



GOVERNMENT OF THE REPUBLIC OF NORTH MACEDONIA  
PROTECTION AND RESCUE DIRECTORATE



## Collection of Original Scientific Articles

INTERNATIONAL CONFERENCE ON THE OCCASION  
OF INTERNATIONAL CIVIL PROTECTION DAY

# CHANGES, CHALLENGES AND RESILIENCE OF CIVIL PROTECTION DURING COVID 19

16 - 18 MARCH 2022, SKOPJE, REPUBLIC OF NORTH MACEDONIA



International conference on the occasion of international civil protection day  
CHANGES, CHALLENGES AND RESILIENCE OF CIVIL PROTECTION DURING COVID 19  
16 - 18 MARCH 2022, SKOPJE, REPUBLIC OF NORTH MACEDONIA



Publisher:

**PROTECTION AND RESCUE DIRECTORATE**

Editor of the publication Maja TIMOVSKA

PROTECTION AND RESCUE DIRECTORATE

PROCEEDINGS OF THE INTERNATIONAL CONFERENCE

„Vasko Karangelevski” 10, 1000 Skopje

Tel: 02 2433-384

Internet address:

WEB of the Protection and rescue directorate:

<https://www.dzs.gov.mk>

ISBN 978608-67053-0-5

Skopje, 2023

---

CIP - Каталогизација во публикација  
Национална и универзитетска библиотека "Св. Климент Охридски", Скопје

355.58:[616.98:578.834-036.21(100)(062)  
614.8:[616.98:578.834-036.21(100)(062)

INTERNATIONAL conference on the occasion of international civil protection day "Changes, Challenges and resilience of civil protection during COVID 19" [Електронски извор] : 16 - 18 March 2022, Skopje, Republic of North Macedonia : the 1 st proceedings of the international conference / [editor Maja Timovska]. - Текст во ПДФ формат, содрж. 61 стр. - Skopje : Protection and rescue directorate, 2023

ISBN 978-608-67053-0-5  
а) Цивилна заштита -- Ковид-19 -- Собири

COBISS.MK-ID 60632069

---

All rights reserved

No part of this publication may be reproduced, stored in a retrieval system or transmitted in any form or by any means: electronic, magnetic tape, mechanical photocopying, recording or otherwise, without permission in writing from the publisher and authors.

International conference on the occasion of international civil protection day  
CHANGES, CHALLENGES AND RESILIENCE OF CIVIL PROTECTION DURING COVID 19  
16 - 18 MARCH 2022, SKOPJE, REPUBLIC OF NORTH MACEDONIA

INTERNATIONAL CONFERENCE

*Bekim MAKSUTI, Editor-in-Chief, North Macedonia*  
*Maja TIMOVSKA, Co-Editor-in-Chief, North Macedonia*

**EDITORIAL BOARD**

*Zulfikar ZEJNULAI*  
*Ratko DUEV*  
*Nikola DUJOVSKI*  
*Mitko BOGDANOVSKI*  
*Nenad TANESKI*  
*Marina MALISH SAZDOVSKA*  
*Marina MITREVSKA*  
*Elenior NIKOLOV*  
*Jugoslav ACHKOSKI*  
*Mende SOLUNCHEVSKI*

**ORGANISATIONAL BOARD**

Safit ZEQRIRI  
Milena NEDELKOVIK  
Sara BARUTI  
Asim SELAMI  
Miroslav TRAJKOVSKI  
Zivko GACOSKI  
Agron BAFTIJARI  
Xhevat SELAMI  
Ljupco GRNCISTANOV  
Toni VELINOV  
Zivko STAVRESKI  
Valentina ATANASOVSKA  
Dejan STOJANOSKI  
Fatime M. KASTRATI  
Ivica NAUMOVSKI  
Angela PETREVSKA  
Viktorija ANDONOVSKA  
Despina MAKAROSKA  
Bekim ISMAILI

PROCESSING: Miroslav TRAJKOVSKI  
Lasko MUKAETOV

International conference on the occasion of international civil protection day  
CHANGES, CHALLENGES AND RESILIENCE OF CIVIL PROTECTION DURING COVID 19  
16 - 18 MARCH 2022, SKOPJE, REPUBLIC OF NORTH MACEDONIA

**GOVERNEMENT OF THE REPUBLIC OF N. MACEDONIA**  
**PROTECTION AND RESCUE DIRECTORATE**

**International conference on the occasion of international civil protection day**  
**CHANGES, CHALLENGES AND RESILIENCE OF CIVIL**  
**PROTECTION DURING COVID 19**

16 - 18 MARCH 2022, SKOPJE, REPUBLIC OF NORTH MACEDONIA

**The 1<sup>st</sup> PROCEEDINGS OF THE INTERNATIONAL CONFERENCE**

**ISBN 978608-67053-0-5**

Skopje, 2023

## **CONTENTS:**

Jusuf ZEJNELI, Ebrar IBRAIMI , Arbër ADEMI

**FUNCTIONING OF THE LEGAL SYSTEM IN THE REPUBLIC OF NORTH MACEDONIA DURING THE PANDEMIC AND HUMAN RIGHTS ..... 7**

Igor PESHEVSKI, Milorad JOVANOVSKI, Andrijana STANKOVIKJ

**LANDSLIDE AS A RISK FOR THE INFRASTRUCTURE AND NEED FOR NATIONAL STUDY FOR GEOHAZARDS .....16**

Aleksandar PETROVSKI, Mitko BOGDANOSKI, Nenad TANESKI

**DEVELOPMENT OF A MOBILE APPLICATION SUPPORTED BY MODERN GEOGRAPHIC INFORMATION SYSTEMS FOR PROTECTION AND RESCUE FROM NATURAL DISASTERS AND DISASTERS ..... 24**

Blagojcho SPASOV

**THE POLICE ROLE IN PROTECTION AND RESCUE.....35**

Zoran NESHKOSKI

**RISK ASSESSMENT WITH PRACTICAL APPLICATION OF PREVENTIVE MEASURES FOR PROTECTION AGAINST FIRE AND TECHNOLOGICAL EXPLOSIONS IN CRITICAL INFRASTRUCTURE FACILITIES .....44**

Tatjana GERGINOVA

**ACHIEVING CRITICAL INFRASTRUCTURE PROTECTION AS COMPONENT ON NATIONAL SECURITY .....52**

International conference on the occasion of international civil protection day  
CHANGES, CHALLENGES AND RESILIENCE OF CIVIL PROTECTION DURING COVID 19  
16 - 18 MARCH 2022, SKOPJE, REPUBLIC OF NORTH MACEDONIA



Respected guests, dear colleagues!

It is a special honor for me to open this international scientific conference on the occasion of the International Day of Civil Protection - March 1. The purpose of celebrating this day is to draw attention and raise public awareness of the importance of civil protection in terms of preventive and protective measures as well as procedures in case of disasters.

In the past period, we faced a large number of such changes due to the emergence of the Covid-19 pandemic, but in parallel with that, the challenges related to disasters. The fact that the spread of the Corona virus has gone out of control and has affected all countries in the world is indisputable. The Covid-19 pandemic has put countries in front of new challenges, but it has brought to the surface many problems that are usually marginalized or neglected. One of the problems that is currently relevant and has completely drawn the attention of the whole world is the conflict between Russia and Ukraine, which additionally threatens the lives of the civilian population above all, but among others, including the most vulnerable categories of people.

This is definitely the biggest global crisis in recent decades: world, economic, health and social.

In addition to other countries that actively participated in the provision of humanitarian aid to the Republic of Ukraine, R.N. Macedonia with donations of military assets and equipment for the armed forces, medical aid and will also participate in the coordination for the acceptance of Ukrainian refugees.

What remains for us in the future is to vigilantly monitor the implementation of the policies and strategies of the states that are the main actors and creators of world security policies and their goals. As a positive effect of this entire situation, we could certainly draw a solid and strategically important lesson.

All these events confirm the fundamental importance of civil protection as an inseparable segment of the total protection and rescue system. The Protection and Rescue Directorate together with the institutions that are involved in the system implementation of civil protection are still facing a large number of challenges, where with their capacities they act preventively and operationally, but it is also important to express a great gratitude to the mechanism for civil protection in EU and to the countries of the region that significantly contributed to solving the current problems.

Based on the lessons learned, we strive to achieve better results and raise the awareness of citizens about the protection and rescue not only of the civilian population, but also of everything that belongs within the Protection and Rescue Law. o

At the end, I would like to wish you successful work, to express my gratitude to the invited speakers and all the guests wishing them a pleasant stay in our beautiful country, and to all of you a wonderful event that will stay in good memories for the years ahead.

Thank you for your presence and I wish you a warm welcome!

**DIRECTOR**  
**Bekim Maksuti, PhD**

## **FUNCTIONING OF THE LEGAL SYSTEM IN THE REPUBLIC OF NORTH MACEDONIA DURING THE PANDEMIC AND HUMAN RIGHTS**

**Jusuf Zejneli PhD**, Faculty of Law-University of Tetova  
Republic of North Macedonia, [jusuf.zejneli@unite.edu.mk](mailto:jusuf.zejneli@unite.edu.mk)

**Ebrar Ibraimi PhD**, Faculty of Law-University of Tetova  
Republic of North Macedonia, [ebrar.ibraimi@unite.edu.mk](mailto:ebrar.ibraimi@unite.edu.mk)

**Arbër Ademi PhD**, Faculty of Law-University of Tetova  
Republic of North Macedonia, [arber.ademi@unite.edu.mk](mailto:arber.ademi@unite.edu.mk)

### ABSTRACT

The functioning of the main constitutional institutions and the legal system as a whole varies from country to country. The Republic of North Macedonia implements a representative democracy, the citizens exercise their power through democratically elected representatives, through referendums and other forms of declaration. This representation is accomplished according to the standard rules of exercising state powers. However, in case of occurrence of a major natural disaster or epidemic, or a state of war, this method of functioning of institutions differs, mainly with the declaration of a state of emergency. So, this is what also happened with the emergence of the Covid-19 virus, whereupon it was declared a pandemic.

In line with this situation, we also had a new mode of operation of the institutions, such as the government, state-public administration bodies, judiciary, local self-government, banking system, private enterprises, thus including the entire legal system in the country. This was the first time that a state of emergency had been declared in our country after its independence. Of particular importance is the fact that we had restrictions of fundamental rights and freedoms of citizens, setting the curfew, other protective measures, in order to protect the health of citizens. This restriction was implemented in accordance with the provisions of the Constitution of the Republic of North Macedonia which defines that human and civil freedoms and rights can be restricted during a state of war or a state of emergency. This restriction cannot be discriminatory on the basis of gender, race, religion, skin color, language, national origin, social origin or wealth.

**Keywords:** *Legal system, pandemic, covid-19 virus, World Health Organization, human rights.*



## THEORIES ON THE EXERCISE OF STATE POWER AND HUMAN RIGHTS

State power is exercised through constitutional, legal provisions, including the bodies that adopt these legal acts and the bodies that implement them. State power is manifested every day by exercising a large number of different matters.<sup>1</sup> The general legal-political theory, depending on the relations between different forms of state power and the way they are exercised, recognizes two main principles: the principle of unity of state power and the principle of separation of state power<sup>2</sup>. The principle of unity of state power concentrates state power in a supreme body which controls the three forms of state power. Unity of power is a form of regulating the relations between the legislative, executive – administrative and judicial power, according to which: 1) all three powers are exercised by a single body; or 2) each of the three powers is exercised by separate bodies, but one of them, the representative body (legislative) is superior over the other two and partly exercises the executive power as well.<sup>3</sup> According to this principle, the following forms of state regulation exist: autocratic, assembly and convention. The theory of separation of powers is based on the idea of the existence of a limited and efficient state power.<sup>4</sup> According to the principle of separation of state power, we have the independent exercise of the legislative, executive and judicial power, and the following systems are known based on this principle: parliamentary, presidential and mixed systems.

The Republic of North Macedonia exercises state power according to the principle of separation of state power. It is a sovereign, democratic, social state, the sovereignty of which derives from the citizens. They exercise power through democratically elected representatives, through referendums and other forms of direct declaration. The fundamental values of the constitutional order include fundamental human and civil freedoms and rights recognized by international law, the rule of law, the separation of state power into legislative, executive and judicial, humanism, social justice and solidarity, local self-government, regulation and humanization of space and protection and progress of the environment and nature, free expression of national affiliation, proper and equitable representation of citizens belonging to all communities in state authorities and other public institutions, political pluralism and free, direct and democratic elections, respecting generally accepted norms of international law, legal protection of property, freedom of market and entrepreneurship. The main constitutional institutions are: the Assembly, the Government, the President of the Republic and the Constitutional Court.

The system of representative democracy makes the government accountable to the citizens and contributes to the citizens being more aware that they are free to be skilled to protect the general interest.<sup>5</sup> Of course, in the framework of their

---

<sup>1</sup>Osman Ismaili, *The Law's Beginnings*, University of Pristina, Faculty of Law, Pristina, 2004, pg. 97

<sup>2</sup> Arsim Bajrami, *Parliamentarianism (Comparative aspects)*, FAMA College, Pristina 2010, pg. 77

<sup>3</sup>Kurtesh Saliu, *Constitutional Law*, Book I, (Fourth edition), Pristina 2004, pg. 307

<sup>4</sup>Svetomir Skaric, Gordana Siljanovska-Davkova, *Constitutional Law*, University "Ss. Cyril and Methodius", Faculty of Law "Iustinianus Primus" - Skopje, 2007, pg. 547

<sup>5</sup>David Held, *Models of Democracy*, Academic Press, Skopje 2008, pg. 125



organization and operation, they always have a constitutional obligation to respect human rights, but in certain cases they can be restricted, such as in the case during the pandemic.

## ACTIVITY OF INSTITUTIONS OF THE LEGAL SYSTEM IN THE REPUBLIC OF NORTH MACEDONIA DURING THE PANDEMIC

### Declaration of a state of emergency

This issue is taxingly defined in the Constitution. “A state of emergency exists when major natural disasters or epidemics take place. The existence of a state of emergency in the territory of the Republic of North Macedonia or a part of it is determined by the Parliament on the proposal of the President of the Republic, Government or at least 30 MPs. The decision determining the existence of a state of emergency is taken by a two-thirds majority vote of the total number of MPs and is valid for a maximum of 30 days. If the Assembly cannot convene, the decision on the declaration of a state of emergency is made by the President of the Republic who submits it to the Assembly for confirmation as soon as it can convene”.<sup>6</sup>

At the meeting of March 18, 2020, the Government of the Republic of North Macedonia, in accordance with the Constitution of the country, submitted a proposal for the Assembly of the Republic of North Macedonia to declare a state of emergency in the territory of the state in order to prevent the spread of the coronavirus COVID-19 and in line with the pandemic declared by the World Health Organization, a new virus which has spread on all continents and at the same time on our country. In addition to the relevant proposal, the Government will also submit a rationale where stating that in order to prevent the spread and confrontation with the coronavirus COVID-19, a disease that is a respiratory infection, appropriate measures should be taken. WHO (World Health Organization) on March 11, 2020, declared a pandemic of the coronavirus COVID-19, based on the fact that it is a new type of coronavirus, spread on several continents. This was also a powerful message to all countries of the world that the situation is very serious. The rationale for declaring a state of emergency in the country also includes the stages of coronavirus development, etiology, clinical manifestation, epidemiology, aspect of transmission, treatment and similar.

In the field of state security, a very important field for every state, the Assembly decides on the state of war and its declaration, as well as on the declaration of a state of emergency in the country or in a part of its territory.<sup>7</sup> However, in this case, the Assembly was self-dissolved because the early parliamentary elections had to be organized and it could not convene to exercise its competence, therefore the President of the state will decide on this issue.

