AUTHOR'S OVERVIEW OF PHD DISSERTATION

NATIONAL UNIVERSITY OF PUBLIC SERVICE

FACULTY OF MILITARY SCIENCE AND MILITARY OFFICER TRAINING

DOCTORAL SCHOOL OF MILITARY ENGINEERING

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Possibilities of modern solution of flood and inland water disaster management tasks

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Budapest, 30.09.2020

SETTING THE SCIENTIFIC PROBLEM

The independent disaster management organization was established on January 1, 2000, and has been involved in a number of flood and inland water protection operations in cooperation with water administrations. The lives and material assets saved during the interventions can be credited as common successes, which can be attributed to the professionalism and perseverance of the organizations dedicated to defense. The 2013 historical flood defense was also a success, but also pointed out that there is no complete security. As a result of hundreds of years of extreme water levels and extraordinary defense tasks, we have reached the limit of our human and defense rampart tolerance.

However, climate change and other unforeseen events will pose more and more challenges for us. In order to improve and maintain the level of our security, it becomes necessary to use new resources, tools, capabilities and procedures with which we can respond effectively to new threats. We know that thanks to the information revolution, personal computers, tablets and mobile phones have been significantly strengthened in their capabilities. The number of internet accesses has increased by orders of magnitude, and data transfer speeds are constantly evolving. The hardware capabilities of IT devices have also increased significantly, which has also led to software innovation. Among other things, the location capability of the devices has been modernized, and the ability to take photos and videos has been significantly improved.

In addition to technological advances, it can also be stated that the vast majority of disaster management volunteers already have smart devices and are able to use their capabilities in their daily lives. This should be taken into account in future defenses, as existing defense capabilities can be developed by taking advantage of technical and technological developments and by providing the most effective scientific basis for organizational and coordination tasks. As a result, our current resource capacities can also be increased to provide a higher level of security to deal with the next, even unforeseen, emergency.

In my opinion, the range of actors involved in defense can be expanded, and vulnerability makes it increasingly justified to increase the capacity to be involved in disaster management operations. As a result, individual voluntary and international organizations may even become the key to successful defenses in the future.

The motivation of disaster management volunteers can be increased by taking into account methods that have not been used so far, so they can be used more effectively in emergency flood and inland water protection tasks. The disaster management organization sees volunteers as a strategic partner and is increasingly supporting the idea of joint action. Nationwide, hundreds of volunteer firefighters or ambulance members are currently helping our fellow human beings in distress and proving the legitimacy of your organization. There is a huge potential in this capability, which, however, can only be used with proper preparation and conscious involvement as well as ongoing management.

There is currently no common platform for communication that would meet the modern expectations in flood and inland water protection that would facilitate alerting supporters and volunteers. In general, however, with the development of IT and electronic hardware and software, almost all records have become more accurate and more easily accessible. The electronic forms used by international units reduce the time spent on data collection to a fraction, thus significantly increasing operational efficiency. These systems are already used successfully by many domestic economic actors and public utility service providers and international humanitarian organizations. In Hungary, this is still unknown in connection with flood and inland water protection, although after an extensive flood damage event, the methodology and software could be used by the disaster management organization. The time spent on damage assessment tasks would be significantly reduced, speeding up the execution of recovery tasks.

To sum up, the scientific problem is that we do not implement flood and inland water protection measures using all the appropriate tools and opportunities. However, in the event of a future disaster, a situation may arise in which all the resources that can be mobilized will be needed to protect human lives and material assets. Without it, in the event of a future damage event, protection may fail simply because the available resources will not be sufficient to handle the event. Water damage control tasks thus pose increasing challenges to the disaster management organization, against which control is only possible with an innovative, adaptive, resilient and modern protection system.

RESEARCH OBJECTIVES

In order to establish my research work, I set the following goals:

1. I examine the international and domestic legal environment of water damage control, paying special attention to the designability of the forces and equipment that can be involved.
2. I analyze the professional publications of international and domestic researchers, as well as the reports related to climate change, in connection with the events causing extraordinary impact.
3. I examine the currently applied domestic and international emergency response planning, especially the rules for the management of flood and inland water risk.
4. I research the possibility of transferring international good practices to the domestic system and increasing their efficiency.
5. I present the volunteer system of disaster management and its legal background, and then I examine its practical applicability and developability.
6. In connection with the organization of the effective flood and inland water protection of the settlements, I assess the motivation of the disaster management volunteers and the possibilities of organizing them for professional tasks.
7. I examine the operation of international rescue teams, especially the applicability for domestic flood and inland water protection.
8. I will analyze the EU Voluntary Unit and the UN INSARAG system, with a particular focus on international forces that can be designed to provide assistance.
9. I analyze the operation of GDACS and CECIS systems.
10. I also examine the domestic applicability of the software used by international rescue teams in connection with the implementation of disaster management tasks.

