

Comment 1:

Results and method presented in the paper are merged to results already published in literature, and the reader cannot understand what is literature and what is a result of this research.

Response:

I'm sorry, what we want to explain here is that the Variable Fuzzy Set theory and Cloud-improved Entropy weighting method we quoted are the previous research results of our team. In addition, I would like to explain our differences from the existing vulnerability researches in combination with the introduction.

First of all, it was proved by literatures that vulnerability research is a scientific method of disaster management and a hot spot of current research. Secondly, through the study and summary of a large number of literatures, we founded that under the specific scale, the vulnerability of different regions may be quite different, and it is necessary to study the regional vulnerability. Finally, it was founded that in the existing regional vulnerability researches, there almost no one has studied the vulnerability from the provincial scale, so we have carried out relevant research to help government decision-makers manage disasters at the macro level.

Comment 2:

The methodology is not clearly explained neither in terms of data nor procedures and calculations, and it is impossible its replication in another study area.

Response:

We have selected eight representative indicators from the four levels of environment, economy, life and society to reflect the vulnerability of disaster victims. Then reliable data were obtained from various official sources. Finally, the vulnerability is calculated by a scientific theoretical method. I'm sorry that the introduction of theory in the manuscript may be not sufficient, which makes you feel that there is no clear explanation, and the method cannot be copied. Therefore, we have supplemented the theoretical content in the manuscript.

Comment 3:

There is an unappropriated use of words as vulnerability and risk that already have specific definitions in literature. Authors combine them in unintelligible neologisms that generate a cascading effect of misunderstandings throughout the entire paper. According to IPCC (Intergovernmental Panel on Climate Change), the "Determinants of Risk are: Hazard, Exposure, and Vulnerability". Then, vulnerability is part of the risk, and terms as “flood risk vulnerability” and "Extreme flood riskvulnerability" for me are obscure.

Response:

Thank you for your professional advice. Other experts also raised this issue. I'm sorry for the inconvenience caused by our writing mistakes. According to your suggestion, we have deleted the word "risk" from the word "risk vulnerability".

Comment 4:

The language used is not adequate to an international scientific journal and does not allow to readers to understand the topic.

Response:

According to your suggestion, we have carefully checked the language expression of the manuscript.

Comment 5:

Figures are not explicative, and show low graphical standard.

Response:

According to your suggestion, we have replaced the high-quality figures and supplemented the description of the figures.

ABSTRACT

Comment 6:

It is not clear. After a section related to flood damage and a not understandable description of the methodological approach, the results are presented as:

"The spatial distribution of the EF risk vulnerability shows (1) a decreasing trend from the regions with high population density to regions with low population density, (2) a decreasing trend from economically developed regions to economically backward regions, (3) a decreasing trend from the eastern coastal regions to the central agricultural provinces and then to the southwest, northwest and northeast regions in China".

First of all, I cannot understand what is the "EF risk vulnerability", and secondly it is unclear what are the "factors of flood resistance" and the "four aspects including life, economy, environment and society" listed in lines 13-16.

Response:

According to the previous suggestions, we have revised the writing of EF risk vulnerability. Ge et al. (2020) points out that the impact of EF can be divided into four aspects: economy, life, environment and society (Title: Status and development trend of research on risk consequences caused by dam breach; DOI: 10. 14042 /j. cnki. 32. 1309. 2020. 01. 015). Among them, life mainly refers to the loss of life in the flooded area caused by factors such as water flow impact, inundation and cold; Economic losses mainly refer to the direct economic losses of houses, furniture, materials, agriculture, etc. And indirect economic losses caused by affecting the transportation and normal production of factories and mining enterprises; The environmental impact mainly refers to the changes in river morphology, human landscape and major pollution caused by floods, which are specifically reflected in the water environment, soil environment, ecological environment and human settlements. The social impact mainly refers to the change of people's original life style, quality of life, psychological state and the impact on the political system and cultural level.