---

<sup>6</sup>Constitution of the Republic of North Macedonia, 1991, Article 125

<sup>7</sup>Osman Kadriu, *Constitutional arrangement of Macedonia*, FocusPrint, Skopje, 2006, pg. 251

International conference on the occasion of international civil protection day  
CHANGES, CHALLENGES AND RESILIENCE OF CIVIL PROTECTION DURING COVID 19  
16 - 18 MARCH 2022, SKOPJE, REPUBLIC OF NORTH MACEDONIA

In line with Articles 125 and 126 of the Assembly of the Republic of North Macedonia, on March 18, 2020, the President issued a decision declaring a state of emergency. On the occasion of declaring a state of emergency, the President underlined that he signed the decision to declare a state of emergency throughout the country, at the request of the Government submitted to the Assembly, which is the first to have the competence to declare a state of emergency, but the President of the Assembly submitted the request to him because he cannot call the Assembly to discuss on this issue. Exception is provided in cases when due to a situation created and presented, the Assembly of the Republic cannot convene.<sup>8</sup>In the President's rationale is stated that this decision is taken due to the protection and confrontation with the consequences of the spread of the COVID-19 virus and the state of emergency will last 30 days and at the moment when the Assembly will have the opportunity to convene it will be submitted for confirmation. He also stressed that he expects the Government to submit within 30 days a report on the effects of the measures taken so far and a proposal with arguments on the need for the eventual prolongation of the state of emergency for another 30 days.

Since the declaration of independence, it is the first time to that a state of emergency has been declared and the institutions didn't have an experience of acting or organizing themselves according to this state, therefore they had to gradually create such an experience. As a result of declaring a state of emergency, the executive power will have greater powers, it can use all the resources of the state, even the private ones, in order to deal more successfully with the epidemic. "In case of a state of war or a state of emergency, the Government in accordance with the Constitution and the law, issues decrees with force of law. The Authorization of the Government to issue decrees with force of law lasts until the end of the state of war or the state of emergency, for which the Assembly decides".<sup>9</sup>

Now, the Government can adopt decrees with force of law by imposing greater restrictions on the movement of citizens, enjoys the opportunity to provide greater means of supporting the economy. Due to the pandemic, the proposals for the continuation of the early parliamentary elections scheduled on April 12, to be set when the conditions for their realization are created, also began, and thus they were held on July 15, 2020. The institutions were constantly required to act in line with the recommendations of the World Health Organization.

In this period will also take place the Meeting of the Security Council, which has presented its determinations on the state of emergency and after the first time, it has also constantly requested the continuation of the state of emergency to deal more favorably with the pandemic.

---

<sup>8</sup>Osman Kadriu, *cited work*, pg. 387

<sup>9</sup>Constitution of the Republic of North Macedonia, 1991, Article 126

International conference on the occasion of international civil protection day  
CHANGES, CHALLENGES AND RESILIENCE OF CIVIL PROTECTION DURING COVID 19  
16 - 18 MARCH 2022, SKOPJE, REPUBLIC OF NORTH MACEDONIA

Стр. 2 - Бр. 104

СЛУЖБЕН ВЕСНИК  
на Република Северна Македонија

17 април 2020

**ПРЕТСЕДАТЕЛ НА РЕПУБЛИКА  
СЕВЕРНА МАКЕДОНИЈА**

1476.

Врз основа на членовите 125 и 126 од Уставот на Република Северна Македонија, а во врска со предлогот на Владата на Република Северна Македонија до Претседателот на Република Северна Македонија да утврди постоење на вонредна состојба на територијата на Република Северна Македонија заради заштита и справување со последиците од ширењето на Коронавирусот COVID-19, а согласно пандемска епидемија прогласена од Светската здравствена организација за нов вид на вирус кој е проширен на сите континенти и ја зафати територијата на Република Северна Македонија бр. 44-2329/2 од 14.4.2020 година и известувањето од претседателот на Собранието на Република Северна Македонија бр. 09-1690/2 од 18.3.2020 година, донесувавам

**ОДЛУКА  
ЗА УТВРДУВАЊЕ НА ПОСТОЕЊЕ НА ВОНРЕДНА  
СОСТОЈБА**

Се утврдува постоење на вонредна состојба на територијата на Република Северна Македонија за период од 30 дена заради заштита и справување со последиците од ширењето на Коронавирусот COVID-19.

Одлуката се донесува врз основа на образложениот предлог на Владата на Република Северна Македонија бр. 44-2329/2 од 14.4.2020 година до Претседателот на Република Северна Македонија, во кој се утврдува постоење на пандемска епидемија прогласена од Светската здравствена организација за нов вид на вирус кој е проширен на сите континенти и ја зафаќа територијата на Република Северна Македонија и известувањето од претседателот на Собранието на Република Северна Македонија бр. 09-1690/2 од 18.3.2020 година дека Собранието на Република Северна Македонија, согласно со Одлуката за распуштање на Собранието на Република Северна Македонија „Службен весник на Република Северна Македонија“ бр. 43/20, не може да одржи седница.

Одлуката ќе му биде поднесена на Собранието на Република Северна Македонија на потврдување штом тоа ќе е во можност да се состане.

IV  
За времетраењето на вонредната состојба Владата во согласност со Уставот и со закон донесува уредби со законска сила.

V  
Одлуката влегува во сила со денот на објавувањето во „Службен весник на Република Северна Македонија“.

Бр. 08-607/2 Претседател на Република  
16 април 2020 година Северна Македонија,  
Скопје **Стево Пендаровски, с.р.**

**МИНИСТЕРСТВО ЗА ФИНАНСИИ**

1477.

Врз основа на член 64 став (4) од Законот за јавните набавки во областа на одбраната и безбедноста (\*) („Службен весник на Република Северна Македонија“ број 180/19), министерот за финансии донесе

**П РА В И Л Н И К  
ЗА ФОРМАТА И СОДРЖИНАТА НА ОБРАЗЕЦОТ  
НА ИЗВЕШТАЈОТ ОД СПРОВЕДЕНАТА ПОСТАПКА  
ЗА ЈАВНА НАБАВКА ВО ОБЛАСТА НА ОДБРАНАТА  
И БЕЗБЕДНОСТА**

Член 1  
Со овој правилник се пропишува формата и содржината на образецот на извештајот од спроведената постапка за јавна набавка во областа на одбраната и безбедноста.

Член 2  
Извештајот од спроведената постапка за јавна набавка во областа на одбраната и безбедноста се изготвува на образец во А-4 формат во бела боја.

Формата и содржината на извештајот од спроведената постапка за јавна набавка во областа на одбраната и безбедноста се дадени во прилог кој е составен дел на овој правилник.

Член 3  
Овој правилник влегува во сила наредниот ден од денот на објавувањето во „Службен весник на Република Северна Македонија“.

Бр. 02-3240/1  
7 април 2020 година  
Скопје **Министер за финансии,  
д-р Нина Ангеловска, с.р.**

10

Subsequently, the Government will adopt several decisions, recommendations, conclusions, measures for all public administration bodies, state bodies, including the private sector, in order to take measures to prevent the spread of the COVID-19 virus.

There will also be some special measures in order to prevent the spread of the relevant virus, a decision on the existence of a crisis situation in a part of the territory of the Republic of North Macedonia, a decision on the prohibition and special regime of movement in the state territory, in the municipalities Debar and Center Zupa, a decision to set higher prices for some products in the retail trade.

All these decisions have been approved upon the proposal and coordination with all institutions and supervisory bodies, assessment group, management committee for coordination and management of the crisis management system, Ministry of Health, the Committee for Infectious Diseases at the Government. In the Republic of North Macedonia, the first positive case was identified on February 26, 2020. All state institutions had special obligations, the Ministry of Health was obliged to share all information, the lists of our citizens that were at border crossings abroad, the Ministry of Internal Affairs

<sup>10</sup>Decision on the existence of a state of emergency, President of the Republic of North Macedonia (Official Gazette of the Republic of North Macedonia, no.104 of 17 April 2020)

International conference on the occasion of international civil protection day  
CHANGES, CHALLENGES AND RESILIENCE OF CIVIL PROTECTION DURING COVID 19  
16 - 18 MARCH 2022, SKOPJE, REPUBLIC OF NORTH MACEDONIA

was committed to give each person leaving the borders of the Republic of North Macedonia a personal statement to sign, thus obliging him/her not to return to the Republic of North Macedonia in the next three months, including the exemptions for drivers of goods crossing the border daily in the country or abroad, or citizen leaving the borders for medical reasons or medical treatment abroad. Also, the protocols on transport for unimpeded circulation of the post of the international postal traffic are regulated, verified by the Ministry of Health, activities related to medical aid and medical consumables are coordinated in order to exempt them from customs duties, diplomatic-consular missions are engaged to carry out the assessment of how many citizens of the Republic of North Macedonia are abroad, establishing contacts with private health hospitals in order to according to the possibilities release their health capacities for the needs of dealing with the pandemic, taking measures to support business in order to mitigate or reduce the consequences facing the country's economy.

In the following, we will present some decrees of the Government regarding the imposition of special measures for pandemic management. Only by adhering to all measures and recommendations can we keep the epidemic under control.<sup>11</sup> The decreewith force of law on using personal protective equipment (over the nose, mouth, any form of protection covering the nose and mouth) to prevent the spread of infectious disease caused by the coronavirus COVID-19 and to protect the population during the state of emergency, adopted by the Government at its 45<sup>th</sup> meeting. All citizens are obliged to wear protection on the face outside their house, while moving in places, open and closed public spaces, markets, public transport, when entering closed spaces where more people gather, including state institutions, shops, banks, post offices, waiting rooms, health institutions and other. Gathering in groups of more than two people is prohibited, in parks and other public places and spaces. Natural persons from the country and abroad are placed in mandatory self-isolation from the moment of obtaining the test material, until receiving the negative result. The educational process is interrupted in all kindergartens, primary schools and secondary schools, higher education institutions and public scientific institutions in the territory of the state and also the holding of lectures, trainings and exams in the examination centers of driving schools is prohibited. Gatherings, mass events in open and closed space, all cultural events, and manifestations in the territory of the country were banned.

This was followed by shop closures, except for grocery stores, pharmacies and supermarkets. Catering institutions that prepare, sell food, worked without accepting customers, they performed the sale alternately through orders, offered delivery or took orders outside the premises of the hotel facility. The Government, at the meeting held on 22.04.2020 adopted a Decree with legal force on the Implementation of the Law on Banks during the state of emergency which determines the establishment of order and discipline when entering and leaving the work units. Banks, savings houses were obliged to provide security when entering and leaving the facility, the minimum necessary distance between people in front of and inside the facility, mandatory hand disinfection and not allowing people who do not wear a face mask to enter the building. The work of libraries, student dormitories was interrupted and employees in these institutions to be released from

---

<sup>11</sup>Work Program of the Government of the Republic of North Macedonia during 2020-2024, pg. 15

work during this period. Cinemas, theatres, playgrounds and museums and other institutions where mass gatherings can take place were closed. Sports facilities were closed, where all kinds of gatherings, events, regardless of size can take place. It also adopted a Decree with law force on mandatory self-isolation while testing for the presence of the coronavirus COVID-19. The Ministry of Internal Affairs and the State Sanitary and Health Inspectorate are mainly responsible for monitoring the implementation of the provisions of the relevant decrees, but in such cases, in order to secure vital facilities, the army can also be engaged, including the role of the Protection and Rescue Directorate. In case of violation of the provisions of the relevant decrees, the prescribed penalties will be imposed. At the time of realization of this study, scientific work, these measures have changed and facilitated due to small cases of persons infected with this virus and institutions of the legal system, citizens, perform their duties by using personal protective equipment, masks, disinfectants.

## RESTRICTION OF HUMAN RIGHTS

The institution human and civil freedoms and rights is one of the most important legal institutions, therefore of Constitutional Law.<sup>12</sup> Although the fundamental human and civil rights are guaranteed by the Constitution, in the event of a state of emergency they can be restricted. The Constitution of the Republic of North Macedonia, defines the civil and political freedoms and rights by a special chapter, respectively Chapter II, where it is stated that: "Citizens of the Republic of North Macedonia are equal in their freedoms and rights, regardless of sex, race, color of skin, national and social origin, political and religious beliefs, property and social status.

All citizens are equal before the Constitution and law".<sup>13</sup> It is also emphasized that human life is inviolable, human physical and moral integrity are inviolable, any form of torture, inhuman or humiliating conduct or punishment is prohibited, human freedom is inviolable, no person may be punished for an offence which had not been declared an offence punishable by law or by other acts, prior to it being committed, and for which no punishment had been prescribed, the freedom of personal conviction, conscience, thought and public expression of thought is guaranteed, the freedom of speech, public address, public information and the free establishment of institutions for public information is guaranteed, the freedom of religious confession is guaranteed, the freedom of association to exercise and protect their political, economic, social, cultural and other rights and convictions is guaranteed, the right to vote is equal, universal and direct and is exercised at free elections by secret ballot, the right to ownership of property and the right of inheritance are guaranteed, everyone has the right to work, free choice of employment, protection at work, and material assistance during temporary unemployment, everyone has a right to education, everyone is guaranteed the right to health protection. "The right to health protection, once again, is

---

<sup>12</sup>Kurtesh Saliu, *the cited work*, pg.203

<sup>13</sup>Constitution of the Republic of North Macedonia, 1991, Article 9

considered by the Constitution as a right which is in the interest of the individual and the community”.<sup>14</sup> This is where the citizens’ right and obligation to maintain health comes from, because it also affects the common good, especially in the case of a pandemic.

However, the fundamental human and civil freedoms and rights may be restricted in the cases defined by the constitution, respectively during the time of a state of war or a state of emergency. “Human and civil rights and freedoms may be restricted only in cases determined by the Constitution. Human and civil rights and freedoms may be restricted during states of war or states of emergency, in accordance with the provisions of the Constitution. The restriction of freedoms and rights cannot discriminate on grounds of gender, race, color of skin, language, religion, national or social origin, property or social status. The restriction of freedoms and rights cannot be applied to the right to life, interdiction of torture, inhuman and humiliating conduct and punishment, the legal determination of punishable offences and sentences, as well as to the freedom of personal conviction, conscience, thought, public expression of thought and religious confession”.<sup>15</sup> This was also the basis for restricting fundamental freedoms and rights of citizens, through the establishment of curfews.

## CONCLUSION

Based on the fact that in our country a state of emergency was declared for the first time since the declaration of independence, this certainly means that the institutions of the legal system did not have any special experience for this situation.

We had no prior practice on how institutions of legal order should act or provide services. However, while the new practices were being created, the lack of trust in the administrative bodies increased and the perceptions of the citizens will be of the most diverse. Seeing that this will happen all over the world, gradually the perception of the citizens will be more realistic, but still there will be many dilemmas whether this state of emergency is well managed or is it simply a formal issue.

The process of vaccination will be a very complicated process, because in many countries of the world citizens will create different beliefs, especially in our country, and this process will not be fully completed even though it aims to protect the health of citizens. The process of online learning will also be a serious challenge, because it will be decided for all levels, such as primary, secondary and higher education, but in general it will be realized despite the obstacles and possible lack of relevant technical equipment in this field. The vaccination process of citizens even in these last moments of the pandemic, is carried out with different perceptions of citizens even though it achieved its positive effects.