RESEARCH HYPOTHESES

After exploring the scientific problems, I formulated the following hypotheses:

1. I assume that the success of future disasters, flood and inland water damage incidents can be significantly increased by supplementing contingency planning with methodological and resource supplies.
2. I assume that domestic and international volunteers can be effectively involved in the prevention of future flood and inland water damage events.
3. I assume that volunteer motivation has a significant impact on the number and involvement of disaster management volunteers.
4. I assume that the use of electronic devices can effectively implement the data collection tasks of flood and inland water protection.

RESEARCH METHODS

To achieve the set goals, I used the following research methods:

1. I examined international and domestic legislation, organizational regulations, and the relevant foreign and domestic literature.
2. I analyzed the international guidelines and the developed practice.
3. I processed and evaluated the experiences of the recent significant domestic defenses, and then drew conclusions by induction.
4. I examined the causes of significant flood damage events in the past, the implementation of protection measures, the forces and tools used, especially the experience processed at the scientific level.
5. In connection with water damage, I participated in scientific events, the results of which I took into account in my research.
6. I involved the population, social and charity organizations, and the participants of the defenses in the research work with several questionnaires. Based on the analysis of the questionnaire responses, I drew conclusions using deduction.
7. The results of the questionnaire research were published in scientific journals for further research.
8. I continuously examined the emerging professional software and web developments.
9. I participated in domestic and international exercises and events aimed at presenting new techniques and technologies.

THE CONCISE DESCRIPTION OF THE INVESTIGATIONS CHAPTER BY CHAPTER

I. Disaster management tasks against flood and inland water

Professional disaster management contributes to water damage control tasks. Its interventions depend to a large extent on the past, present and future hydrographic features of the affected sites, on the possibilities of protection. The chapter is therefore the first to list past domestic hydrological disasters. This is followed by a brief presentation of the topography of the Carpathian Basin and the rivers of Hungary. The second part deals with the rising flood level of the Danube and Tisza and its tributaries, and the effects of the expected climate and environmental change. Finally, the damage caused by water worldwide is analyzed.

II. Development of emergency planning

The first part of the chapter discusses in detail the current regulations on water protection and water damage. It explains the system of tasks of each protection actor, the structure of the disaster management organization, and then the basic norms related to flood and inland water protection. It demonstrates a change from the previous incident management concept to disaster risk reduction. This is followed by Hungary's current emergency planning system, which is based on the traditional approach. When classifying settlements, the risks are assessed on the basis of recent events and fixed points (for example: the presence and proximity of a nuclear power plant or a hazardous plant). Among the design guidelines, a novel approach is emerging at the international level, the achievements of which are not yet applied. The two approaches can be combined, which will thus be effective in helping to deal more effectively with low-probability events[1] (afterwards: HILPs). The second part of the chapter examines the relationship between disaster and crisis and analyzes HILP events. These can have a significant impact on flood and inland water hazard planning.

[1] High Impact Low Probability events

III. Involvement of disaster management volunteers

Volunteers are greatly able to help the effectiveness of disaster management operations. The first part of the chapter contains the results of their involvement and motivation analysis. This continues with an analysis of the categories of volunteers. They are important and therefore include a detailed description of volunteers from citizens, civil protection organizations, volunteer rescue groups, charitable and church organizations, public bodies and business organizations. The second part of the chapter examines the use of resources and asset capacities provided by international forces and instruments. Using the results of the research, the concept of the flood intervention rescue team was developed as a new element. This idea can serve as a basis for either volunteers or professionals to create a team specifically specializing in flood and inland rescue.

IV. Applicability of electronic devices and software

In the field of disaster management, we can see that with the development of information technologies, electronic devices are appearing more and more often, both in prevention and in applications in the field of damage. This is clearly due to the fact that in the last 10-20 years, individual electronic devices and applications have developed at an unprecedented rate, becoming more and more accessible. At the beginning of the chapter, research on the use of electronic devices by disaster management volunteers is conducted. This is followed by an analysis of the domestic applicability of the Global Disaster Forecasting and Coordination System. The second part of the chapter describes the Kobo Toolbox program and examines its usability in relation to flood and inland water protection. The end of the chapter discusses the efficiency-enhancing and cost-reducing possibilities of using electronic forms.