INTRODUCTION

Comment 7:

It is confused and pertains papers of sectors not inherent to the research topic. The authors used here several unclear words (for example: L65 Country-scale regions (country region or scale region?); L47 vulnerability of life loss; L56 vulnerability of EF…!) The authors do not relate their work to the broader literature, and then the reader cannot understand the context, what others have done, and what is the novelty of the submitted paper

Response:

We are sorry that our writing method has caused you great trouble in reading. In line 65, what we want to express is that Zeng, the author, has conducted a vulnerability study at the county scale. In line 47, what we want to express is that Ziegler, the author, only carried out the research on the vulnerability of EF to people life, excluding the consideration of economic, environmental and social impacts. In line 56, what we want to express is that Adikari, the author, believes global changes, domestic migration patterns, development practices, political instability and other factors have a great impact on vulnerability. According to your suggestions, we also checked and revised the language

problems in the rest of the manuscript.

Comment 8:

From L90 to 94 the authors tried to explain the aim of the work, even if this explanation in not clear enough. Introduction ends with the 4th aim of the paper that is:

”It will provides important decision-making basis for flood control, disaster reduction, disaster relief and disaster reduction, and provides reference for similar research in the future”.

In my opinion, this is not an objective of the paper, maybe an application of results, with the repetition of “disaster reduction”.

Response:

In lines 90 to 94, we gave a more specific description of the 4th aim of the manuscript: to provide the government decision-makers with a macro understanding of the vulnerability at the provincial scale, and to provide reference for the subsequent research on the vulnerability at the provincial scale.

We believe that providing an important decision-making basis for flood prevention, disaster reduction, disaster relief and disaster reduction is the ultimate goal of all disaster assessment researches, but different studies have different ways to achieve this goal. Our research on vulnerability at the provincial scale can help government decision-makers grasp vulnerability at the provincial scale.

MATERIALS AND METHODS

Comment 9:

From L99-105, the authors talk about the “evaluation method”. But the sentence explaining it is unclear:

“In this manuscript, we make full use of the expectation of cloud model and cloud entropy parameters, learn from the processing method of entropy weight method for index differences, take into account the subjectivity and objectivity of weight, and scientifically reflect the importance of risk factors”.

The description becomes more intricate in INDEX SYSTEM section, where it is unclear the difference between quoted literature and the work carried out by the authors.

Basing on this premises, from here on I found great difficulties in reading the paper, and especially the “Calculating Model” resulted completely obscure to me.

Response:

I'm sorry for the inconvenience. In lines 99-105, the references we cited are the results of our team's previous research (Li et al., 2018, 2019; Ge et al., 2020). We applied them to the current manuscript to ensure the scientificity of the calculation results. The specific information of the three references is as follows:

Li, Z.; Li, W.; Ge, W. Weight analysis of influencing factors of dam break risk consequences. Nat. Hazards Earth Syst. Sci. 2018, 18(12), 3355-3362. https://doi.org/10.5194/nhess-18-3355-2018

Li, Z., Li, W., Ge, W., Xu, H, Dam breach environmental impact evaluation based on set pair analysis-variable fuzzy set coupling model. Journal of tianjin university (science and technology). 2019, 52(03), 49-56. https://doi.org/10.11784/tdxbz201807030

Ge, W.; Li, Z.; Li, W.; Wu, M.; Li, J.; Pan, Y. Risk evaluation of dam-break environmental impacts based on the set pair analysis and cloud model. Nat. Hazards. 2020, 104, 1641-1653. https://doi.org/10.1007/s11069-020-04237-9

Comment 10:

"Evaluation indexes are constructed in the same type of data source for the consistency of data caliber". I cannot understand the meaning.

Response:

What we want to express is that, due to the lack of statistical data, we try our best to ensure that various data are same or similar in years.

Comment 11:

L156: "2.2.1 Index value basis and its standard": also here, it is unclear the title of the section and absolutely obscure the entire section. The use of index (singular) means that the authors used a single index. Section starts declaring that "disaster's impact on a region has a significant correlation with its population density". It seems quite obvious.

Response:

According to your suggestion, we have changed the title to "Indexes value basis and their standards". We believe that indicators must be typical and representative when selecting indicators, so the more obvious the indicators are, the more they meet the selection criteria.