---

<sup>14</sup>SavoKlimovski, VladimirMitkov, RenataTreneska, TanjaKarakamiseva, *Constitutional Arrangement of the Republic of North Macedonia*, Skopje 2003, pg. 79

<sup>15</sup>Constitutiona of the Republic of North Macedonia, 1991, Article 54

International conference on the occasion of international civil protection day  
CHANGES, CHALLENGES AND RESILIENCE OF CIVIL PROTECTION DURING COVID 19  
16 - 18 MARCH 2022, SKOPJE, REPUBLIC OF NORTH MACEDONIA

## LITERATURE

- Arsim Bajrami, *Parliamentarianism (Comparative aspects)*, FAMA College, Pristina 2010;
- David Held, *Models of Democracy*, Academic Press, Skopje 2008,;
- Svetomir Skaric, Gordana Siljanovska-Davkova, *Constitutional Law*, University “Ss. Cyril and Methodius”, Faculty of Law “Iustinianus Primus” - Skopje, 2007;
- Savo Klimovski, Vladimir Mitkov, Renata Treneska, Tanja Karakamiseva, *Constitutional Arrangement of the Republic of North Macedonia*, Skopje 2003;
- Osman Ismaili, *The Law’s Beginnings*, University of Pristina, Faculty of Law, Pristina, 2004;
- Osman Kadriu, *Constitutional arrangement of Macedonia*, FocusPrint, Skopje, 2006;
- Kurtesh Saliu, *Constitutional Law, Book I, (Fourth edition)*, Pristina 2004;
- *Constitution of the Republic of North Macedonia*, 1991;
- *Work Program of the Government of the Republic of North Macedonia during 2020-2024.*



## LANDSLIDE AS A RISK FOR THE INFRASTRUCTURE AND NEED FOR NATIONAL STUDY FOR GEO-HAZARDS

**Igor Peshevski PhD**, Faculty of civil engineering –  
Ss. Cyril and Methodius University in Skopje  
Republic of Macedonia, [pesevski@gf.ukim.edu.mk](mailto:pesevski@gf.ukim.edu.mk)

**Milorad Jovanovski PhD**, Faculty of civil engineering –  
Ss. Cyril and Methodius University in Skopje  
Republic of Macedonia, [jovanovski@gf.ukim.edu.mk](mailto:jovanovski@gf.ukim.edu.mk)

**Andrijana Stankovikj BSc**,  
Protection and Rescue Directorate  
Republic of Macedonia, [andrijana.stankovikj@dzs.gov.mk](mailto:andrijana.stankovikj@dzs.gov.mk)

### ABSTRACT

Geohazards present a great threat to population and infrastructure. As a country of mountainous setting Macedonia is severely affected by geohazards, especially landslides and related phenomena. From a perspective of protection and rescue, landslides are among the most difficult challenges upon which the institutions might be set up against. The present paper gives an general overview of the actual landslide hazards and risks in Macedonia, as well as the current practice of landslide management and treatment countrywide. Based on the current setting of institutions, usually established practice and the local geotechnical and geological knowledge, authors present outlines of possible approach to begin improve the resilience from these occurrences for the future generations. A proactive approach from the concerned institutions is very important.

**Keywords:** *Geohazards, landslides, hazard and risk, approaches, resilience, institutions.*

### LANDSLIDES AS A GEOHAZARD

There are many different hazards that pose threat to population, activities and the infrastructure.

In general terms the hazards are separated to natural, intentional man made and nonintentional man made. Natural hazards can be related to the Atmosphere – called Meteorological hazards, Earth – Geological hazards, Water – Hydrological hazards, hazards of the Space and Biological hazards. Just as an illustration on the importance of the natural hazards, we

International conference on the occasion of international civil protection day  
CHANGES, CHALLENGES AND RESILIENCE OF CIVIL PROTECTION DURING COVID 19  
16 - 18 MARCH 2022, SKOPJE, REPUBLIC OF NORTH MACEDONIA

give a short citation of the 2019 Global Natural Disaster Assessment Report prepared by the Academy of Disaster Reduction and Emergency Management, Ministry of Emergency Management - Ministry of Education National Disaster Reduction Center of China, Ministry of Emergency Management Information institute of the Ministry of Emergency Management (May 2020): “According to EM-DAT, 290 major natural disasters were recorded worldwide in 2019<sup>16</sup>, of which 49% were caused by floods (143), 21% by storms (typhoons and hurricanes, 61) and 11% by earthquakes (30). A total of 11,694 people died in disaster-affected areas. In terms of fatalities, floods killed the largest amount of people, at more than five thousand, followed by extreme temperature events. In 2019, 90.64 million people were affected by natural disaster, of which 35% (31.29 million) were affected by storms. Floods were second only to storms, affecting 29.63 million people. Disaster countries reported direct economic losses valued at US\$ 121.9 billion in this year. Storm (US\$ 579 billion) and floods (US\$ 360 billion) were also the top 2 costliest type of disasters. The whole year of 2019 witnessed a number of severe natural disasters including forest fires in Australia, super typhoon Lekima and Hagibis as well as floods in India.”

As major Geological hazards are considered the Earthquakes, Volcanoes and volcanic activity, Tsunami waves, Landslides, Sinkholes, Debris Flows, and Collapses. Not going in more details on the other type of geological hazards, the paper will focus on the landslides as one of the most pronounced geological hazards. Namely, A landslide is defined as the movement of a mass of rock, earth or debris down a slope (Cruden, D.M. A simple definition of a landslide. Bulletin of the International Association of Engineering Geology 43, 27–29 (1991). In worldwide context there are many regions affected by numerous landslides occurring in different period of the year. Landslides can be triggered by natural physical processes such as heavy or prolonged rainfall, earthquakes, volcanic eruptions, rapid snow melt.

Moreover, some of the largest natural disasters in the world throughout history are related to landslides as a primary or secondary cause for high population losses and infrastructural damages.

As a trigger for most landslides are the intensive rains and seismic events – earthquakes. They can also be triggered by man-made activities such as slope excavation, or by any combination of natural and/or man-induced processes. In some instances, many so called shallow landslides occur in a very short period of time. Number of landslide occurrences can vary largely over the years, depending on many conditions on the environment. One of the most difficult task when dealing with landslides is to define the degree of landslide activity and when to undertake specific measure of reaction. One typical example of a landslide is presented in the following figure.

---

<sup>16</sup> Data in the EM-DAT database are recorded on a country or region basis; unless otherwise specified, China's loss data are for mainland China only, excluding Hong Kong, Macao and Taiwan, and disasters affecting multiple countries or regions have been combined in this report for global and continental scale disaster frequency



Figure 1. Photograph of a landslide affecting the state road Istibanja – Makedonska Kamenica. See people on the left for comparison of the size of the landslide mass.

#### LANDSLIDE PROBLEMS IN MACEDONIA

As many other mountaneous regions troughout Europe, Macedonia belongs to countries exposed to a very high hazard of landslides. Due to the complex geology, tectonical setting, rugged morphology of the terrain, extreme variations in the precipitation rates on a very short geographical distances, the seismicity and other factors, the landslides occur very frequently and are considered as a very important issue by local engineers from the field of geology and geotechnics.

On figure 2 is presented a map of Europe on which is shown the landslide susceptibility of the terrain. From the map it is very obvious that the landslide problems would be of high intensity for the whole Balkans region.

Landslide losses in Macedonia are seen in human life and millions of euros of costs for remediation per year.

Most of these funds are usually spent on roads and railway infrastructure remediation. This is confirmed by the fact that 60% of the registered landslides have obstructed or blocked the traffic on the highways, regional and local roads.

Statistics show that about 70% of the landslides are triggered by the effects of intense or prolonged rainfalls, which in turn are the cause of floods.

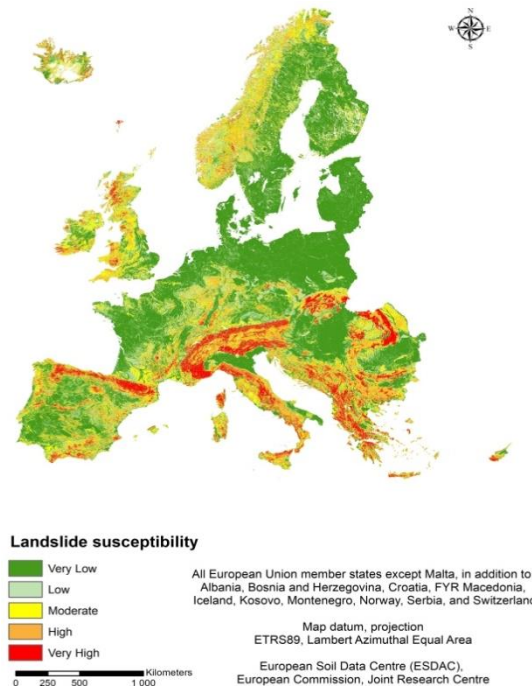


Figure 2. Landslide susceptibility map of Europe, ELSUS Ver.2 by Wilde, M., Günther, A., Reichenbach, P., Malet, J.-P., Hervás, J., 2018. Pan-European landslide susceptibility mapping: ELSUS Version 2. *Journal of Maps*, 14(2): 97-104

In order to get impression where the largest number of landslides are registered, Figure 3 shows a cadastral map of unstable phenomena.

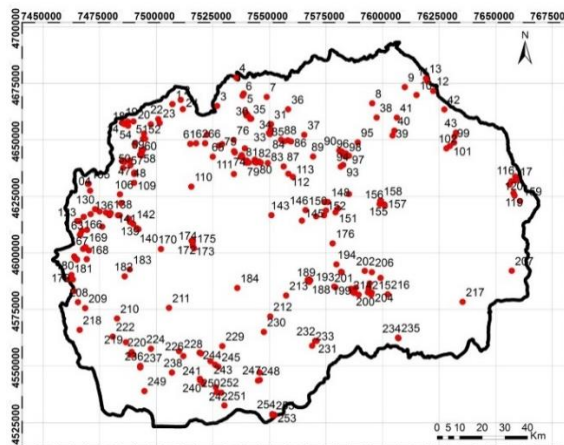


Figure 3. Cadastre of occurred landslides on the territory of R. Macedonia, Peshevski I. (2015) *Landslide susceptibility modeling using GIS technology*, PhD Thesis, Faculty of Civil Engineering – Skopje

Table 1 lists the known data for human losses due to landslides and related events, while table 2 lists typical landslide costs for remediation for an usual year long period.

International conference on the occasion of international civil protection day  
 CHANGES, CHALLENGES AND RESILIENCE OF CIVIL PROTECTION DURING COVID 19  
 16 - 18 MARCH 2022, SKOPJE, REPUBLIC OF NORTH MACEDONIA

Table 1. Human losses related to landslides for period 1946 – 2015. Authors own archive

Location name	Date	Death	Injury	Type of landslide	Description
Access road to dam Sveta Petka	21.3.2007	1	1	Rockfall	rockfall during preparations for blasting
Preseka (Gostivar-Kicevo road)	30.9.2008	0	2	Rockfall	hit rockfall sitting on carriageway
Rudina (road to Rakovec near Tetovo town)	25.4.2010	1	0	Rockfall	rockfall hits shepherd
Access road to Knezevo dam	21.6.2010	0	1	Rockfall	workers cleaning one rockfall hit by another one
road to mount.Bistra (Gostivar-Kicevo road)	9.2.2011	0	3	Rockfall	rockfall hits car while driving
Senecki livadi (road Mavrovo-Debar)	5.5.2012	1	2	Rockfall	rockfall hits car while driving
Railway Veles - Skopje	29.1.1946	15	40	Rockfall	hit rockfall sitting on railway
Gradot - Kavadarci	05.9.1956	11		Rotational slide>debris flow	slowmoving landslide turned into debris flow
Avalanche Mavrovo hydrosystem construction	11.2.1956	52		Avalanche (rock+snow+trees)	construction workers on the Mavrovo hydrosistem sleping in barracks
Two victims in a Truck accident on the road to Debar	197?	2		Rockfall	hit rockfall sitting on carriageway
Debar-Melnicki most	21.4.2008	1		Rockfall	construction works Debar Melnicki most
Tetovo area	03.8.2015	4		Flash flood + mudslide	several factors contributed to fatalities

Table 2. Some examples for remediation costs for recent landslides and rockfalls. Data taken from Design documentation

Location	Costs for remediation (eur)
Road R-2433, Resen – Greece Border, place Markova noga	1.700.000,00
Veles, road R-1102, km 49+300	894.000,00
Kratovo, road R-1205, km 18+125	305.000,00
Kratovo, road R-1205, km 18+165	850.000,00
Road for the ski center Kozuv R-1105, seven landslides	3.500.000,00
Bitola bypass	600.000,00

## TREATMENT OF THE LANDSLIDES IN PRACTICE

Landslide problems in the country are treated on different level, depending on the size of the problem, state of affected structure, available funds and so on. Some studies are being performed on a national level, some on regional but most on a local scale. Due to the goal of the paper, they are not presented here and can be found in other publications of the authors.

In general terms, it can be said that the institutions are not very well prepared with staff and equipment for systematic managment and dealing of these problems. The most usual institutions dealing with landslide problems are Public Enterprise for State Roads, Public Enterprise Macedonian Railways, Municipalities, the operators of hydrotechnical structures (dams and reservoirs) and other entities.

Municipalities show poor capacibility in solving landslide problems and are slow to respond.

The Protection and Rescue Directorate are involved in these activities very rarely, i.e. only in the most critical cases and moments, such as in reaction for the case of landslide occurrence in settlements, or when the population alarms for possible landslide risks on their lifes and property.

In order to establish a concept for better treatment of the landslide problem nationwide, the authors have prepared a proposal for strategic plan to establish a landslide database (figure 4). The databases are the most important document that serves for building a strategic approach to deal with the landslide problem. Authors note that in the current laws and bylaws of the country, the term “landslide” is mentioned only once in the Law for Nature. In all other documents it is only denoted as a natural risk or catastrophe.



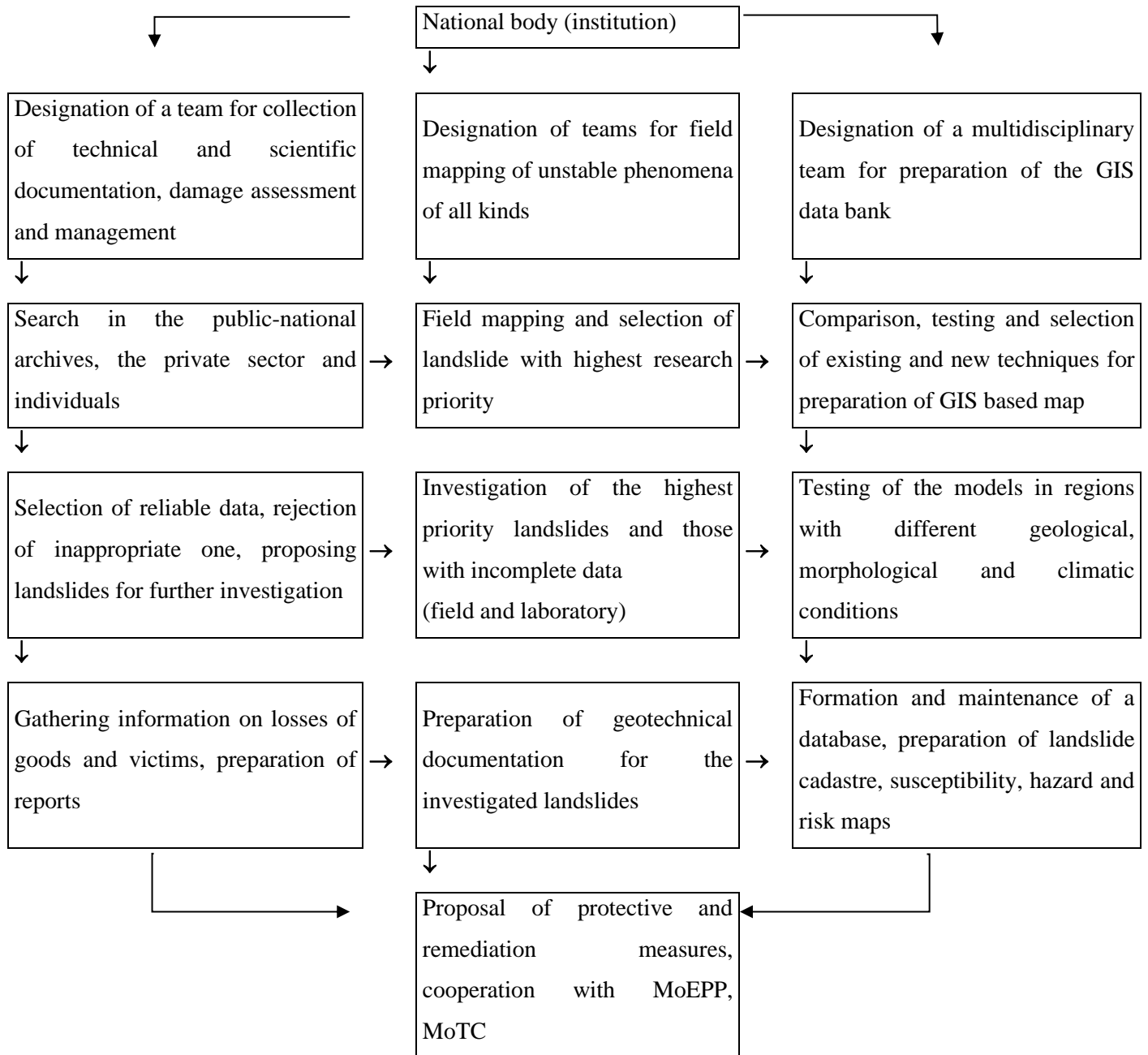


Figure 4. Strategic plan for establishing a landslide database in the Republic of Macedonia., Peshevski I. (2015) Landslide susceptibility modeling using GIS technology, PhD Thesis, Faculty of Civil Engineering – Skopje



## CONCLUSION

Based on personal experience of the authors in the field of landslide hazard and risk estimation, as well as taking part in landslide mitigation processes it can be concluded that there are many challenges to be dealt with, and there is a huge need for interventions. As a first step towards improvement the Protection and Rescue Directorate have signed a memorandum of understanding with Faculty of Civil Engineering -Skopje and different activities shall follow.