SUMMARIZED CONCLUSIONS

1. In spite of climate change causing droughts, with the exception of the summer period, we have to reckon with more and much higher intensity rainfall, and with them more and greater flood and inland water damage. The frequency and probability of damage events that hit flood peaks increase many times over.
2. Domestic emergency planning is clearly based on the traditional approach (experiential learning). Effective, as evidenced by the elimination of daily incidents. It plans for hazardous effects and prepares to deal with the consequences before they occur. However, in order to maintain its efficiency, it is necessary to fully expand the threatening effects set out in the legislation, taking into account all the threats identified so far, which can be applied to Hungary and individual settlements.
3. Due to HILP events, we are aware from a disaster management perspective that in addition to unknown and unexpected factors, we also have known and acknowledged risks. These should be taken into account in emergency planning within the limits of social acceptance.
4. In addition, due to the HILP events, it would be appropriate to examine the 10-year period together with the water authorities.
5. During the emergency planning for flood and inland water protection, the periodic change of the population of the settlement (availability of the persons planned for use) shall be examined separately.
6. Taking into account and maintaining the motivation of disaster management volunteers can greatly improve the number of volunteers that can be involved in dealing with each incident.
7. Taking into account the category of disaster management volunteers, new groups of volunteers can be involved (for example: volunteers of economic organizations), which can significantly increase the number of deployable staff and the efficiency of professional tasks.
8. IT tools have become “smart devices” and accessible to almost everyone. As a result, special programs and applications have appeared which are able to support the implementation of certain tasks (even disaster management) in a targeted manner. It is

advisable to use this knowledge and generational differences when organizing disaster management volunteers.

9. Software developed and used by disaster management is generally well-functioning and up-to-date, but can be further developed in several ways (e.g. two-way communication, use of electronic forms, volunteer repositories, volunteer communication and support for self-organization).
10. Programs used by the international community can be samples for developing your own software. They enable the disaster management organization to operate more efficiently (for example: significant cost reduction, electronic data collection in the area of damage).

NEW SCIENTIFIC ACHIEVEMENTS

1. I explored the links between disasters and crises, as well as extreme impact events with low probability (HILP) and their severe impact on emergency planning, flood and inland water protection. All this significantly increases the level of preparedness of the participants in the defense and the responsiveness of the available organizations.

2. In order to increase the efficiency of operational interventions, I have prepared the concept of a new flood intervention rescue team, which can be created by transforming the existing forces or creating new ones.

3. Based on the results of the motivation research, I developed the external and internal components of volunteer motivation, as well as some aspects of the involvement of volunteers in a way that can be used in practice. This can make a significant contribution to increasing and retaining the number of volunteers, as well as assisting in the recruitment tasks of a professional disaster management organization.

4. I have proved that the methodological solutions of electronic data collection in the area of damage can be applied in flood and inland water protection, as well as in other fields of disaster management tasks. Based on this, the use of electronic forms in the assessment of damages and the performance of official tasks results in optimal use of time, easier professional data processing and increased economic efficiency

RECOMMENDATIONS

In my dissertation, I comprehensively present the impact of climate change on the frequency of future extreme flood and inland water damage events. I explain in detail the tasks of disaster management related to flood and inland water protection, as well as the possibilities of supplementing and developing emergency planning. I have demonstrated that the number and effectiveness of disaster management volunteers can be increased by involving domestic and international target groups. In the event of an emergency, this provides significant support to the executors of the defenses. My research has confirmed that disaster management volunteers are active users of modern IT tools and methods, and the analysis and domestic application of internationally used disaster management software can result in significant resource, time and economic savings for the disaster management organization. In order to effectively involve disaster management volunteers, I propose research on independent training topics, and the use of electronic tools for the performance of water management and disaster management tasks is worth further investigation.

I recommend reading my dissertation to the attention of protection professionals involved in flood and inland water protection, who prepare emergency plans during the prevention period and participate in the implementation of professional tasks in water damage prevention. I recommend that the results be made known in particular to those who carry out legislative and scientific research into flood and inland water protection.

I also recommend it to professionals in disaster management and water management, mayors, clerks and public safety officers of endangered settlements, lecturers at the National University of Public Service, the Institute for Disaster Management and the Disaster Management Training Center, provide practical assistance in the implementation of defense planning, organization and defense tasks.

