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[Invited Lecture]

Analysis of flood fatalities in the Republic of Serbia

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Abstract: The paper analyses the impact of floods on the loss of human lives in the Republic of Serbia in the period 1960-2023. In the purpose of the paper, a dataset based on EM-DAT data on the number of floods and deaths caused by floods were analyzed in this period. It was shown that floods have not only socio-economic but also demographic consequences. Likewise, it has been established that floods occurred more frequently in Serbia at the beginning of the 21st century than in previous periods. Based on the available data, the floods in 1981 and 2014 were identified as the ones with the highest number of fatalities. In order to reduce effects of future floods on human life, the paper emphasized the importance of adequate policies.

Keywords: flood, fatalities, population, Serbia

Introduction

Natural disasters are destructive events of atmospheric, geological and hydrological origin, including floods, earthquakes, volcanic eruptions, landslides, tsunamis, droughts etc. Floods are the most frequent natural hazard event and have serious health, social and economic consequences (Liu et al., 2024).

The reported flood-related impacts on society and human health are widespread and complex. Floods continue to affect communities unequally and in different ways, with impacts ranging from short to longer term (Alderman et al., 2012). In recent decades, the number of people affected by floods and the number of deaths directly caused by them has increased (Yang et al., 2023). Flood mortality is a real problem worldwide and many countries are affected by the impacts at different levels. For every fatal flood, one or more people died due to a range of circumstances (Petrucci, 2021).

The impact of a flood is strongly influenced by the characteristics of the flooded area and the characteristics of the flood itself. For example, fast-rising flash floods can cause greater devastation than smaller floods due to drainage problems, and people in developing countries may be more vulnerable to the risk of flooding than people in developed regions. Area characteristics such as population density and size, land use, warning and emergency response vary at the regional level and have a major impact on the loss of life from flooding (Jonkman, 2003).

The floods in Serbia, which were accompanied by great material damage and loss of life, posed great challenges to society (Aćimović, 2021). This natural disaster is therefore increasingly being discussed in the media and in scientific circles. The main objective of this article is to provide an insight into the number of deaths caused by floods in Serbia and to analyse whether and how the impact of floods has changed over time.

Methods and data

For the purpose of this paper, EM-DAT data (<https://www.emdat.be/>) on the total number of deaths caused by floods in the Republic of Serbia were analysed. EM-DAT defines flood as "A general term for the overflow of water from a stream channel onto normally dry land in the floodplain (riverine flooding), higher-than-normal levels along the coast (coastal flooding) and in lakes or

reservoirs, as well as ponding of water at or near the point where the rain fell (flash floods)” (EM-DAT, 2024a). A dataset based on EM-DAT data on the number of deaths caused by floods, covering the period from 1960 to 2023.

Results and discussion

The data analysis shows that from 1960 to 2023, 28 floods were registered on the territory of Serbia, including mainly river floods. the number of floods at the beginning of the 21st century is significantly higher than in the previous period. From 1960 to 2001, five floods were recorded, while 23 floods were recorded from 2002 to 2023 (EM-DAT, 2024b).

Table 1. Total deaths caused by floods in the Republic of Serbia, 1960-2023.

year	Total deaths	year	Total deaths
1965	3	2013	-
1981	70	2013	-
1999	11	2014	-
1999	-	2014	51
2000	-	2014	1
2002	-	2014	4
2005	2	2016	-
2006	-	2016	-
2006	-	2018	-
2007	-	2019	-
2009	-	2020	-
2010	-	2021	-
2010	2	2023	2
2010	-	2023	-

Source: EM-DAT, 2024b.

Between 1960 and 2023, floods caused the deaths of 146 people. Based on the available data, the floods of 1981 and 2014 were singled out as the floods with the highest number of fatalities on the territory of the Republic of Serbia. In the 1999 floods, 11 people lost their lives. In other years, less than 10 people were affected by the floods. It is important to note that according to EM-DAT data, in most cases the impact of floods on human lives is unknown or unreported (Table 1).

In the 21st century, the floods in 2014 have had the greatest impact on the population in Serbia. After these floods, more attention was paid to this problem. Due to the socio-economic impact and the consequences for the population, some researchers have emphasised the importance of prevention, pointing out that investing in flood protection can lead to reducing the loss of life, i.e. avoiding a human tragedy. In addition to the humanitarian impact achieved by investing in protection against natural disasters, such an investment can also bring significant economic gains and cost savings for the state. The assessment of hazards and risks, accurate weather forecasts, the improvement of the early warning system and the timely announcement of extreme weather situations would be of great importance. In this context, the importance of local governments and capacity building is also emphasised. It is pointed out that local self-governments need permanently employed experts who specialise in a specific topic in order to minimise the impact of floods on the population (Ristić et al., 2017; Aćimović, 2021).

Conclusions

Floods are natural disasters that have different effects on the population in different parts of the world. Serbia is one of the countries where floods have catastrophic consequences for the population. According to the available data, 146 people died in Serbia in the period 1950-2023. Every life is important and the impact of future floods on people must be minimised. The researchers

suggest that policy makers should raise awareness of the increased risk to the population in order to improve disaster management strategies and thereby reduce the number of deaths (Yang et al., 2023). However, this issue in Serbia therefore requires more research that can serve as a framework for policy.

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