

ANALYSIS OF COMPLIANCE OF VALJEVO DISASTER RISK ASSESSMENT WITH METHODOLOGY

Srecko Vukovic¹, Serif Bajrami^{2a}, Katarina Jankovic^{3b}

¹ General Staff of the Serbian Armed Forces, Directorate for Development and Equipping J-5, Technical Test Center, Center for Testing Weapons and Military Equipment, Nikinci, Republic of Serbia, srecko.vukovic99@gmail.com

² University of Defence in Belgrade, Military Academy, Veljka Lukica-Kurjaka 33, Belgrade, Republic of Serbia, bajramiserif@gmail.com

³ General Staff of the Serbian Armed Forces, Directorate for Development and Equipping J-5, Technical Test Center, Center for Testing Weapons and Military Equipment, Nikinci, Republic of Serbia, jankovickatarina95@gmail.com

Received: 29th August 2023

Accepted: 10th September 2023

Professional paper

Abstract: *In today's dynamic world, disaster risk assessment stands as a pivotal element in safeguarding and promoting the sustainable development of local self-government units. These units play a crucial role in ensuring the safety of their citizens, environment, and valuable assets, all while confronting increasingly frequent threats, including natural disasters and other hazards. This paper centers its focus on evaluating the alignment of Valjevo's disaster risk assessment with the prescribed methodology and content, including the protection and rescue plan.*

The research aims to deepen our understanding of how the recommended steps of the disaster risk assessment methodology are consistently applied within this specific local self-government unit. Through an examination of how potential risks are identified, assessed, and documented, this paper sheds light on the effectiveness of the disaster risk assessment process and the quality of its outcomes.

Key words: *risk assessment, methodology, disaster, city of Valjevo*

1. INTRODUCTION

In a world facing increasingly frequent natural disasters, technical-technological accidents, and other threats, risk assessment becomes an essential tool for managing these dangers. Local self-government units bear the responsibility to accurately identify, analyze, and respond to potential risks, safeguarding the lives, health, critical infrastructure, and cultural assets of their communities.

^a ORCID: 0000-0002-8504-9430

^b ORCID: 0009-0006-0988-4895

This paper analyzes the compatibility between the risk assessment methodology and the protection and rescue plan within the local self-government unit of Valjevo. By examining the steps in the risk assessment process, the research aims to determine if potential risks are correctly identified, adequately analyzed and assessed, and if response strategies are effectively integrated.

This study can enhance our understanding of the pivotal role of disaster risk assessment in the sustainable development of local communities. The compliance analysis offers valuable insights for improving local-level risk management approaches, bolstering security, and enhancing resilience against unforeseen events that may jeopardize the well-being of citizens, property, and the environment.

2. METHODOLOGY OF CREATION AND CONTENT OF DISASTER RISK ASSESSMENT

The Law on Disaster Risk Reduction and Emergency Management (2018) places greater responsibility on local self-government units, emphasizing their primary role in disaster risk management within their territories (Article 5). The principle of the gradual use of forces and assets dictates that local self-government units should first deploy their own resources in protection and rescue efforts, with involvement from the Republic of Serbia's forces and assets when necessary (Article 6).

Within their territories, local self-government units are responsible for creating risk assessments, disaster risk reduction plans, and protection and rescue plans, which have a three-year validity and require approval from the Ministry of the Interior. These documents must be prepared by authorized companies or by the local self-government unit itself, provided they have at least one permanently employed person with the required license.

The minister responsible for internal affairs prescribes the methodology, preparation method, and content of the disaster risk assessment (Maric, 2006). The entire process includes preliminary actions to determine participants, hazard assessment criteria, on-ground monitoring, and periodic updates post-adoption. The Disaster Risk Assessment methodology encompasses risk assessment, monitoring, determination, analysis, evaluation, and risk treatment procedures.

Risk assessment, as a part of risk management, forms the foundation for developing preventive and operational plans. It is crucial to conduct risk assessments effectively, considering realistic assumptions, available data, and innovative approaches. The risk assessment process follows ISO 31000 and ISO 31010 standards, as depicted in Figure 1.

1) Communication and consultation is a continuous and interactive process that the holder of the Assessment implements in order to provide and share the obtained information and engage in dialogue with stakeholders regarding risk management.

2) Determining the context is defining the external and internal parameters that should be taken into account when creating a scenario in terms of representing the potential, and at the same time, the greatest and most probable risks.