PRACTICAL USE OF RESEARCH ACHIEVEMENTS

1. In view of the expected increase in the number and frequency of emergency flood defenses, it is appropriate to supplement the existing flood and inland water disaster risk analyzes and to standardize the planning periods for risk analyzes carried out by disaster management and water management authorities.

2. The concept of HILP events should be introduced in emergency planning. They must be consciously prepared for their periodic expected occurrence at the governmental, central and regional levels. Based on the results, it will be possible to develop a special state procedure with which the efficiency of response can be significantly increased compared to traditional methods.

3. I examined the contingency planning based on the traditional approach in detail. In order to increase efficiency, it is expedient to fully expand the threatening effects recorded in the existing legislation in accordance with all the threats identified in Hungary so far. The use of these results allows new hazards to appear in traditional emergency planning, increasing the professionalism of the classification of settlements into disaster protection classes, the safety of the population.

4. By examining the supporters of disaster management, I found that in addition to the existing obligors and volunteers, additional, previously unused forces (also at the level of experts and mass work) can be involved in the performance of disaster management tasks. Disaster management will make it possible to involve these forces, which will increase the effectiveness of operational interventions.

5. I prepared the concept of the flood intervention rescue team for the domestic and international rescue teams, the use of which significantly increases the number and capabilities of the forces prepared for rescue tasks in the event of floods. The concept of a flood intervention rescue team will be applicable worldwide to UN INSARAG rescue teams through the “Fit for Future” program.

6. In the case of existing and newly enrolled volunteers, the results of my motivation research can make a significant contribution to increasing and retaining the number of volunteers, as well as increasing the professional training of disaster management and water management agencies in volunteer management.

AUTHOR'S LIST OF PUBLICATIONS ON THE TOPIC

Revised book, application, note – Article in edited book

The report of the Climate Change Intergovernmental Board and their affects
Disasters, risks, volunteers study volume
3rd Civil Protection Workshop, Szekszárd, 2020
ISBN 978-615-00-8298-1 (electronic) 978-615-00-8297-4 (printed)

In a foreign language journal published in Hungary

Voluntary Rescue Service in Hungary: The HUSZAR Team
AARMS: 2020. Publication No. 1.

In an authoritative journal in Hungarian (categories A, B, C, D according to the Hungarian Academy of Sciences classification)

The categories of Hungarian volunteers and the direction of their possible development in the light of flood and water protection.
Védelem Tudomány, II: 2 pp. 88-124. 36 p. (2017)

Support for disaster management operation in the HELIOS civil protection data registry program.
Hadmérnök, XII: 2 pp. 137–150., 14 p. (2017)

Usage of Kobo Toolbox during the extensive damage assessment of the UN INSARAG classified international rescue teams.
Hadmérnök, XII: 2 pp. 123–137. 15 p. (2017)

Research on the motivation of disaster management volunteers to increase the effectiveness of defense.
Hadmérnök XIII: 2 pp. 159-171., 13 p. (2018)

Introduction of the Global Disaster Alerting Coordination System and the Common Emergency Communication and Information System.
Hadmérnök, XIII: 3 pp. 203-218., 16 p. (2018)

Impact of crises on emergency planning.
Bolyai Szemle 2018: 2 pp. 64-80., 15 p. (2018)

Use of social media by disaster management volunteers
Hadmérnök 14: 1 pp. 80-98., 19 p. (2019)

Supporting disaster management operations with the involvement of volunteers
Hadmérnök 14: 3 pp. 35-51., 17 p. (2019)

Volunteering and duty in disaster management interventions

Hadtudomány 29:4 pp. 65-79., 15 p. (2019)

Lecture published in an international professional conference publication – peer reviewed lecture in a foreign language

Die Öffentlichkeitstätigkeit des ungarischen Katastrophenschutzes First Conference on Effective Response. Conference Proceedings. Sopron, 15th November 2019. Hungarian Red Cross. Budapest, ISBN (e-book): 978-963-7500-81-7. (2020)

Lecture published in a Hungarian professional conference publication – lecture in a foreign language:

The work of the United Nations Disaster Assessment Team (UNDAC) after an industrial disaster using the Flash Environmental Assessment tool (FEAT) Industrial security and Authority Day conference volume, Tolna County Disaster Management Directorate Paks, (2020) ISBN: 978-615-00-7436-8

Lecture published in a Hungarian professional conference publication – lecture in Hungarian

Implementing system-based self-training and self-development in the disaster management organization Balázs, Gábor (editor) Responsible society – disaster management and public education, Tolna County Disaster Management Directorate (2016)
ISBN: 978-963-12-5299-6