Here we will mention the need for increasing of the capacity of municipalities (the most affected ones) in regard of hiring a professional from this field on a regular basis and securing funds from different sources. In this regard, some international funds and donors are helping to move things forwards and the effects are felt in some regions of the country. Also, the general capacity of state institutions is generally weak and they mostly respond to the landslide risk reactively rather than pro-actively. In some instances, this approach unfortunately can lead also to human losses. As a possible way to improve the landslide management capacity is to take steps in establishing the proposed national body to run official GIS based landslide database, connect state institutions with foreign agencies and run projects for landslide risk mapping and mitigation.

Another very important activity will be to make a detailed review of the current laws and secondary legislation, compare with international laws and make changes that will enable the processes for solving the landslide issues to run faster. The improvement of the capabilities and resources of the civil protection in different form is of essential importance, and in this field a lot of efforts should be made.

All above mentioned activities should be performed on state level and for priority regions.

In order to achieve some of the goals set here, authors consider that there is a need to prepare a national strategy for geohazards, which has been already stressed in the adopted National Strategy for nature protection.

## **DEVELOPMENT OF A MOBILE APPLICATION SUPPORTED BY MODERN GEOGRAPHIC INFORMATION SYSTEMS FOR PROTECTION AND RESCUE FROM NATURAL DISASTERS AND DISASTERS**

1. **Assoc. Professor Aleksandar Petrovski,**  
[aleksandar.petrovski@ugd.edu.mk](mailto:aleksandar.petrovski@ugd.edu.mk)
2. **PhD Mitko Bogdanoski, Full professor,**  
[mitko.bogdanoski@ugd.edu.mk](mailto:mitko.bogdanoski@ugd.edu.mk)
3. **Assoc. Professor Nenad Taneski,**  
[nenad.taneski@ugd.edu.mk](mailto:nenad.taneski@ugd.edu.mk)

University „Goce Delcev“, Stip  
Military Academy „General Mihailo Apostolski“ Skopje, N. Macedonia

Nowadays it is the concern of both the government and the citizens to take care of the people against the increasing crises around the world. There are so many natural disasters such as: incidents of forest fires, earthquakes, floods, eruptions, tsunamis, etc. despite all these types of natural and man-made disasters from a social perspective, in their potentiality, they lead to regions ending up with serious and irreversible damages that in certain cases end with the permanent displacement of the population. In addition, the extent and severity of such incidents can significantly affect the way populations and wildlife survive. For that reason and the fact that the Geographic Information System is recognized as a useful risk mitigation system during crisis management, we are developing the idea of promoting a new model to have a practical and applicable method of adopting a mobile application based on modern GIS supported by GPS technology within crisis management to save as many lives as possible.

This scientific paper aims to come up with a model that will not allow us to guess how many people are affected by a certain natural disaster. Every smartphone will have an application in the event of a natural disaster and will collect information that will report the last location and the change in the vital function of the person in trouble. This will help the protection and rescue departments to respond as quickly as they can and save as many lives as they can and also reduce the percentage of people who could not call for help. This paper highlights the design challenges and necessary technical innovations towards the goal of making GIS at a much more useful level.

The application will be based on the principle "every person with a mobile phone is a sensor" and feel safe at any given moment. It will collect all the necessary information from personal and collective safety that will help emergency and rescue teams.

In addition to such cases of application, it will also be used in everyday activities to help in various situations where there is a need for interventions. With this application, we enter the area of prevention and have some control over the area of intervention and remediation. For safe rescue in the field we will use the mobile application 4Safe&Save.

**Keywords:** *GIS, mobile application, protection, rescue and disasters.*

## INTRODUCTION

A critical component of any successful rescue operation is time. Knowing the precise location of landmarks, streets, buildings, emergency service resources, and disaster relief sites reduces that time -- and saves lives. This information is critical to disaster relief teams and public safety personnel in order to protect life and reduce property loss. The Global Positioning System (GPS) serves as a facilitating technology in addressing these needs. Incorporation of GPS in mobile phones places an emergency location capability in the hands of everyday users. Today's widespread placement of GPS location systems in passenger cars provides another leap in developing a comprehensive safety net. Today, many ground and maritime vehicles are equipped with autonomous crash sensors and GPS. This information, when coupled with automatic communication systems, enables a call for help even when occupants are unable to do so. GPS has become an integral part of modern emergency response systems -- whether helping stranded motorists find assistance or guiding emergency vehicles. When disaster strikes, apps save lives. We've experienced the social impact disaster management apps can have first hand through our work with The Red Cross. Here are the top nine features that we believe can make mobile apps help during a crisis.

Development of a mobile application "4Safe&Save" supported by modern geographic information systems for protection and rescue from natural disasters and disasters is that's where disaster management technology can come to the rescue, not only responding to emergencies and disasters when they happen but preparing communities, by educating them on the best ways to prepare for the inevitable.

One of the most effective ways we've seen this done is with a mobile app. supported by GIS. Geographic Information Technology in Natural Disaster Education Provide position information for mapping of disaster regions where little or no mapping information is available. Having experienced something of this scale, it feel as though there's a real opportunity to make an impact and help save more lives during times of catastrophe.

By providing positional information about individuals with mobile phones and in vehicles in case of emergency and making sure that app is easy to use and easy to understand FOR EVERYONE, it will make sure the disaster preparedness app can save lives when it matters the most. That's why it's so important that disaster management apps include advice on what to do BEFORE the disaster strikes. It could be a fact file, a quiz, a survival game... as long as people are engaged and learning, it'll save lives.

In all our time working with disaster preparedness and management organisations, we've experienced first hand the impact apps can truly have, and the sheer number of lives they have the potential to save. Natural hazards include earthquakes, cyclones, floods, mud slides, droughts, tsunamis, volcanic eruptions, and fires. For all disasters that follow natural hazards, ICTs play a critical role in facilitating the flow of vital information in a timely manner. Enhance capability for flood prediction and monitoring of seismic precursors and events. Information and Communication Technologies (ICTs) play a significant role in disaster prevention, mitigation response and recovery. Timely, predictable and effective information is much needed by government agencies and other humanitarian actors involved in rescue operations and decision-making processes.

With the popularization and application of mobile smart devices, the number of users of smartphones and tablets has far exceeded the number of desktop computer users. Meanwhile, mobile communication is developing rapidly, and the number of 5G base stations is also increasing. Mobile GIS has become an important client of Web GIS. Survey 123 for ArcGIS is a forms-centered data collection solution for mobile GIS applications. With its simple interface and easy operation, geography teachers can quickly design questionnaires and share them in the form of QR code or URL. At the same time, geography teachers can analyze the collected questionnaire information on the platform.

## GIS AND THEIR APPLICATION IN NATURAL DISASTERS AND DISASTERS

The GIS Technology is combined with Global Positioning System (GPS), which will help to receive/update the help from disaster rescue teams. That's where disaster management technology can come to the rescue, not only responding to emergencies and disasters when they happen but preparing communities, by educating them on the best ways to prepare for the inevitable. One of the most effective ways we've seen this done is with a mobile app. GIS technology has been vital for emergency preparedness through planning & execution and has saved many lives in many disasters. It has improved certain extended limits like environmental understanding, strategic decision making, monitoring of climate change impact, and ascertaining future risks. It is mathematics functional algorithms to analyze the geo-spatial data and display the output in a visual format.

GIS is useful for hazard zone mapping and during emergency conditions mitigation of people can easily possible using these maps. GIS and Remote Sensing are much beneficial in mitigation strategies and preparedness plans.

Real-time geographic data can improve the allocation of resources for response. GIS technologies are much useful in the modeling of disaster risks and human adaptations to hazards. It also provides a decision support system in disaster management.

All disasters are spatial in nature. GIS techniques act as a decision support tool. Decision-making can possible by the analysis of different GIS layers. Currently, socio-economic and geo-spatial data is useful for the management and planning of disasters as well as tackling disastrous conditions. Various departments and agencies are stakeholders using GIS in the disaster management process. GIS, RS and GPS is useful in disaster management applications and for decision making. The evolution of computer technology and the availability of hardware is helpful for the rapid expansion of GIS in both disaster research and practice.

GIS is the most complete information system for modeling, analyzing spatial data, and displaying community vulnerability. When we identify hazard locations with critical infrastructure. Processed GIS Models can be useful for the determination of event impact and necessary mitigation requirements. Preparedness is important when a disastrous event occurs. An analysis of risk and hazards is beneficial in an emergency management program.

In the event of a disaster or post-disaster emergency, GIS technology uses a combination of GPS and 5G technology to enhance assistance. In the event of a disaster, people need emergency assistance after the disaster, geospatial data can be used to determine the answers to user questions regarding emergencies like health center operations, temporary potential shelter locations, and so on.

The central / state government or relief team address/respond to all those in need of help during the time of the fight against a disaster with of help of GIS Technology. Making sure your app is easy to use and easy to understand FOR EVERYONE, it will make sure the disaster preparedness app can save lives when it matters the most. The real-time location tracking platform or web/mobile GIS-based applications are enabled to interact with the maps which contain the details of the earthquake location & its intensity, health facility, nearby base camp information, and damage assessment. The GIS-based application also acts as a collective platform for data gathering around the incident of infrastructure damage or fire and information dissemination to relief teams involved in providing aid to those affected by the disasters.

#### DEVELOPMENT OF A MOBILE APPLICATION “4Safe&Save” BASED ON GIS FOR PROTECTION AND RESCUE FROM NATURAL DISASTERS AND DISASTERS

The development of mobile applications has made it possible for people to access information and services anywhere they are. Applications that help people in the event of a natural disaster or disaster can be very helpful. A modern geographic information system (GIS) can be used to create maps, which will show areas affected by a particular type of disaster, as well as where resources are needed most.

International conference on the occasion of international civil protection day  
CHANGES, CHALLENGES AND RESILIENCE OF CIVIL PROTECTION DURING COVID 19  
16 - 18 MARCH 2022, SKOPJE, REPUBLIC OF NORTH MACEDONIA

This application will allow users to find shelters, food banks, and other necessary resources quickly and easily. The application will also allow responders to locate victims quickly during a crisis situation. The development of a mobile application “4Safe&Save” that is based on GIS is a research and development project. The project will involve the study of the problem, the formulation of the need, the design of the system, the development of the system, and the testing of the system. The application will be designed to be used by civilians, civil defense and response teams to locate and rescue victims from disasters. The system will be able to integrate with other systems to provide the user with a comprehensive picture of the disaster and the area surrounding it. Implementation of the system will involve the training of personnel who will be responsible for using the system. The personnel will also be required to maintain and update the system.

Geographic Information Systems (GIS) provide accurate mapping tools necessary for effective decision making following a disaster. Modern Geographic Information System technology allows users access maps using GPS devices embedded within smartphones, tablets and laptops. Geographic Information Services offer several applications including emergency services where realtime location of the affected area is critical enabling timely response and recovery, mitigation strategy support, resource allocation/assistance decisions based on current data, public warnings, tracking volunteer activity/instructions.

GPS systems provide essential tools for emergency response teams including first responders, police officers, search and rescue personnel, public utility workers as well as transportation service providers to locate victims faster, identify potential hazards sooner, reduce property damage due to hazardous conditions and enhance evacuation efforts. We need to learn about different cultures before we go overseas to see what life there is like so that when we return home our interactions are based upon mutual understanding rather than stereotyping and ethnocentrism. When rescue teams reach areas affected by floods, earthquake or hurricanes, they need to determine their exact positions within five meters accuracy in order to coordinate their search operations effectively.

Having weighed up all arguments, we come to the conclusion that the use of smartphones and other portable electronic equipment can be beneficial for people working closely with dangerous situations, when applied correctly. Having experienced something of this scale, I feel as though there’s a real opportunity to make an impact and help save more lives during times of catastrophe. When disaster strikes, apps save lives. We've experienced the social impact disaster management apps can have first hand through our work with The Red Cross.

#### STRUCTURE OF THE SYSTEM AND MOBILE APPLICATION “4Safe&Save”

Field data is very important in GIS applications and Mobile GIS provides crucial information. Field teams capture information and sent it back to the user. So ground information useful for recognizing actual event conditions. Then new data can be sent to operation teams in the field (where the disaster occurs), so they have the information possible for protecting lives and providing safety to people. Whether it’s a response or recovery phase, Mobile GIS provides the right

International conference on the occasion of international civil protection day  
CHANGES, CHALLENGES AND RESILIENCE OF CIVIL PROTECTION DURING COVID 19  
16 - 18 MARCH 2022, SKOPJE, REPUBLIC OF NORTH MACEDONIA

information. Google People Finder is another innovative piece of technology which can help with disaster relief efforts. It was developed in 2010 in response to the Haiti earthquake. It is an open source web application, which is available in over 40 languages. The application allows users to post and search for the status of people affected by a disaster. During the 2015 Nepal earthquake, well over 7,500 records on the people finder were searched.

For that purpose it should be made a complex system of software for managing crisis situations and disasters. The system it will be able to help in all aspects of crisis management.

The system must comply with the objectives, functions and powers of the territorial bodies of executive authorities and departments of the countries, in the field of prevention, combating and elimination of criminal crises, terrorism, natural and manmade, anti-terrorist and anti-criminal protection, safety and security. Creating a system should be comprehensive interdepartmental aimed at improving information technology and information and communication infrastructure of public administration in general [4].

To create a comprehensive system is to ensure the safety of protection by reducing the probability of threats of natural, man-made, criminal, terrorist and other situations due to:

- Effective monitoring of the current situation and providing information for the authorities.
- Providing information about the current state of security facilities, protection services and operational headquarters.
- Providing analysis and management of the threats, natural, man-made, criminal, terrorist and other character crisis.

With an integrated system must be provided:

- Development of technical regulations (conditions) to equip the objects of protection (and their components) technical means of security and control, as well as the functioning of the monitoring tools and equipment (systems).
- The ability to monitor the status of security protection objects (their elements), as well as the movement of persons and transport facilities for protection.
- Automation of the process of collecting and transmitting information to the monitoring objects of protection (their elements).
- The possibility of collecting and transmitting information from existing and emerging security products to protect and control objects.
- The possibility of collecting and transmitting information to the services of territorial bodies.
- The possibility of sharing information between services (including situational centers) with the task of ensuring human safety both on a bilateral and multilateral basis.

Must be implemented automated control mechanisms, information analysis monitoring, forecasting situations. Integrated system it will be based on geographically distributed principle and consisting of a single point of management, transport network, as well as places of gathering, processing and analysis of information.



International conference on the occasion of international civil protection day  
CHANGES, CHALLENGES AND RESILIENCE OF CIVIL PROTECTION DURING COVID 19  
16 - 18 MARCH 2022, SKOPJE, REPUBLIC OF NORTH MACEDONIA

The whole system it will consists of four phases.

- Phase one: Software that helps in locating, guiding and directing the people;
- Phase two: Flying drones that search and detect disasters and people;
- Phase three: Specialized machines for helping people;
- Phase four: Human resources or specialized people working on field.

1 st phase: Is to use a GIS software that will detect the crisis/disaster and to classify it. (What sort of disaster (crisis) and the proportions of it).

Then it will be created an appropriate application for all types of smart phones, for all types of operating systems (Android, IOS, Microsoft ....). The application it will have access to the location of the smart phone, calls, messages, emails and the phone contacts. This will allow locating phones in crisis areas and access to vital content on the phone (name of the user, numbers of the closest or most used phone calls), for those phones that are turned on (operational)[3].

The application will consist of three main functions / tools:

- Prevention or procedures and actions what to do before the disaster,
- Instructions what to be done during the crisis and
- Instructions after the crisis, how to take un appropriate measures and procedures

1. The first function of the application will inform the users about the possible natural disaster, what to do and how to do it. Directions on how to protect, provide or avoid possible situation (flood, fire, tsunamis, NHB pollution ect). It will inform the consumers where to head, with the appropriate address, phone numbers and how to reach the place with a particular map.