3) Risk assessment is the determination of the nature and degree of risk of potential danger, state of danger and consequences that can potentially endanger the lives and health of people, material goods and the environment. It is a process that includes determination (identification), analysis and evaluation of risks.

4) **Risk monitoring** is a constant check, supervision, critical observation or determination of status, in order to identify the expected or necessary changes of all parameters on which the assessment is based.

5) **Risk identification** is the process of finding, recognizing and describing risks.

6) **Risk analysis** is the process of understanding the nature of risk and determining the level of risk.

7) **Risk assessment** is the process of comparing the results of the risk analysis with the risk criteria, in order to determine whether the risk and/or its magnitude can be tolerated.

8) **Dealing with risk (risk treatment)** is a process that is carried out to modify - reduce risk.

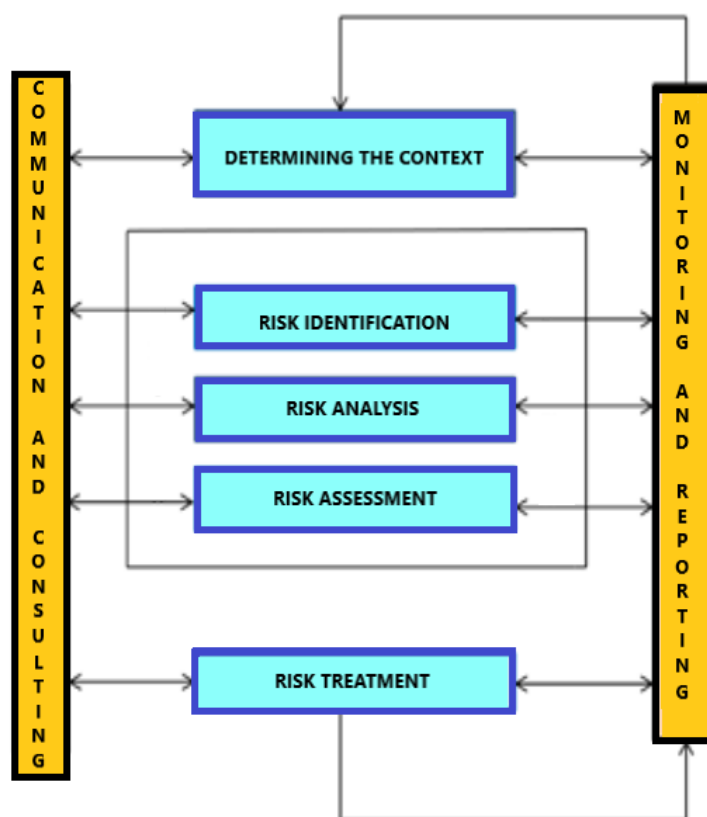


Figure 1. Risk assessment process within risk management

Source: ISO TC 223/SC, 31000: Risk management - Guidance on the principles and implementation of risk management

The aim of disaster risk assessment is to recognize, define, and analyze all aspects related to the current situation, hazards, consequences, risk mitigation, and community responses to natural and other disasters (Smith & Petley. 2009). This includes:

- Description and status of protected values.
- Identification of risks and their root causes.
- Assessment of potential consequences resulting from hazards.

- Determining the suitable organization and implementation of prevention measures.
- Evaluation of requirements and opportunities for providing human and material resources.

Disaster risk assessment in accordance with the Methodology (2019) contains the following parts: Introduction, General part, Special part, Conclusion.

3. DISASTER RISK ASSESSMENT OF THE CITY OF VALJEVO

Reducing the risk of disasters and managing emergency situations is a top priority for all authorities in the City of Valjevo. The area of Valjevo is increasingly threatened by various types of natural hazards, including floods, droughts, earthquakes, landslides, erosion, storms accompanied by hail, heavy snowfalls and drifts, as well as technical and technological accidents, explosions, fires, hazardous substances, and the potential collapse of the "Stubo-Rovni" dam.

Global climate changes in recent years have also contributed to an elevated disaster risk and environmental degradation, leading to adverse effects on human health, the survival of many natural species, and cultural heritage.

The disaster risk assessment for the territory of Valjevo provides an overview of the city's geographical location, hydrographic and meteorological-climatic characteristics, demographic makeup, agricultural production, material and cultural assets, and protected natural resources. Facilities and other critical infrastructure are presented in detail. Furthermore, the assessment identifies and addresses the risks posed by natural disasters and other accidents.