Comment 12:

L168: why POPULATION DENSITY is called Rp (risk population)??

Response:

According to the suggestions of other experts, we have modified it to population density (P_D).

Comment 13:

L170: the authors stated that: "The young and middle-aged populations are physically

stronger, so they tend to have the ability to rescue themselves and others when disasters occur. Therefore, they are regarded as the main social force forresuming production and life after a disaster. According to the China and international labor force classification standards". This is an opinion: why this opinion is reported here?

Response:

Because it divides the young and middle-aged people, the ability of self rescue can be calculated according to this view

Comment 14:

L178 "Regional and urban-rural disparities are the important factors leading to regional disparities in disaster prevention in China. In terms of economic development, the eastern regions are the most developed, the central regions the second, and the western regions are the least developed. The economic development gap among these three regions is obvious. From the perspective of losses caused by disasters, the more intensive social and economic activities of an area, the more its social assets exposed to disasters due to the concentration of social wealth". Once damaged by disasters, the area will suffer greater economic losses". It seems that the authors already know the results that they are looking for, even before try to assess them…

Response:

Thank you for your comments to help us further improve the level of the manuscript. On the one hand, the more intensive social and economic activities are, the more likely they will cause serious losses. This is a qualitative description. The problem is how to quantitatively analyze this problem. For example, the more severe the flood, the more serious the economic loss. We also know this rule or result, but we will still analyze it. On the other hand, the difference in economic level is one of the important factors leading to different vulnerabilities, but it is not the only factor. We comprehensively assess vulnerability through four aspects: economy, life loss, environment and society, and then compare vulnerability among provinces.

Comment 15:

The section Discussion is merely made by one text line and one figure. Conclusions, according to the style of the paper, describe things that the reader is unable to assess if they represent a result of the paper or an opinion of the authors in some way confirmed by the intricate combination of not well-defined parameters presented in the paper.

Response:

The vulnerability is comprehensively affected by many factors. On the basis of calculating the vulnerability of each province and city, we intuitively express the degree of vulnerability in the form of images through classification methods (average and second average analysis), and analyze the distribution law of China's vulnerability according to the figure. These contents are the results of the paper and also represent our views. In addition, in order to verify the scientificity of the results, we also added the rationality analysis of the results as follows:

Although Beijing, Shanghai Tianjin, Guangdong and Jiangsu have strong comprehensive

disaster reduction and prevention capabilities, but their economies are the most developed and their population density is very high (their GDP per capita and population density are among the top seven in China all the year round), which leads to their extremely serious vulnerability. Provinces in the Yangtze River, Yellow River and Huaihe River basins (Hebei, Henan, Shandong, Sichuan, Chongqing, Hunan, Hubei, Anhui, Zhejiang and Fujian) are the main producing areas of grain in China, with relatively developed economy and large population, so their vulnerability is severe. In the northwest, southwest and northeast of China, although the traffic network density is low, once a serious EF disaster occurs, it is difficult to transfer the affected people and property, and may cause indirect losses due to ineffective relief and slow recovery. However, due to the terrain and geographical location, its population density is low, it is a gathering area of most ethnic minorities in China, and its economy is underdeveloped, so the vulnerability level of these provinces (Jilin, Liaoning, Inner Mongolia, Shanxi, Shanxi, Ningxia, Qinghai, Gansu, Xinjiang, Tibet, Yunnan, Guizhou, Jiangxi and Guangxi) is moderate. Heilongjiang province has become the only province with slight vulnerability to EF disasters. The reasons include low population density (bottom three in China all the year round), high proportion of labor force (top six in China all the year round), and strong disaster prevention and relief capacity (Heilongjiang, known as the "Great Granary of China", is the location of the Great Xing'an Mountains and the Small Xing'an Mountains. It is rich in forests, minerals, animals and plants. Therefore, the local government attaches great importance to disaster prevention). The vulnerability assessment results are highly consistent with the distribution laws of population, economy and natural environment in China, which verifies the rationality of the results.