2. The second function it will be based on the morale and stability during the disaster. How the users to remain calm and not to panic, but to think realistically and rationally. Of course, the application will have all the previous functions, where how and what to do.

3. The third tool will consist of basic survival manuals with pictures. And measures where people to go and how to reach the most basic needs.

For all non-smart phones and cell phones that don't have GPS, this will also be possible. It can still be tracked. This is because a cell phone is basically an advanced two-way radio in which communication are made via cell towers. These cell towers are within a network of cell towers which its main function is send and receive the radio signals emitting from your phone. And cell phone is basically transmitting radio signal to the nearest cell tower. The closer your phone to a cell tower, the stronger the signal that is emitted. So, by measuring the signal strength and also through triangulation method with other

cell tower; that is by measuring how strong or weak signal emitted by your phone, your phone location can be pinpointed almost accurately. Innovation is that mobile application “4Safe&Save” is remembering last position of every person, no matter of his condition. We will know exactly how many people are effected directly in every disaster situation by showing their last coordinates on map that will help us in search and rescue operations.

2nd phase: The second phase will be consisting of a series of little flying drones which it will be equipped with a various sensors and cameras (video live stream, thermal scanning, structural laser scanning, Wi-Fi hotspots servers, signal scanner and receiver). Sensors for identifying the crisis and sensors for tracking and founding people. All flying drones will be communicating with one HQ that will control the drones.



Figure 1: Parrot beob drone

3rd phase: will be for those who cannot reach the emergency centers and basic needs. On them will be sent help from ground and air with adequate machines (robots and drones) in the form of food, water, first aid and medicine. The machines will choose where to go alone and where to deliver the packages by implementing AI and machine learning softvers.

4th phase: will consist of specialized teams for different kind of disasters and teams dedicated for managing crisis situations. Every team will be equipped with equipment and tools for dealing with every situation on field and in every HQ. This phase will have an option of including the Army of the country that has a crisis or every available people.

#### POTENTIAL BENEFITS OF USING A MOBILE APPLICATION “4Safe&Save” FOR DISASTER MANAGEMENT

People will be relying on our app to get themselves to safety, that’s why keeping their life-line alive is by far the most important thing to do. Assist with hazard mapping to identify key infrastructure at risk - the risk can then be addressed through mitigation or built in redundancy. Can also be used for later damage assessment post-disaster, the merit of using

multiple types of crowdsourcing data is that it covers all age groups of citizens and overcomes technical limitations, such as poor mobile network connectivity.

After the disaster, in the recovery phase, it is possible to provide connectivity with the solution as Cell on Wheels (COW) (Riccardi, 2016). The lack of network operation during a disaster can be overcome by developing of our mobile application that collects urban data to reduce hazards and enable communication during the disaster without using a network in the moment, but with WiFi drones we can made buffer zones for net communicatons.

The goal of IoT devices used during catastrophe management is to not only minimize the harm caused by the disasters but also ensure prompt and effective assistance to the victim and quick recovery from that disaster effectively. All these objectives are fulfilled by using effective IoT devices for the effective rescue operations post from the disaster.

There are various forms of catastrophe damage information needed for successful preparation and urgent relief for these disasters. The IoT technologies that are already quite advanced can minimize the harm caused by the catastrophe situation. Having the ability to track disasters in real-time means that you can know when and where the disaster is going to hit and how to respond on it.

For example, you can get help and information on how to provide emergency medical aid for an injured person. In emergency situations you just need to connect to the application, find your problem and follow the instructions provided by the experts, and the most important thing is that this application knows your last location and have all your data information. “The application is quite important for population especially for those people who live in rural and remote areas to understand what disasters are likely to impact their living area, how to cope with disasters like earthquakes or floods, and how to manage the situation until professional emergency help comes.”

Such an application would be useless if nobody used it. Telecommunications are critical at all stages of disaster management: mitigation, preparedness, response and relief, recovery and rehabilitation. There is a lot of literature on the topic of crowdsourcing support for disaster management. From the wealth of information found in previous studies, a few recent review studies have highlighted that look back at the importance of the practice due to the constant evolution of technologies.

Challenges that must be overcome for the development of a mobile application “4Safe&Save” for disaster management are the criticality and complexity of disaster operations requires robust and validated ML and DL solutions. Disaster operations affect human life; therefore, the developed models should also be explainable to be understood by domain experts and decision makers. Moreover, research should focus on improving the quality of the data and developing novel data capture techniques as well as using crowdsourcing to improve the performance of ML/DL-based methods for disaster management operations.

Bottlenecks in DL that need to be addressed in future studies, in order to enhance the robustness of DL-based methods for effective disaster management, include the limited amount of available labeled training data and the human labeling of the

datasets. DL overcomes the manual feature engineering process by automatically learning complex structures, yet with the expense of requiring very large amount of labeled data manually annotated in order to automatically learn the features. Moreover, social media data contain high levels of noise, therefore, more methods should be developed to effectively differentiate signal from noise in the above data.

Furthermore, focus on all phases and areas of disaster management is needed, as already identified in previous reviews. Long-term disaster recovery includes sustainable development efforts ultimately leading to community resilience building. The resilience of key infrastructure influences the effectiveness and progress of disaster recovery efforts.

Vulnerability assessment of an urban electricity and transportation infrastructure was studied in the context of resilience, using a hybrid graphical causal method. Additionally, the accurate damage and loss assessment is necessary for efficient management of financial aid allocation during the recovery phase. Novel methods based on CNNs and satellite imagery data can enhance the performance of damage assessment of residential buildings.

Furthermore, the integration of multiple remote sensing data can improve the overall performance. If information and communication technology (ICT) infrastructure is damaged during a disaster, it can be difficult to carry out relief operations. This disruption can cause serious problems in communications and the identification process of the areas where immediate relief operations are needed. It is proposed and applied a methodology to identify those areas where relief operations are needed based on priority using big data analytics techniques. They used the census, geospatial and satellite images data and deployed this system using the cloud platform of AWS (Amazon Web Services).

The complexity of the disasters and the criticality and complexity of disaster operations require robust decision making, enhanced by information technology and in particular AI.

## CONCLUSION

This integrated system should allow:

- Ensure compatibility of existing and emerging information and technical systems to improve the efficiency of management in the field of safety of life of the population.
- Increase the effectiveness of control objects with mass stay of people and critical facilities.
- Increase the effectiveness of measures to eliminate the consequences of natural and man-made disasters.
- To reduce the loss of life in emergencies, fires, earthquakes by locating people in every situation and every moment.

Every day, we are confronted with disasters of varying degrees. Those that have adequately developed, maintained, and exercised their contingency plans will survive. Yet many people continue to take the uninhibited operations of their lives for granted. They remain complacent, assuming that the power will always be available, the telephone system will not fail,

International conference on the occasion of international civil protection day  
CHANGES, CHALLENGES AND RESILIENCE OF CIVIL PROTECTION DURING COVID 19  
16 - 18 MARCH 2022, SKOPJE, REPUBLIC OF NORTH MACEDONIA

there will be no fire or earthquake--everything will always be normal. However, it is only as good as the foundation upon which it was built. The foundation is, of course, the concept.

This research application is the means by which a particular mission, program, or policy directive is translated into a fundamental organizational and operational methodology. Once the system is developed and is sanctioned by both management and the operating elements, construction of the contingency plan may commence. A fundamental premise of successful contingency planning is that plans are developed by those who must carry them out in the event of an actual disaster. Disaster planning is truly a vital part of the overall business plan. With every year rising disasters the people are more and more threatened. We are hoping that with this software will help them all. The software is expected to decrease the casualties all around the world, in the crisis areas, and organize the management in these situations. The low cost of the software is a big advantage in the development of the system.

\*All this information is part of Military academy research application, and all of them are forbidden for unauthorized use and copying without permission of the authors and institution.

#### REFERENCES:

- [1] <https://3sidedcube.com/disaster-management-apps-features-save-lives/>
- [2] <https://www.sgligis.com/gis-in-disaster-management/>
- [3] <https://www.esds.co.in/blog/use-of-gis-and-rs-technology-in-disaster-management/>
- [4] <https://safetymanagement.eku.edu/blog/when-disaster-strikes-technologys-role-in-disaster-aid-relief/>
- [5] <https://public.wmo.int/en/bulletin/public-weather-services-disaster-risk-reduction>
- [6] <https://link.springer.com/article/10.1007/s11069-022-05277-z>
- [7] <https://www.itu.int/en/ITU-D/Emergency-Telecommunications/Pages/ICTs-4-DM.aspx>
- [8] <https://reliefweb.int/report/china/full-text-chinas-actions-disaster-prevention-and-reduction/>
- [9] <http://defense-update.com/events/2005/summary/LIC-c4sec.htm>;
- [10] <http://environment.nationalgeographic.com/environment/global-warming>;
- [11] <http://myphonelocater.com/category/triangulation>;
- [12] Disaster Recovery Plan Strategies and Processes February 2002 pp 11-12 .

## THE POLICE ROLE IN PROTECTION AND RESCUE

Blagojcho Spasov, MA.

[blagojcospasov@yahoo.com](mailto:blagojcospasov@yahoo.com)

Ministry of Interior, Republic of N. Macedonia

### ABSTRACT

Risks and threats to the life and health of citizens are a real challenge for every state that strives to build an efficient platform in which all rights and freedoms will be realized.

In the past we have been witnessed certain threats that have endangered the citizens of the Republic of North Macedonia and a large part of them appeared precisely as a result of a system that in certain segments lacks the necessary level of communication and coordination between the competent entities.

The conducted research directs the focus in the area of competences, communication and coordination between subjects, i.e. their efficiency and effectiveness. Starting from that angle, the police, with its scope of competences, is one of the key actors in the process of protection and rescue by taking direct measures and activities or providing the necessary level of assistance to other state authorities responsible for the mentioned problem.

**Keywords:** *risks, threats, protection and rescue, safety, security sector*

Ризиците и заканите по животот, здравјето на граѓаните се вистински предизвик за секоја држава која настојува да изгради ефикасна пратформа во која ќе се остваруваат сите права и слободи.

Во минатото сме сведоци на одредени загрозувања кои во висока мера ги загрозија граѓаните на Република Северна Македонија а голем дел од нив се појавија токму како резултат на еден систем на кој во одредени сегменти му недостасува потребното ниво на комуникација и координација помеѓу надлежните чинители. Спроведените истражувања, фокусот го насочуваат во делот на надлежностите, комуникацијата и координацијата помеѓу субјектите односно нивната ефикасност и ефективност. Тргувајќи од тој агол полицијата со својот делокруг надлежности е еден од клучните чинители во процесот на заштита и спасување со преземање на директни мерки и активности или пак пружање на потребното ниво на асистенција на другите државни органи надлежни за наведената проблематика.

**Клучни зборови:** *ризичи, закани, заштита и спасување, безбедност, безбедносен сектор*

## INTRODUCTION

The safety of the citizens and the protection of their lives and properties is a fundamental right of every individual and most often the rights that are deeply carved in the Constitution of every state. One of the obligations that every state has, is to organize and create an efficient security system, which will resist to all the forms of risks and threats and at the same time will guarantee the rights and the freedoms of the citizens within the state.

In that direction, the Republic of North Macedonia has been building its own system for protection and rescue for thirty years, which is actually the product of a transition process that constantly imposed certain dilemmas about the model and methodology on the basis of which it functions until today.

The evolution of the protection and rescue system has begun with the declaration of independence of the state, which has left the former federation of states that had an arranged and established system, which in those conditions was considered as highly efficient and functional.

Namely, the various external political pressures faced by the newly formed independent state, the lack of financial and economic stability created a labyrinth through which the competent institutions that have been part of the security apparatus of the Republic North Macedonia have moved and still move. The protection and rescue are legally defined issue based on the Law of Protection and Rescue, i.e., the provisions that come from it.

The specific law predicts the formation and functioning of a competent state authority for protection and rescue, which is the Directorate for Protection and Rescue, but it also creates an overall picture of the position and role of other entities in the protection and rescue system that have an grand influence, operational or other form of jurisdiction.

When we talk about the protection and rescue system of the Republic of North Macedonia, we cannot ignore the fact that it is still the subject of analyzes and attempts to reform it in order to increase its efficiency and effectiveness by amending or supplementing the existing legislation in order to improve the communication and coordination of the entities that comprise it.

All of this has a scientific and practical dimension in which the scientific and practical professional experts in the state are involved, but also the experts from the wider region.

Taking into account the fact that the police is part of this system and in fact it is one of the operational segments and has a direct role in the protection and rescue of citizens and their property, starting from the hypothetical assumption that the police has a serious role in protection and rescue is imposed the research challenge that will be established in the continuation of this scientific paper.



## PROTECTION AND RESCUE METHOD OF REALIZATION IN THE REPUBLIC OF NORTH MACEDONIA

Article 1 of the Law on Protection and Rescue determines the system for the protection and rescue of people, the environment, material goods, natural resources, animal and plant life and cultural heritage from natural disasters and other accidents in time of peace, state of emergency and war in the Republic North Macedonia (Official Gazette of the Republic of Macedonia No. 36/04).

Article 3 of this Law states that protection and rescue in the Republic is organized as a unique system for detecting and preventing the occurrence and removing the consequences of natural disasters and other accidents and providing assistance in time of peace, emergency and war. The protection and rescue is a connected process for planning, programming, organizing, managing, commanding, coordinating, implementing, financing and supervising for timely and effective prevention as well as preparing, acting and eliminating the causes and consequences of natural disasters and other accidents (Official Gazette of RM no. 36/04). Accordingly, protection and rescue in the Republic of North Macedonia is realized through the System for Protection and Rescue in the Republic of North Macedonia, which manifests the integrality and interactivity of and is realized through (Saliu et al. 2011. 25-26):

- observation, detection, monitoring and study of possible dangers from natural disasters and other accidents;
- undertaking prevention measures to mitigate and prevent the occurrence of possible dangers;
- reporting and warning about possible dangers and giving instructions for protection, rescue and assistance through the single reporting system;
- raining, training and training exercises for protection, rescue and assistance;
- organizing the forces for protection and rescue and establishing and maintaining other forms of preparedness for protection, rescue and assistance;
- self – protection, self – help and rescue assistance;
- mobilization and activation of forces and means for protection and rescue;
- determination and implementation of protective measures;
- rescue and assistance;
- removing the consequences of natural disasters, and other accidents, until providing the basic conditions for life;
- supervision of the implementation of protection and rescue;
- providing aid to areas that have suffered large-scale damage from natural disasters and other accidents;
- providing assistance to other states that have suffered large-scale damages from natural disasters

International conference on the occasion of international civil protection day  
CHANGES, CHALLENGES AND RESILIENCE OF CIVIL PROTECTION DURING COVID 19  
16 - 18 MARCH 2022, SKOPJE, REPUBLIC OF NORTH MACEDONIA

and other accidents, and that have expressed a need for it;

- receiving aid from other countries;
- identification and assessment of hazards;
- maintaining a database of all sources of risks and dangers from natural disasters and other accidents, and
- preparation of risk assessment from natural disasters and other accidents and plans for protection and rescue and updating them.

The protection and rescue in the Republic is based on the following basic principles (Saliu et al. 2011. p. 26):

- everyone has the right to protection and rescue from natural disasters and other accidents;
- in the protection and rescue from natural disasters and other accidents, the life and health of people have priority;
- in the event of natural disasters and other accidents, everyone is obliged to help within the limits of their abilities;
- The Republic, municipalities and the City of Skopje, public enterprises, institutions and services and commercial companies are obliged to promptly organize and take preventive and operational measures for protection and rescue from natural disasters and other accidents;
- every natural and legal person, in accordance with the law, is responsible for failure to implement the foreseen protection and rescue measures;
- when engaging the forces for protection and rescue, the model of proportionality is used, whereby the forces of the owner react first, then the municipalities and the City of Skopje, the Republic and the international community, and the data on the dangers and the actions undertaken for protection and rescue by the competent authorities and services are public and must be transparently published.

The measures and activities that are undertaken for protection and rescue at the national level are under the direct competence of the competent state institutions, state bodies, state administration bodies, local self-government, public enterprises, public institutions and services, trade companies, various civil associations, the forces intended for protection and rescue.