In addition to local and district-level experts, specialists from the Institute for Water Management "Jaroslav Cerni" in Belgrade, the Seismological Institute of Serbia, and the Hydrometeorological Institute of Serbia were involved in the process of identifying disaster risks.

In accordance with the methodology for preparing the Disaster Risk Assessment, scenarios were developed for the most likely adverse events and scenarios with the most severe possible consequences. These scenarios are detailed in Table 1.

Table 1. Identified hazards with possible scenarios (*Valjevo disaster risk assessment, 2022*)

No.	DANGER	SCENARIO	
		The most likely adverse event	An event with the worst possible consequences
1	Earthquake	An earthquake with a magnitude of 5.2 on the Richter scale	An earthquake with a magnitude of 5.6 on the Richter scale
2	Floods	Flooding in the Obnica river basin. The occurrence of large waters with a probability of 1% (Q=240 m3/sec) and precipitation of a local character in the basin - 120.00 mm in 24 h	Catastrophic floods in the Kolubara river basin in coincidence with the Gradac river with the generation of other hazards (landslides and landslides)
3	Fires and explosions, open fires	Fire in the attic of a multi-story house in an inaccessible place	A large forest fire in the conifer complex "Maljen-II" in Divcibare
4	Technical and technological accidents	Accident in "HK Krusik" Valjevo	The demolition of the "Stubo Rovni" dam and the appearance of a flood wave

Figures 1 and 2 present summary matrices of identified hazards for the most likely adverse event and the worst-case scenario event.

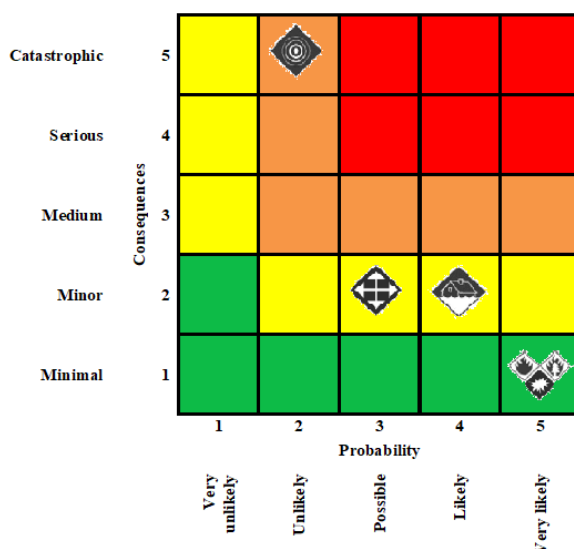


Figure 1. Summary matrix of the most likely adverse event according to the constructed scenarios for the identified hazards
Source: Valjevo disaster risk assessment, 2022

In Figure 1, the risk levels for floods, technical-technological accidents, fires, and explosions are acceptable for the most likely adverse event, while the risk level for earthquakes is unacceptable.

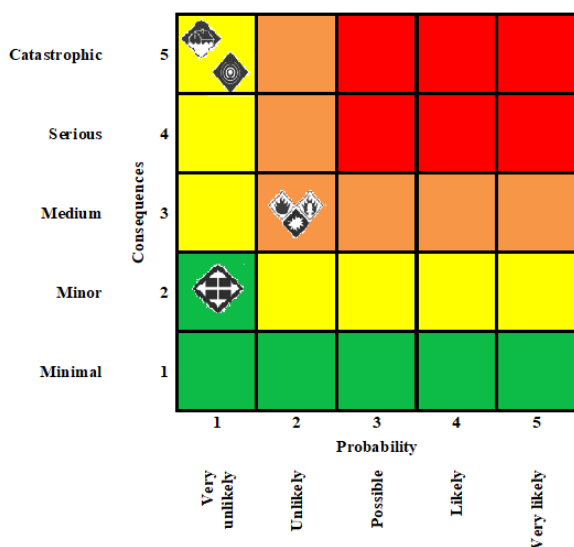


Figure 2. Summary matrix of events with the most severe possible consequences according to the constructed scenarios for the identified hazards
Source: Valjevo disaster risk assessment, 2022

In Figure 2, the risk levels for floods, technical-technological accidents, and earthquakes are acceptable for events with the worst possible consequences, while the risk level for fires, explosions, and open fires is unacceptable.

A risk assessment is a document designed to identify hazards and potential consequences. Its primary goal is to enhance the City's overall capacity for hazard prevention, planned and effective responses to natural disasters and other accidents, damage prevention, and, if unavoidable, minimizing damage to the greatest extent possible.