Organization of disaster management volunteers to protect settlements against flood and inland water -
National Settlement Rainwater Management Conference
ISBN: 978-615-5845-21-5 (2017)

Reception and deployment of UN INSARAG classified international rescue teams during earthquakes, assessment of the extensive damage area by electronic devices Oszvald, T; Botos, K (szerk) 11th Geologic Emergency Conference: conference volume Budapest: Dotax Bt. (2017)
ISBN 978-615-80931-0-1

High Impact Low Probability (HILP) events and the emergency planning 2nd Tolna County Civil Protection Workshop, Tolna County Disaster Management Directorate (2019)
ISBN: 978-615-00-4954-0

PROFESSIONAL-SCIENTIFIC CV OF THE DOCTORANDUS

Tamás Hábermayer Tamás Hábermayer began his career on August 20, 2002 in the Szentendre Barracks of the Hungarian Armed Forces, after graduating from the Kossuth Lajos Faculty of Military Sciences of the Zrínyi Miklós University of National Defense as an artillery officer and lieutenant. He gained military peacekeeping experience in 2004 when he held a liaison position in the Central - South Multinational Division - Hungarian Logistics Transport Battalion in Iraq for 6 months. In recognition of his work during the international peacekeeping mission, the Minister of Defense of the Republic of Hungary presented him with a Service Sign for Peacekeeping Service, and the Polish commander of the Middle - South Multinational Division served him with the sign of the division. As a military subunit commander, he took part in the Danube flood protection of 2006. In recognition of his activities, Minister of Defense donated him a service badge for Flood Protection, and the Minister of Environment and Water granted him a ministerial award. After completing various responsible military positions (trainer, deputy squadron commander), he was transferred from the Hungarian Armed Forces to the Disaster Management staff at his request. On 1 March 2007, he was appointed to the position of Head of the Civil Protection Branch Office of the Bács–Kiskun County Disaster Management Directorate, which he held until 31 December 2011. During this period, he took part in the protection against the 2010 floods in Felsőzsolca and the red sludge disaster, where he served as rescue and coordination commander. Dr. Sándor Pintér, Minister of the Interior, awarded him a medal for the “Red Sludge Disaster for an Extraordinary Position”.

He developed his professional knowledge by obtaining the master degree of disaster management civil protection organizer, passing a law enforcement professional examination and passing a law enforcement master's examination (The higher professional and master's examination also ended with an excellent result.). In addition, in order to expand his legal knowledge, he graduated from the University of Szeged, Faculty of Law. From 1 January 2012 to 30 June 2013, he held the position of Deputy Commander of the Kalocsa Professional Fire Brigade of the Bács-Kiskun County Disaster Management Directorate. During the 2013 Danube flood, he worked as a defense manager on the Solt - Harta - Dunapataj defense line.

In recognition of its activities, the Municipality of the City of Kalocsa awarded it the Public Service Award of the City of Kalocsa. From 1 July 2013 to 21 December 2014, he was the Deputy Inspector General of Civil Protection of the National Directorate General for Disaster Management of the Ministry of the Interior. As of December 22, 2014, he is currently the Deputy Director of the Tolna County Disaster Management Directorate. As head, he is responsible for the general replacement of the director and for the professional management of the fire, civil protection, industrial security and integrated official work. During his term of office, on the proposal of his superior, the Minister of the Interior awarded him the title of Fire Adviser, and the Tolna County Defense Committee awarded the Commemorative Medal for the Defense of Tolna County.

In 2016, he was successfully admitted to the Doctoral School of Military Engineering at the National University of Public Service. His supervisor is Dr. Árpád Muhoray civil protection major general (retired), the head of research area is Firefighter Colonel Lajos Kátai–Urbán. The topics chosen were disaster management, floods and volunteering, based on previous experience. During his studies, he successfully completed the complex exam, required credit scores, and publication scores. There were no passive semesters. In addition to his scientific research, he successfully organized 4 scientific conferences in Tolna County in the period between 2018 and 2020 (Tolna County Civil Protection Workshops I-II-III., And Industrial Safety and Authority Days.) In connection with the conferences, he edited 2 conference volumes and 1 study volume. He is an active member of the HUNOR and HUSZÁR rescue organizations, and has also represented Hungarian disaster management at international conferences and exercises on several occasions. He has extensive experience in the management of domestic emergencies, especially in the field of protection against water damage, and has performed command duties several times.

He is married, father of two sons.