As an independent body of the state administration with the capacity of a legal entity and for the purpose of carrying out the works of protection and rescue from natural disasters and other accidents, the Directorate for Protection and Rescue was established, which has a wide range of competences and operational competence in protection and rescue.

## POLICE FUNCTIONS IN MODERN SOCIETY

The protective - security function of the police is a synthesis of police work that is carried out with the aim of ensuring a high level of protection of the vital and other values of citizens and institutions from all illegal elections and threatening activities. Furthermore, the security function of the police is a consequence of policing on the one hand and security as a goal on the other. Modern police work is aimed at legal and efficient protection, i.e. strict respect for human rights and freedoms, and as a result maintaining a high level of public safety and social peace of citizens, as well as providing assistance to citizens if necessary. In order to present the relationship between the police and citizens, the phrase that the police is an organization in the function of protecting citizens is very often found in the literature on human rights. The police performs the protective - security function, respecting the principle of protecting the rights of citizens and protecting the public interest. With the stated principle, it is foreseen to respect the position, that the internal affairs authority should carry out activities primarily for the realization and protection of the public interest, while tending to the protection of legal and natural persons, the protection of the right to property and their interests. The protective-security function of the police is determined by all matters that arise according to the law on police or are treated as police matters (Suboshic, 2010).

The police's criminal and misdemeanor functions are an integral part of its everyday life. Bearing in mind the fact that certain crimes that can cause serious threats to the safety of citizens, the police through this function discovers the perpetrators of crimes and misdemeanors and initiates appropriate criminal or misdemeanor proceedings against them, depending on the type, type and intensity of the crime.

The social function of the police allows it to influence the social segment of citizens and build positive social norms and forms of behavior. In order to maintain favorable public order and peace, the police build normal conditions for life in society through mechanisms of social control.

The normative function of the police enables it to participate in the establishment of normative control within its sphere of competence, where it participates in the implementation of existing legal obligations and norms by the citizens and the institutions of the system. Namely, it also participates in the preparation of certain laws and other normative acts that are under the jurisdiction of the police.

In the course of its development, the police permanently uses the latest scientific achievements and technologies and introduces technical and technological achievements within its ranks within the framework of police operations. The police pay special attention to information technology, criminal-technical, psychological-criminal, judicial-medical and other modern areas.

In that direction, the process of internal specialization continues (creation of special and special services for certain police tasks), scientific achievements are applied, state-of-the-art laboratories and scientific-criminological institutions are established, great attention is paid to the education of police officers, work is being done to improve of the equipment and means necessary for the performance of police work. In addition to negative phenomena such as the militarization of the

International conference on the occasion of international civil protection day  
CHANGES, CHALLENGES AND RESILIENCE OF CIVIL PROTECTION DURING COVID 19  
16 - 18 MARCH 2022, SKOPJE, REPUBLIC OF NORTH MACEDONIA

police, modern trends in the development of the police are increasingly approaching, namely: humanization of police operations, reduction of the use of physical force and coercion, decentralization, improvement of relations between the police and citizens, professionalization and depoliticization of the Police (Ristovic, 2015).

Science in its archive records research that indicates that the tasks of the police, regardless of which country in the world the police organization exists in, mostly refer to the protection of the life and health of citizens, that is, their material goods, where Stevanovic indicates (Stevanovic, 2012):

1. Protection of life, personal and property security of citizens, their rights and freedoms, especially maintenance of public order and peace, security of certain persons, security of public gatherings and facilities, guaranteeing security in the local community and providing assistance to competent authorities in carrying out their executive decisions.
2. Suppression of criminality, including special mechanisms for the suppression of organized crime, prevention and detection of crimes, finding and arresting perpetrators of crimes and bringing them before the competent authorities.
3. Works in the area of safety, control and regulation of road traffic.
4. Works for control and crossing the state border, movement and detention in the border zone, control of the movement and stay of foreigners and other activities in the field of border operations.
5. Providing assistance to citizens and institutions, protecting them, rescuing and removing the consequences of natural disasters and accidents, works to prevent and solve complex security problems that exceed the capabilities of the regular police.

#### THE ROLE OF THE POLICE IN PROTECTION AND RESCUE IN THE REPUBLIC OF NORTH MACEDONIA

The Public Security Bureau has a wide range of responsibilities that primarily relate to public and national security, where public order and peace and the required level of security are maintained through the implementation of police powers. In that direction, Article 5 of the Law on Police gives the police the authority to (Official Gazette of the Republic of Македонија No. 114/06):

- implementation of the system of public and state security;
- prevention of violent demolition of the democratic institutions established by the Constitution of the Republic of North Macedonia;
- protection of life, personal security and property of citizens;
- prevention of inflaming of national, racial or religious hatred and intolerance;
- preventing the commission of crimes and misdemeanors, discovering and apprehending their perpetrators and taking other measures determined by law to prosecute the perpetrators of those crimes;
- civil works and

International conference on the occasion of international civil protection day  
CHANGES, CHALLENGES AND RESILIENCE OF CIVIL PROTECTION DURING COVID 19  
16 - 18 MARCH 2022, SKOPJE, REPUBLIC OF NORTH MACEDONIA

- other matters determined with this special law.

For the efficient performance of police work, monitoring of security issues, monitoring and analysis of the situation from the aspect of public safety, undertaking the necessary police operational activities, police work is divided into security sectors (Jovicic., Shetka. 2020).

Within the security sectors, police officers undertake operational measures and activities related to the protection of life and health of citizens. Operational action can be implemented by taking repressive and preventive measures. The operational procedures of the police in the context of protection and rescue refer to:

- on-site security of an event that may endanger the life and health of citizens;
- wider or narrower blocking of the space;
- evacuation of citizens from the threatened area;
- diverting traffic and establishing alternative routes for movement;
- assistance to other teams from other competent authorities in the process of protection and rescue;
- prevention of committing crimes and detection of perpetrators of crimes;
- other matters determined by law

The basic function of the Police in the Republic of North Macedonia is incorporated in Article 3 of the Law on Police and it provides for the protection and respect of the basic freedoms and rights of the person and the citizen guaranteed by the Constitution of the Republic of North Macedonia, the laws and ratified international agreements, protection of the legal order , prevention and detection of criminal acts, taking measures to prosecute the perpetrators of those acts, as well as maintaining public order and peace in society (Official Gazette of the Republic of Macedonia no.114/06).

The Police of the Republic of North Macedonia as an institution is aimed at ensuring the necessary level of security of the citizens. To achieve this goal, the police works in different conditions and in different circumstances. Regardless of the conditions in which it operates, it still strives to adapt to the security challenges it faces continuously. Unlike in the past when traditional threats and risks were more pronounced, today we live in a world that is unpredictable and has a distinct tendency to be faced with a large number of shapes and forms of security threats. Hence the total efforts to build capacities that will be in function of achieving the ultimate goal, which is to deal with security threats (Mitevski., 2011).

The police are a part of the system for protection and rescue in the Republic of North Macedonia and it has a special legal obligation to participate in the protection and rescue of the citizens, which requires from the police to provide assistance to state authorities, municipalities and the City of Skopje, to legal and natural persons in the rescue of people and material goods from natural disasters and other accidents. (Official Gazette of the Republic of Macedonia No. 114/06).

CONCLUSIONS:

International conference on the occasion of international civil protection day  
CHANGES, CHALLENGES AND RESILIENCE OF CIVIL PROTECTION DURING COVID 19  
16 - 18 MARCH 2022, SKOPJE, REPUBLIC OF NORTH MACEDONIA

The police in the Republic of North Macedonia actively participates in protection and rescue on the basis of legally established competencies and by-laws that determine the issue in question.

Protection and rescue are carried out by the police through regular police work, which is based on preventive activities and undertaking certain operational tactical measures with specific protection and rescue activities.

Protection and rescue activities by the police in the Republic of North Macedonia are carried out independently in operations involving only police officers and systems when more competent authorities from the protection and rescue system are involved.

Effectiveness in protection and rescue depends directly on the readiness, education and judgment of the police officers engaged to carry out protection and rescue operations.

The lessons learned so far point to the need to improve the communication and coordination of the subjects in the protection and rescue system and certain reforms that would improve the operability, efficiency and effectiveness of the police and military teams involved in the protection and rescue in the Republic of North Macedonia.

#### BIBLIOGRAPHY:

1. Бакрески, О. (2010). Безбедносни дијалози. Број 2. Година I. 160-161. Скопје.
2. Бакрески, О. (2013). Координација на безбедносниот систем-принципи и предизвици. Аутопринт Т.А. Скопје.
3. Бакрески, О. (2018). Безбедносни системи: компаративна анализа. Скопје.
4. Buzan, B. Waever, O. (2003). Regions and Powers, The Structure of International Security. Cambridge University Press. New York.
5. Јовичић, Д. Шетка, Г. (2020). Јавна Безбедност. Универзитету Бањој Луци Факултет безбедносних наука. Бања Лука.
6. Дончев, А. (2007). Современи безбедносни системи. Скопје.
7. Котовчевски, М. (2016). Национална безбедност. Филозофски факултет. Скопје.
8. Кулић, В.Ж., & Милошевић, Б.Г.(2014) Управљање људским и материјалним ресурсима. Криминалистичко-полицијска академија. Београд.
9. Митевски. С. (2011). Организација и функционирање на полицијата во Република Македонија во современи услови. магистерски труд. Скопје.
10. Митревска, М.(2016). Општествените промени како причина за појава на приватни безбедносни компани. Приватна безбедност во XXI век: искуства и предизвици. Комора на Република Македонија за приватно обезбедување.
11. Митревска, М. Милески, Т. Микац, Р. (2019). Критична инфраструктура: концепт и безбедносни предизвици. Фондација Фридрих Еберт, Канцеларија. Скопје.

International conference on the occasion of international civil protection day  
CHANGES, CHALLENGES AND RESILIENCE OF CIVIL PROTECTION DURING COVID 19  
16 - 18 MARCH 2022, SKOPJE, REPUBLIC OF NORTH MACEDONIA

12. Млађан, Д. (2015). Безбедност у ванредним ситуацијама. Криминалистичко-полицијска академија. Београд.
13. Ристовић, С. (2015). Полицијски менаџмент. Криминалистичко-полицијска академија. Београд.
14. Стевановић, О. (2019). Безбедносни менаџмент, треће измењено и допуњено издање. Криминалистичко-полицијски универзитет. Београд.
15. Стевановић, О. (2012). Руковођење у полицији, друго измењено и допуњено издање. Криминалистичко-полицијски универзитет. Београд.
16. Субошић, Д. (2010). Организација и послови полиције. Криминалистичко-полицијска академија. Београд.
17. European union, Serious and organised crime threat assessment, (2017), Crime in the age of technology, Europol.
18. Мижалковић, В. С. (2011). Nacionalna bezbednost. Kriminalističko policijska akademija. Beograd.
  
19. Закон за управување со кризи,
20. Закон за полиција,
21. Закон за заштита и спасување,



## **RISK ASSESSMENT WITH PRACTICAL APPLICATION OF PREVENTIVE MEASURES FOR PROTECTION AGAINST FIRE AND TECHNOLOGICAL EXPLOSIONS IN CRITICAL INFRASTRUCTURE FACILITIES**

**MSc.Zoran Neshkoski –**

Ministry of Interior, Republic of N. Macedonia

[neshkoskizoran@gmail.com](mailto:neshkoskizoran@gmail.com)

### **ABSTRACT**

Threats to the health and life of people that occur at the world level as a result of climate change, industrial, geographic, geopolitical, military interventions, demographic and many other factors contribute to endangering the critical infrastructure in every society.

Depending on the application of preventive protection measures regarding the dangers of fires and technological breakdowns and explosions in correlation with the assessment of the risk of the same, there will be an impact in reducing or increasing the degree of endangerment of the critical infrastructure. Evidently and statistically every year, the number of fires both in urban and open spaces cause great material damage.

In that direction, there is a need for the readiness of each state for a quick response to challenges and necessary cross-border cooperation. The cooperation of each of the neighboring states is of great importance at all levels, such as protection and rescue and between other non-interventionist services, etc.

***Keywords:*** *risk assessment, prevention, fire, critical infrastructure*

## INTRODUCTION

The assessment of the risk of fire and explosion is a complex process that consists of numerous known and adopted values for calculation that should give the result for the correct selection of preventive protection measures. It includes expert and competent analysis and identification of potential risks for "critical infrastructure" facilities as well.

The assessment includes an analysis of the probability of the occurrence of accidents as well as their consequences. In that direction, the assessment of the risk of fire allows to answer several questions. The assessment of the risk of fire and other accidents can also be carried out through the following questions: what, when&where, how and why it can happen, what is the probability of it happening and what consequences can occur?

These answers as information can serve to inform the decision-making priorities of the competent authorities for protection and rescue, with the aim of reducing the risk of the probability or mitigating the actions and consequences of the accident. With the application of modern methods and the use of new technical-technological achievements and information technologies, the method of obtaining timely and accurate information about fire risks is facilitated. Information is important, but also the next decision-making step in taking concrete action to solve the problem. The resulting situation, especially when it comes to a fire, accident or other danger that can be of a large scale, it is necessary to engage the appropriate institutions locally, regionally or between neighboring states, etc. Hence the need for cross-border and international cooperation between states is also imposed.

## RISK OF FIRE

The risk of fire occurrence can also be defined as the result of the probability and consequence of the harmful effect on human health, property, work and the environment. The term risk comes from the Italian word "rissiko". Starting from the aspect of protection, risk according to other definitions is the fulfillment of the real possibility of the unwanted consequences of the accident. If the risk exists, it is a "potential danger".

The risk assessment covers the probability of its occurrence and its consequences, and it is possible to analyze the dangers of fire, explosion, flood, earthquake, radioactivity, toxicity, traffic accidents, etc.

So, risk is a product of:

Probability of an accident (danger) and Consequence (magnitude, intensity) of the accident (danger).

Most often, the following formula is used to calculate the risk in practice:

$Risk = (Probability + Frequency) \cdot (Sum\ of\ Consequences)$

Where are:

-Risk = [consequences / time],

- (Probability + Frequency),
- (Sum of Consequences).

There are many other risk assessment methods in the world based on scientific achievements from various associations. No risk assessment method prescribes preventive protection measures in order to prevent, eliminate or reduce hazards. Risk assessment methods are divided into several areas, one of which is the fire risk assessment.

Fire risk assessment methods can be divided based on the use of data as quantitative, qualitative analyzes and mutual combination or combined analyses.

### QUANTITATIVE ANALYSIS

Quantitative analysis for fire risk assessment is an assessment that includes numerical values and probability of occurrence. By multiplying the numerical values of probability and consequence, the product of the risk value is obtained.

The cumulative sum of the value of the risk with all possible consequences represents the total numerical value of the risk. Risk assessment can be a risk to life, property and the environment. Also, with this analysis, the equivalence-comparison of the fire risk and the alternative design solution based on the requirements of the standards and legal provisions is enabled.

In principle, in practice, quantitative risk assessment is carried out in two ways:

- using a checklist for the analysis of potential fire hazards and quantitative calculations for adequate risks;
- the use of the event tree method for the potential consequences of fires and the quantitative assessment compared with equivalent risk assessments for the analyzed phenomenon.

### Qualitative analysis

Qualitative analysis for fire risk assessment is based on subjective assessment of probability, fire development and consequences. In principle, it is used for a quick assessment of the risk of fire and the analysis of various preventive measures in order to reduce the consequences of the fire. With the qualitative risk analysis, the numerical values for the probability or the consequences are not taken in order to be able to assess the ultimate danger. Qualitative risk assessment can generally be carried out in two ways:

- with the help of a checklist (the potential risks are seen through the application of the preventive fire protection measures as well as the subjective risk assessment);
- the tree of events used for the analysis of potential risks (also applied to the preventive fire protection measures as well as the subjective risk assessment).

The end result in both cases is the assessment of the risk and the expectation of potential fires or other accidents and applied to the preventive measures for fire protection.

### Factors determining fire risks

The particular fire risks that can be assessed in an area will depend on many factors. It is not the same to analyze fire risks in urban areas or in open spaces. Urban environments where there are areas with old architecture are potentially threatened by fire, unlike new buildings where modern construction and technical protection measures have been applied.