4. CONFORMITY OF THE DISASTER RISK ASSESSMENT OF THE CITY OF VALJEVO WITH THE METHODOLOGY OF THE CREATION AND CONTENT OF THE DISASTER RISK ASSESSMENT AND THE PROTECTION AND RESCUE PLAN

Upon analyzing the Disaster Risk Assessment of Valjevo, it is evident that all aspects of the assessment align with the prescribed methodology, meeting the national-level requirements and guidelines. The verification of compliance with both the methodology and content of the disaster risk assessment and the protection and rescue plan was carried out through the following points:

1. Application of the steps in the disaster risk assessment: The analysis confirmed that the steps of the disaster risk assessment for the city of Valjevo were correctly and consistently applied in accordance with the prescribed methodology. This included systematic hazard identification, risk analysis and assessment, as well as the thoughtful consideration of response strategies and risk treatment.

2. Content of the Disaster Risk Assessment: The analysis of the Disaster Risk Assessment content confirms that all key components of both the general and special parts are documented and presented in the assessment.

3. Relationship with the Protection and Rescue Plan: The results of the Valjevo disaster risk assessment are clearly incorporated into the protection and rescue plan, with response strategies and the plan itself being based on identified risks and potential consequences.

4. Involvement of interested parties: Relevant stakeholders are actively involved in the disaster risk assessment process in Valjevo, as outlined in the introductory part of the Assessment. Their contributions are documented and integrated into the overall results, demonstrating transparency and comprehensiveness in the approach.

5. Quality of output results: The output results of Valjevo's disaster risk assessments consistently meet the guidelines and requirements of the methodology. Risks, probabilities, consequences, and risk treatments are well-documented and presented.

The disaster risk assessment of Valjevo aligns with national-level methodology and standards, meeting all required guidelines throughout the assessment process. This coordinated approach ensures that Valjevo has a comprehensive and accurate understanding of potential disaster risks, facilitating effective risk management and enhancing overall community safety and sustainability.

5. CONCLUSION

The analysis of Valjevo's disaster risk assessment confirmed that the risk assessment process was systematically and consistently applied, encompassing hazard identification, probability and consequence assessment, and risk treatment. The assessment's content includes all

essential components and maintains a clear and transparent link with the Protection and Rescue Plan (Cvetkovic, 2020). Involving relevant stakeholders enhances result integrity and quality.

It's crucial to emphasize that the output results of the risk assessment are precisely documented and well-presented, providing Valjevo with a clear understanding of potential disaster risks. This forms the foundation for effective risk management, enhancing community safety and sustainability.

The analysis further verified that the risk assessment process is meticulously managed and aligns with guidelines. This alignment is crucial in addressing the growing threats of natural disasters and other hazards. As risk management gains importance, this analysis contributes to a broader understanding of its pivotal role in protecting and promoting sustainable development within local communities.

REFERENCES

Cvetkovic, V. M. (2020). Upravljanje rizicima u vanrednim situacijama. Beograd: Naucno-strucno drustvo za upravljanje rizicima u vanrednim situacijama

Ivanis Z, Babic B, Komazec N. (2016), Security and crisis management-theory and practice: proceedings, Regional association for security and crisis management, Obrenovac

Komazec, N., Randjelovic, A., Pavlovic, S., Mladenovic, M. (2016). Preventive attributes of the risk assessment process in emergency situations, International Risk and Security Consulting and Engineering, Kopaonik, ISBN 978-86-6211-097-8

Komazec, N., Pavlovic, S., Ilic, M. (2014). Risk management as a function of prevention in emergency situations, 16th National Conference "Quality-condition for better business", AKSS, Kopaonik

Maric, P., (2006) Novi institucionalni okviri prevencije vanrednih dogadjaja i njihov znacaj, Bezbednost, br. 4, Beograd

Smith, K.,Petley, D., (2009): Environmental hazardsassessing risk and reducing disaster, Routledge, London and New York.

Assessment of the risk of disasters in the city of Valjevo, Sl. Gazette of the city of Valjevo, February 4, 2022.

Instructions on the methodology and content of the disaster risk assessment and protection and rescue plan, Sl. gazette RS no. 80/2019.

Law on Disaster Risk Reduction and Emergency Management, Official Gazette RS 87/2018

ISO TC 223/SC, 31000: Risk management - Guidance on the principles and implementation of risk management

Nacionalna strategija zastite i spasavanja u vanrednim situacijama "Sl. glasnik RS" br. 86/2011