The assessment of fire risks should start with the processing of all available and relevant information that will define the analyzed area. In practice, eight key factors that have been identified as those that describe the characteristics of the analyzed area are processed. These factors act on the expected event and shape the potential fire scenarios along with the expected results, namely:

- the type and quantities of dangerous substances;
- the fire load;
- the height of buildings, surfaces and open spaces;
- the year of age of the facilities;
- the categorization of objects at risk;
- the demographic profile;
- geography, topography and road infrastructure;
- statistical data on fires and property damage;

From this review, factors should be considered individually or in combination with others in order to identify potential fire risks and hazards in "critical infrastructure" areas.

## LEVELS OF PROBABILITY

The probability of fire occurrence is usually estimated based on the data (indicators) from previous experiences. Analytical processing of fires includes the relevant data on the consequences and damages of the fires. Some theoreticians also develop sub-models for the assessment of fire risk, and for such a model of fire assessment, temperature, smoke, toxicity, etc. are taken into account. And of course, experience and scientific achievements are also taken into account in combination with historical data to estimate the probability of the occurrence.

Table 1. Levels of probability

<i>Description</i>	<i>Level</i>	<i>Specifics</i>
--------------------	--------------	------------------

International conference on the occasion of international civil protection day  
 CHANGES, CHALLENGES AND RESILIENCE OF CIVIL PROTECTION DURING COVID 19  
 16 - 18 MARCH 2022, SKOPJE, REPUBLIC OF NORTH MACEDONIA

<i>Rare</i>	1	<i>-may occur in exceptional circumstances -no incidents in the past 15 years</i>
<i>Unlikely</i>	2	<i>-could occur at some time, especially if circumstances change -5 to 15 years since last incident</i>
<i>Possible</i>	3	<i>-Може да се случи под моментални околности -Еден инцидент во поминати 5 години -might occur under current circumstances -1 incident in the past 5 years</i>
<i>Likely</i>	4	<i>-will probably occur at some time under current circumstances -multiple or recurring incidents in the past 5 years</i>
<i>Almost Certain</i>	5	<i>-expected to occur in most circumstances unless circumstances change -multiple or recurring incidents in the past year</i>

The frequency of incidents as data should be used as a general guide and indicator in determining probability values. It should be supplemented with data from analyzes that occur in other similar areas and regions. Events that have not occurred for a long time in one area. they can be very common in some other area. Such data can serve us that there is a high probability of such an event in the given area, and thus the decision to apply preventive measures and concrete decisions for action and solving the problem.

#### ACCEPTANCE OF MODERN FORMS OF PROTECTION

Representative examples of fire risk assessment methods are "Fire Risk Assessments" developed by NFPA (National Fire Protection Association, SAD). The risk indexing method contains precisely determined tabular values for risk ranking. The checklist method (NFPA 551, 2007) introduces the creation of a list of potential hazards and checking fire protection measures. If the dangers are real and exist or can be predicted, everything is done in order to arrive at the subjective assessment of the risk of fire. The formulation of the checklists allows a systematic check of the potential fire hazards related to a certain object or a certain place. The list of fire protection measures compared in parallel with the potential fire hazards allows a quick check of any preventive protection measure and the need for the additional protection measures in order to reduce the risk to the minimum value. With the checklist method, the potential fire hazards and fire protection measures are listed first.

If a comparison is made between the already existing and the potentially assessed dangers, the result of the subjective assessment of the remaining part of the risk of fire occurrence is obtained. Within this checklist method, specific assessment methods have been developed in certain companies and facilities from the critical infrastructure. are only for their internal

use. This method or method of risk assessment does not take into account the logical development of a fire unlike the method using the tree of events.

The event tree method is another way of identifying potential fire hazards, assessing the probability and consequences as well as the value of the risk. If the checklist method and the event tree are compared, the event tree in terms of probability shows more potential hazards. and fire protection measures, the consequences and the level of risk.

## CRITICAL INFRASTRUCTURE

A large number of countries in the world have made a precise specification of critical infrastructures and, generally speaking, these are the same or similar sectors, which are repeated in several countries with the addition of certain specific sectors, such as: energy, information and telecommunications, public health, food, agriculture, banking and finance, emergency services, government, basic defense industry, water, chemical industry and hazardous substances, natural gas and oil, electricity generation and distribution energy, transport systems, police, customs, foreign diplomatic missions and residences, post offices, etc.

In general, the identified lists of sectors are correlated with the European Union Directive on critical sectors, namely: energy, information and communication technologies, water, food, finance, public administration, transport, chemical industry, research activities, with all their capacities and activities, products or services.

## PREVENTIVE PROTECTION OF CRITICAL INFRASTRUCTURE

In order to provide a complete picture of trends and methods for efficient protection of critical infrastructure, emphasis should be placed on the following aspects:

- Assessment, taking into account the risks and vulnerability, as well as the expected results of the possible consequences. This is achieved by the methods of analysis, modeling and simulation.
- Prevention, that is, risk reduction by forecasting the effects of threats. This dimension is achieved through intimidation, as well as with other "passive" countermeasures (designed security).
- Detection - it is the ability to promptly recognize abnormal conditions and behavior. This aspect is realized with active sensors and other technological devices.
- Response - more precisely, rapid reaction to threats. This aspect is realized with the method of early warning, situation monitoring and decision support systems.

Possible methodologies to help identify the necessary capabilities needed to address specific threats include:

- identification of the basic infrastructure, which is crucial for the smooth functioning of society;
- threat evaluation: proactive identification of critical infrastructure elements, taking into account

future trends (at this stage, it is necessary to perform an analysis of the relevant intelligence information);

- threat evaluation: determining the effects of an incident on critical infrastructure, taking into account the vulnerability of existing facilities.
- risk assessment: it is necessary to create a list of existing credible risks, depending on the potential risks in terms of their nature, potential targets, as well as impact assessment.
- The protection of critical infrastructure is a very important process from several aspects – economic, political, security, but also social and environmental. This is due to the fact from the analysis that if there is a disruption or destruction of a part of the critical infrastructure system, there will be a cascading effect that will spill over from one element to another, regardless of whether it originates from a natural or anthropogenic source.

Managing the risks of serious threats and the dangers associated with physical and cyber threats to critical infrastructure requires an integrated approach in terms of:

- identifying, preventing, detecting and preparing for dealing with threats and dangers of the critical infrastructure;
- reducing the vulnerability of critical systems and networks and
- mitigating the possible consequences of incidents or negative events that occur on critical infrastructures.

The success of this integrated approach depends on the whole range of capabilities, expertise and experiences in the infrastructures and of course the stakeholders.

## CONCLUSION

In short, the percentage of risk of fire and other type of accident in areas of critical infrastructure is dependent on the definition of the degree and zones of danger. Necessarily, we are guided by the assessment of the key factors that characterize the properties of the circumstances for the formation of potential fire risks. The division of probability and level of consequences of accidents is needed from the application of risk analysis and determination of priority decisions. The analytical area where fire hazards are determined are the basis for the preparation of various scenarios for exercises and preparations of the competent services. Then, the analysis of the conducted exercises can serve as a basis for selection and defining the priority decisions when solving the specific situation. The purpose of the assessment and decision is to reduce the risk of fires, large-scale disasters and their consequences, and of course a quick and professional response.

Continuous need for improvement and exchange of new experiences, standards and methods, application of new achievements from science and technology as well as promotion of regional, border and international cooperation.



International conference on the occasion of international civil protection day  
CHANGES, CHALLENGES AND RESILIENCE OF CIVIL PROTECTION DURING COVID 19  
16 - 18 MARCH 2022, SKOPJE, REPUBLIC OF NORTH MACEDONIA

LITERATURE

1. Milanko V., Laban M., Urban residential block fire safety assessment regarding access roads, in Proceedings (ed. Milanko V.) 2nd International Scientific Conference on Safety Engineering, Novi Sad, October 21-22, 2010;
2. Neshkoski Z., Fire protection in urban areas, Fire Union of Macedonia, Skopje, 2012;
3. Neshkoski Z., Health and safety in terms of fire and evacuation, Proceedings of scientific papers, First International Scientific Vocational Conference, Bitola 2013;
4. Sarić S., Leković M., Petković D.: Primena kvantitativnih metoda u odlučivanju, Prosveta, Niš, 1994;
5. Starčević J., Ilić M., Paunović-Pfaf J., Priručnik za procenu rizika, GLOBE DESIGN, Beograd, 2010 (str. 16);
6. Džukleski G, Nacionalni koordinativni centar za granično upravljanje, kao nova strategija za kontrolu kriminaliteta, Fakultet Bezbednosti-Skopje, 2013;
7. Leković M., Teorija i metode odlučivanja-kvantitativna analiza, Ekonomski fakultet, Priština, 1998;
8. O. Bakreski, T. Miloshesvska, G. Alcheski, Zastita na kritičnata infrastruktura, Skopje, 2017
9. [file:///C:/Documents%20and%20Settings/zoran/My%20Documents/Downloads/previes-NFPA 551-13 pre.pdf](file:///C:/Documents%20and%20Settings/zoran/My%20Documents/Downloads/previes-NFPA%20551-13%20pre.pdf), (12.02.2014);
10. <http://www.cornwall-online.co.uk/support/firesafety-riskassessment.pdf> (10.02.2014);
11. <http://www.homelandsecuritynewswire.com/dr20131017-canadian-city-developed-mathematical-formula-to-evaluate-risk> (01.03.2014);
12. [http://www.nfpa.org/catalog/product.asp?pid=sfpe06&cookie test=1](http://www.nfpa.org/catalog/product.asp?pid=sfpe06&cookie%20test=1),
13. SFPE Engineering Guide to Performance-Based Fire Protection, 2007, (15.02.2014) ;
14. <http://www.nfpa.org/codes-and-standards/document-information-pages?mode=code&code=550&tab=nextedition>,
15. NFPA 550-Guide to the Fire Safety Concepts Tree, (01.03.2014);
16. [http://www.rother.gov.uk/media/pdf/p/p/Lacors Fire Safety Guide July 2008.pdf](http://www.rother.gov.uk/media/pdf/p/p/Lacors%20Fire%20Safety%20Guide%20July%202008.pdf) (08.02.2014);
17. <https://www.dhs.gov/what-critical-infrastructure>;

## **ACHIEVING CRITICAL INFRASTRUCTURE PROTECTION AS COMPONENT ON NATIONAL SECURITY**

Assoc. Prof. Dr.sc. Tatjana Gerginova, PhD  
Faculty of Security-Skopje,  
University "Sv. Kliment Ohridski"-Bitola, Macedonia  
[tanjagerginova@gmail.com](mailto:tanjagerginova@gmail.com)

### **ABSTRACT**

National security is a multidimensional dynamic cognitive phenomenon and the realization of protection of critical infrastructure is one of the components of national security. In the introductory part of the paper, the author will give several scientific definitions of national security and the term critical infrastructure. Furthermore, the author provides an analysis of the critical infrastructure in the Republic of North Macedonia and the Republic Srpska. In the concluding remarks, the author will give certain recommendations in order to improve the situation regarding the protection of critical infrastructure in the Macedonia. The content will be prepared on the basis of analysis of scientific literature and using electronic content. In the preparation of the content of the paper, the author will apply the general scientific methods: the descriptive method, the normative method, the comparative method and the method of content analysis as a separate scientific method.

Keywords: national security, critical infrastructure, critical infrastructure security

### **INTRODUCTION**

The three basic elements that make up a state are: territory, population and power. The notion of national security is a dynamic phenomenon and multidimensional. In order to define the term national security, it is necessary to start from the values that need to be protected (physical and property security, political independence, territorial integrity, international peace etc.) and from the basic entity that is subject to protection (individual citizen, state, international community, social security, economic system, environment etc.). National security is a structural element of the survival and action of individuals, societies, states and the international community and it is one of the fundamental life functions. The reference object of protection, i.e. values that are protected by security are sovereignty, independence, territorial integrity, constitutional legal order, human rights and freedoms.

Today, the content of security is expanding, which in addition to the safety or security of the citizen and the security of the state, includes contents of economic, environmental, social, energy security etc.

#### SCIENTIFIC DEFINITION OF THE TERM NATIONAL SECURITY

There is speculation in the scientific literature that the term "national security" was first used by the famous American journalist Walter Lippman, in 1943 in his book *American Foreign Policy*, and this phrase became the standard name for this concept of security after World War II (Tatalovič, 2006 : 143).

Sasa Mijalkovic defines National Security as the activity of nation states, through which, in accordance with their social capabilities in the present and in the future, taking into account global change and development, they protect their own identity, survival and interest (Mijalkovi, Keserovi, 2010 : 67).

Anton Grizold defines national security as the security of the national territory (including airspace and territorial waters), the protection of the lives of people and their property, the maintenance of national sovereignty and the exercise of the fundamental functions of the state (Grizold, 1992).

Sinisa Tatalovic believes that security is a structural element of the survival and action of individuals, societies, states and the international community and it is one of the fundamental life functions (Tatalovič, 2006 : 11).

According to Trajan Gocevski - "Security in the broadest political-legal sense includes measures and activities for preservation and protection from all kinds of threats to the independence and territorial integrity of a country and protection of the internal state and legal order" (Gocevski, 2002).

The approach to the term security was best expressed by the eminent researcher Arnold Wolfers. According to Wolfers, in order to understand the term security, it is necessary to study the basic categories of the term security, types of security, mechanisms for its realization, types of threats, etc. (Wolfers,1962).

I define the term national security as taking measures and activities aimed at protecting the basic constitutional values (independence of the state, territorial integrity and sovereignty of the state, constitutional order, human rights and freedoms) from all internal and external threats, as well as survival. and the development of society and the state as a whole (Gerginova, 2015).

We can conclude that national security in every modern state is linked to national reference values. Hence, "Critical Infrastructure" is defined as an important component of the national security of each country. Critical infrastructure could be defined as a value or set of values and goods that are essential for achieving protection of the state and society, safety of citizens, protection of their property and environment, protection of the economy, etc. whose disruption in the functioning or destruction could create long-term harmful consequences on the basic values of the economy, the state and society as a whole.

The endangerment of such facilities / infrastructures in every modern state brings into question the general functioning of the state as well as the normal course of life and safety of the citizens.

#### SCIENTIFIC DETERMINATION OF CRITICAL INFRASTRUCTURE

There are various definitions of the term "critical infrastructure" in the scientific literature. Critical infrastructure is the basic physical and organizational structure that society and the state need to function. Critical infrastructure is defined as the sum of all facilities, systems, networks and functions, vital for the survival of the state, the destruction of which will negatively affect security, national security, public health and the like.

The term critical infrastructure includes all national capacities, services and information systems that are vital to the state and because of the impossibility of their operation or damage may endanger national security, national economy, public safety, public health, and government efficiency.

According to the authors Motef and Parfomak, critical infrastructure is a complex system that is specifically exposed and vulnerable primarily to natural threats, technical-technological hazards and anthropogenic threats. In this context, Motef and Parfomak believe that the term "critical infrastructure" should be extended from what is primary to national defense, economic security to what is vital to public health, security and national morale. (Moteff, Parfomak, 2004 : 5).

In the Republic of North Macedonia, the term critical infrastructure is a relatively new area and is legally unregulated. In fact, there is still no legal framework regarding the identification, definition or protection of critical infrastructure, and thus no formal established list of critical infrastructure. The need for protection of the critical infrastructure, in general, arises from the need for each state to have a systematized access to the building.

Infrastructure needs to be defined as critical, so it can be a potential goal. There are many different solutions and practices, but every country needs to recognize the most appropriate model for the protection of critical infrastructure. That is why it is necessary to protect the critical infrastructure to be regulated through an integrated approach - starting with identifying, preventing and preparing for critical infrastructure threats, by reducing the vulnerability of critical infrastructures to mitigate the consequences on critical infrastructure.

"There are several theories or approaches on how to single out critical infrastructure that incorporate different methodologies and criteria, such as: the geographical scope of the impact of a particular segment of critical infrastructure, the significance (national, regional, global) and the duration of the necessary protection (permanent, occasional/temporary). In order to understand the concept of critical infrastructure, it is important to consider sectoral interdependence as well as close interaction. Vital sectors are interconnected and interactive, leading to the creation of new vulnerabilities and critical points". Australia is a country that, together with the United States, has begun the theoretical development of critical infrastructure. Australia defines critical infrastructure as "physical facilities, supply systems, information technology and communication

International conference on the occasion of international civil protection day  
CHANGES, CHALLENGES AND RESILIENCE OF CIVIL PROTECTION DURING COVID 19  
16 - 18 MARCH 2022, SKOPJE, REPUBLIC OF NORTH MACEDONIA

networks which, if destroyed, disabled or weakened over a long period of time, may significantly affect the social or economic well-being of the people, or affect on Australia's ability to maintain national defense and ensure national security (Mitreska, Mileski, Mikac, 2019 : 20)The National Infrastructure of the United Kingdom is defined by the Government as: 'Critical elements of infrastructure (assets, facilities, systems, networks or processes and the essential workers who operate and maintain them) whose loss or disruption could result in: major, detrimental impact on the availability, integrity or performance of essential services, including services whose integrity, in the event of injury, could result in significant loss of life, ie casualties given the significant economic or social impact and / or significant impact on national security, national defense or the functioning of the state For this see more: <http://www.cpni.gov.uk/about/cni/> accessed on 25.03.2022

In Canada, critical infrastructure refers to the processes, systems, facilities, technologies, networks, goods and services vital to the health, safety, security and economic well-being of Canadians, and the efficient functioning of Government. Critical infrastructure can be independent or interconnected and interdependent within and across provinces, territories and national borders. Disruption of critical infrastructure can have catastrophic consequences, which can lead to loss of life, adverse economic effects and a significant decline in public confidence (According to Government of Canada, PublicSafety: <http://www.publicsafety.gc.ca/cnt/ntnl-scrtr/crtcl-nfrstrctr/index-en.aspx> accessed on 25.03.2022)

In Germany, "Critical infrastructure means the organizational structure and facilities vital to society, so that their degradation or deficit will result in deficiencies cause a significant reduction in supply, disturbance of public order or other consequences" (According to National Strategy for the Protection of Critical Infrastructure of the Federal Republic of Germany (2009), English language version available at [http://ccpic.mai.gov.ro/docs/Germania\\_cip\\_strategy.pdf](http://ccpic.mai.gov.ro/docs/Germania_cip_strategy.pdf))

In Italy, critical infrastructure encompasses all objects, systems, networks, and functions — physical or virtual — that are vital to the survival of a country whose incapacitation or destruction would have a debilitating impact on security, national economic security, public health, and safety, or which any combination of these phenomena (Bakreski, Gerasimoski, Mileska-Stefanovska, Spasov, Kermetchieva, 2016 : 12)

In NATO, facilities, services and information systems that are vital to a nation are considered critical, and their destruction can endanger the security, economy, health, or general security of the nation or hinder the effective functioning of states. (Mitreska, Mileski, Mikac, 2019 : 22)Analyzing the national definitions of critical infrastructure, it can be determined that they contain two elements, namely: first, they emphasize the subject of the infrastructure: the object, ie the processes and secondly, they state the threats and / or consequences.

The critical feature indicates that the infrastructure provides essential support for economic and social well-being, public safety and the functioning of key Government competencies For this see more: <http://www.merriam-webster.com/dictionary/critical> accessed on 25.03.2022

However, not every national infrastructure is critical. The infrastructure characteristic mainly refers to the physical infrastructure (eg facilities, installations, equipment, etc.), but often the infrastructure includes intangible assets and / or production and communication networks, and in addition the critical national infrastructure of the United Kingdom stands out and "logical" means of infrastructure, including information networks or systems

## EUROPEAN UNION AND CRITICAL INFRASTRUCTURE

The European Union defines critical infrastructure through Directive 2008/114 / EC, which calls on member states to identify and design European critical infrastructure, as well as to assess the need to improve their protection. All Member States have implemented the Directive by establishing a process for identifying and designating critical European infrastructure in the energy and transport sectors. According to the Directive, critical infrastructure is defined as: "an asset, system or part thereof located in the Member States which is essential for the maintenance of vital social functions, health, safety, economic or social well-being of the people and whose disruption or destruction would significant impact in the Member State as a result of failure to maintain those functions" (According to DIRECTIVE 2008/114/EC - <https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=LEGISSUM%3Ajl0013>)

The European Critical Infrastructure Protection Program creates a procedure for identifying and assessing Europe Critical Infrastructure and learning how to better protect it. (According to European Commission website, available at <https://ec.europa.eu/energy/en/topics/infrastructure/protection-critical-infrastructure>)

The Green Paper was adopted on November 17, 2005. The Green Paper is defined as a "policy document" (According to Green Paper on a European Programme for Critical Infrastructure Protection. Commission of the European Communities, Brussels, 2005).

However, the Green Paper of the European Critical Infrastructure Protection Program provides an indicative list for identifying critical infrastructure by sectors, as well as a proposed list of framework definitions of key terms. The most important pillar of the European Program for the Protection of European Critical Infrastructure is the adoption of Council Directive 2008/114/EC. This Directive invites Member States to designate the European Critical Infrastructure as well as to assess the need to enhance its protection.

The European Union defines critical infrastructure through Directive 2008/114 / EC, which calls on member states to identify European critical infrastructure, as well as to assess the need to improve their protection. All Member States have implemented the Directive by establishing a process for identifying and designating critical European infrastructure in the energy and transport sectors.

International conference on the occasion of international civil protection day  
CHANGES, CHALLENGES AND RESILIENCE OF CIVIL PROTECTION DURING COVID 19  
16 - 18 MARCH 2022, SKOPJE, REPUBLIC OF NORTH MACEDONIA

In the Directive itself, critical infrastructure is defined as: "property, system or part thereof which is located in the Member States and is essential for the maintenance of vital social functions, health, safety, security, economic and social well-being of the people, whose disturbance or destruction would have a significant effect on a Member State as a result of the failure to maintain those functions"

For this see:

DIRECTIVE 2008/114/EC – identification and designation of European critical infrastructures and assessment of the need to improve their protection available at

<https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=LEGISSUM%3Aj10013> )

The Directive specifically recognizes the "European Critical Infrastructure" as critical infrastructure whose disruption or destruction would have transboundary effects in the Member States and which should be referred to as such in a joint procedure (Poposka, 2019 : 81).

European Critical Infrastructure means "critical infrastructure" located in the Member States, the disruption or destruction of which would have a significant impact on at least two Member States.

In order to improve the protection of critical infrastructure, the European Commission in 2012 establishes a working document for the revision of the European Program for Critical Infrastructure Protection, which sets out a global plan for the improvement of critical infrastructure in all EU member states and in all relevant sectors of the economy activity. The program is the result of a regular exchange of information between all members of the European Union and it is not limited to terrorism but also includes natural disasters, technical-technological hazards, organized crime and all other anthropogenic threats (in all sectors of critical infrastructure).

In the energy and transport sectors, Directive 2008/114/EC has been implemented by the EU Member States since 12 January 2011 with a view to extending its application to other critical infrastructure sectors. Prior to accession to the European Union, all new members of the Union are required to implement this Directive in their national legislation.

The document is conceived as the first measure to identify, determine and assess the necessary protection of critical infrastructure and this obligation and responsibility is given to states and owners of critical infrastructure.

If we make a comparative analysis of the legislation for protection of critical infrastructure in the Republic of North Macedonia and the Republic Srpska, we can conclude the following:

The Law on Critical Infrastructure Security has been adopted in the Republic Srpska and this law defines two terms For this see: Закон о безбједности критичних инфраструктура Републике Српске, Службени Гласник број 58/19.

The term "critical infrastructure" is defined as systems, networks and facilities of particular importance, the destruction or threat of which could cause serious disturbances in the free movement of people, transport of goods and services, adversely affect the internal security, health and life of people, property, environment, external security, economic stability and the continuous functioning of the republican bodies.



International conference on the occasion of international civil protection day  
CHANGES, CHALLENGES AND RESILIENCE OF CIVIL PROTECTION DURING COVID 19  
16 - 18 MARCH 2022, SKOPJE, REPUBLIC OF NORTH MACEDONIA

It is further that the critical infrastructure includes several sectors:

- industry, energy and mining (production, including input resources, facilities, transmission systems, storage, transport of products, energy, distribution systems),
- information and communication infrastructure (electronic communications, data transmission, information systems, provision of audio and audio-video media services),
- traffic (road, rail and traffic and internal water traffic),
- health care (health care, production, transport and supervision of drugs).
- Communal activities (communal infrastructure facilities, especially in the field of production and delivery of water, treatment and disposal of wastewater, production and delivery of thermal energy, removal of waste from residential and business premises etc.).
- Water economy (regulatory and protective water facilities),
- Food and beverages (production and supply of food and beverages, food and beverages safety system, stocks),
- Finance (banking, stock exchanges, investments, insurance and payment systems),
- Production, storage and transport of hazardous substances (chemical, biological, radiological and nuclear materials);
- Public services;
- Upbringing and education;
- cultural and natural goods (religious buildings, cultural monuments, spatial cultural-historical units, archeological sites, sights, art and historical objects, archives, film material, old and rare books, as well as protected natural goods prescribed by the Law on Protection of nature).

It is further determined that the Government of the Republic of Srpska, at the proposal of the Ministry of Interior, may designate other sectors of the critical infrastructure with a decision.

The mentioned Law defines the following terms: risk analysis and security plan.

Risk analysis is the consideration of possible threat scenarios in order to assess the vulnerability and possible consequences, ie disruptions in the operation of critical infrastructure or its destruction;

A security plan is a mandatory plan for the protection of critical infrastructure.

The term critical infrastructure protection includes all activities aimed at ensuring functionality, smooth operation and delivery of critical infrastructure goods and services in order to prevent critical infrastructure from being compromised.

The term protected data defines data on critical infrastructure that are marked as such in accordance with special regulations; and critical infrastructure management means providing working conditions and continuous operation of critical infrastructure.

Furthermore, the law defines the following terms:

Critical Infrastructure Determination Methodology is a set of general criteria based on which the risk for individual critical infrastructure systems and networks in all sectors is assessed and critical infrastructure facilities are identified.

International conference on the occasion of international civil protection day  
CHANGES, CHALLENGES AND RESILIENCE OF CIVIL PROTECTION DURING COVID 19  
16 - 18 MARCH 2022, SKOPJE, REPUBLIC OF NORTH MACEDONIA

Legal entities, i.e. public enterprises and companies that are responsible for critical infrastructure management are determined under the responsible entities of the critical infrastructure;

sectoral measures is a set of specific measures based on which the risk for critical infrastructure systems and networks in a certain sector is assessed;

The risk analysis identifies the possibilities for disruption of the critical infrastructure and is carried out in accordance with the Methodology and sectoral measures.

The risk analysis of all critical infrastructures, as direct damage, assesses:

- 1) human losses (estimated possible number of victims or injuries due to disruption of certain critical infrastructure),
- 2) economic losses (estimated according to the importance of the economic loss or reduction of the quality of the products or services, including the possible impact on the environment),
- 3) impact on the public (assessed by the impact on public confidence, physical suffering and disruption of daily life, including the loss of basic and public services).

The risk analysis of all critical infrastructures, as indirect damage, assesses:

- I. long-term impact on the integrity of individuals and the community (assessed according to the importance of the data from the point of view of the functioning of the community, the realization of human rights and freedoms),
- II. long-term economic damage (assessed according to the importance of the data for protection of collective values and prevention of undermining of personal and collective economic interests);
- III. long-term impact on the quality of the environment (assessed according to the importance and transparency of the data on the systems and the hazards that can significantly affect the quality of the environment).

When assessing the risk and the required level of protection, the effect of an individual sector or critical infrastructure network on other critical infrastructures is taken into account and the exchange of data necessary for the preparation of the risk analysis is provided.

The security plan ensures the confidentiality, completeness and availability of organizational, personnel, material, information-communication and other solutions, as well as security measures for the functioning of the critical infrastructure.

In the Republic of North Macedonia, the term critical infrastructure is a relatively new area and is legally unregulated in fact, there is still no legal framework in terms of identification, definition or protection of critical infrastructure and thus no formal established list of critical infrastructure.

In Macedonia it is necessary to scientifically define the terms "critical infrastructure" and "protection of critical infrastructure", as well as the terms "European critical infrastructure" and "national critical infrastructure".

It is necessary to prepare a comprehensive list of critical infrastructure that should be protected. Furthermore, it is necessary to make a security risk assessment, to determine the sectors of the protected critical infrastructure and to determine sectoral and cross-sectoral criteria on the basis of which it will be determined which facilities, systems and processes will enter the protected critical infrastructure.

It is necessary to provide a good assessment of the threats, the vulnerability, the indicative list and the standards for the protection of the critical infrastructure. Improvement of critical infrastructure resistance, i.e. critical security infrastructure of possible human, physical and cyber-threats is particularly needed.

The basic security concept of successful critical infrastructure protection must be prevention, especially through the effective assessment and management of security risks after critical infrastructure. In Macedonia, it is necessary to clearly and legally identify entities that will be involved in the protection of critical infrastructure. It is also necessary to follow and apply the best world, European and regional practices in the protection of critical infrastructure. It is necessary to realize trainings and other professional trainings for the entire staff that will be included in the domain of protection of the critical infrastructure.

## REFERENCES

1. Bakreski Oliver, Gerasimoski Sase, Mileska-Stefanovska Verica, Spasov Nikolcho, Kermetchieva Sanja (2016), Legal framework for providing critical infrastructure with a view to providing critical infrastructure in the Republic of Macedonia, Skopje: Chamber of the Republic of Macedonia for Private Security
2. Bakreski, Oliver., Milosevska, Tanja., Alceski Gjorgji., (2017) Protection of critical infrastructure Publisher Chamber of the Republic of Macedonia for private security
3. Green Paper on a European Programme for Critical Infrastructure Protection. Commission of the European Communities, Brussels, 2005
4. Government of Canada, Public Safety: <http://www.publicsafety.gc.ca/cnt/ntnl-scrtr/crtcl-nfrstrctr/index-en.aspx> accessed on 25.03.2022
5. Gerginova, Tatiana., (2015). Global Security; Publisher: Faculty of Security – Skopje
6. Gocevski, T., Fundamentals of the national defense system, Skopje, 2002.
7. DIRECTIVE 2008/114/EC – identification and designation of European critical infrastructures and assessment of the need to improve their protection available at <https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=LEGISSUM%3Aj10013>

International conference on the occasion of international civil protection day  
CHANGES, CHALLENGES AND RESILIENCE OF CIVIL PROTECTION DURING COVID 19  
16 - 18 MARCH 2022, SKOPJE, REPUBLIC OF NORTH MACEDONIA

8. European Commission website, available at <https://ec.europa.eu/energy/en/topics/infrastructure/protection-critical-infrastructure>
9. Закон о безбједности критичних инфраструктура Републике Српске, Службени Гласник број 58/19.
10. Ilic, P., On the Definition and Definition of National Security, War Act, MoD RS, Belgrade, 2012
11. Moteff J., Parfomak P., Critical Infrastructure and Key Assets: Definition and Identification, Congressional Research Service - The Library of Congress, 2004, p.5
12. Mijalkovi., Sasa., Keserovi., Dragomir., Fundamentals of Security, Faculty of Security and Protection, Banja Luka, 2010
13. Mitreska Marina., Mileski Toni., Mikac Robert., (2019). Critical Infrastructure-Concept and Security Challenges, Skopje
14. National Strategy for the Protection of Critical Infrastructure of the Federal Republic of Germany (2009), English language version available at [http://ccpic.mai.gov.ro/docs/Germania\\_cip\\_strategy.pdf](http://ccpic.mai.gov.ro/docs/Germania_cip_strategy.pdf)
15. Poposka, Vesna., International University Vision - eu.org.mk/ Critical infrastructure as a critical factor in integration processes. For more details see: Schmitt, Michael N. (2013) Tallinn Manual on the International Law Applicable to CyberWarfare, Cambridge University Press
16. Tatalovi., S., National and international security, Political culture, Zagreb, 2006
17. Wolfers, A., National Security as an Ambiguous Symbol, Discord and Collaboration, John Hopkins University Press, Baltimore, 1962.
18. <http://www.cpni.gov.uk/about/cni/> accessed on 25.03.2022
19. <http://www.merriam-webster.com/dictionary/critical> accessed on 25.03.2022