AUTHOR'S DESCRIPTION OF A THESIS (PhD)

NATIONAL
UNIVERSITY OF PUBLIC SERVICE
Doctorate Committee

TIBOR PETRÓ

The Hungarian upgrades of flood resistance, and the modern approach of the task of population protection

author's description of a doctorate thesis (PhD) and
its official evaluations

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DEFINITION OF THE SCIENTIFIC PROBLEM

The climate change and its additional effects are not just debates of scientific conversation, but at the daily conversations. Sometimes it is mentioned because the temperature and its fluctuation is different than the approximate, and sometimes the reason is, that the rain's intensity is higher than the average. It is proved that the effects of global climate change are considered to be devastating storms, abnormal precipitation, excessive precipitation, excessive heat fluctuations in the short term and rapid snowfalls. In order to reduce the effects of global climate change, it is imperative to further investigate the effects of extreme weather events, to better understand the role of certain weather factors and to develop the organizational and instrumental system needed for effective implementation of forecasts and population protection measures.

Hungary's most relevant value is water, however, it holds the biggest danger too. Fighting against the flood damages, the symbiosis with the dangers of the flood, the drought and inland water caused by water has its own traditions over the century. The protection against the natural dangers – including the flood protection – part of Hungary's security strategy, which with „only" the law enforcement's, the flood -and inland water enforcement, and the disaster recovery unit's help cannot be achieved or with unequally high effort. The all-time government base task is to create the civilian's protection, which is necessary to conjoin the community, for creating the individuals' self-saving ability, coordinating the different ambulance teams' activities, widely implementing the defense.

The quarter area of Hungary is below the river's level. The large, quickly fallen rain can't be contained in flood protection ramparted river, „the ramparts can't be built sky-high". The so far good technical and defensive solutions need to be mixed with new ones, new conducted behaviors are needed. In the Hungarian areas the extremist weather anomalies are breaking more and more old records. There were extremisms in the national weather earlier too, however, the measure, intensity of it is increasing, making challenges from the hydrological, meteorological and disaster recovery unit's side too. Observing the problem from the side of disaster recovery enforcement, our duty is to measure the awaited danger's quality from the gathered data and experiences, to size up its force and tool requirements, and also involve all available citizen in fulfilling the most effective defense, and to eliminate all damages the danger did. In the 21st century, the strengthening of security and consciousness is a basic requirement for both the society and the state, which means that the abilities of those who are actively involved in the

defense need to be continually improved in order to effectively overcome the negative effects of climate change and the consequences of the resulting phenomena. One of its main fields is defending the population and material goods, which part is the flood defense. From the state's, from the population's side it is indispensable to ready ourselves in the „peaceful period", which requires the results of the current research of the subject time and time again. To develops an effective protection against problems caused by the climate change, securing the water, protecting the water bases', creating the effective defense against the increasing meteorological and hydrological events' negative impacts, the research, analysis and evaluation of response to increase the volunteer organizations and populations number and quality is becoming more and more important by the day. Improving the population's self-reliance is a well-known goal in the defense management, which is only partially realized today. The protection against the flood coin-efficient implementation, the settlements risk prevention's planning and activity will be done, once the population defending methods and capabilities will be assured. For that an observation is required from the available flood protecting and population defending task system, and also the possible development of its abilities needs to be worked out. In accordance with the mentioned above, for our country's safety, A timely, current, interdisciplinary task is to develop and enhance the system of flood protection and population, to study effective intervention actions against the consequences of damage, to research responses to increase the number of volunteers involved in defense, self-reliance and to modernize the organizational and device system of volunteer rescue organizations.

RESEARCH TARGETS

In my dissertation, I volunteer to observe how tasks of flood protection impacts the population protection system, with what methods and tools can the population self-reliant ability be enhanced.

1. Based on the current legislation, based on the system of population protection equipment, *I have summarized* the current problems and challenges of the flood control task system, which I carry out in a historical overview of flood protection and investigation of major flood protection projects. My aim is to *organize* the tasks of flood protection in disaster management, the protection of the population

and the material goods, as well as the introduction of new methods and tools that improve the resilience of the population.

2. With my researches *I ascertain* the Hungarian influence of the climate change, primarily viewed on the emergence of the flood, the flood protection's enhancement possibilities, for the population and material goods. Based on my analysis *I summarize* that, how the climate changes, the flood and the damages caused by water affect the rescuing activities.
3. *I determined the purpose of my investigations*, that the dangers due to water what psychical reactions may cause in the affected population, and what treatment methods can be used in successive protection, and defending effective life- and material assets.
4. For improving the population's self-reliance, *I research* those technological solutions, which with an individual can effectively defend his life, his physical safety, wealth, which in my opinion benefit to the population self-relying ability's improvement.
5. *The purpose of my research* is to demonstrate the possibilities of effectively providing the emergency information of the population in a given emergency with 21. century communication tools. For this I analyze the population emergency information gathering opportunities. My goal is to assemble a glossary about the research topic, which helps understanding the interdisciplinary natured area.
6. *I research* the new possibilities, organizational schemes and methods for increasing the number and qualifications of volunteer rescue organizations related to the winding up experiences of the events of the last 17 years. I analyze what volunteer rescuing teams are availed in flood protection, under what condition may they be deployed under the direction of the leading protector.
7. As a branch office manager, I acquired knowledge about the system of flood protection, that way I experienced its shortcomings in practice. *My goal* is to reveal the shortcomings in my exam, and to point at the solution.

RESEARCH HYPOTHESES

To find the hypothesizes I think it is important to determine the extension of the research. In view of the scope limits of the dissertation, I do not detail the components climate

change that affects us on global scale or analyze the other damaging effects of water, the protection of water supplements found underneath the earth, water bases, the protection against the icy flood and the resulting emergencies.

1. On the basis of the challenges of today's defense against water, *I assume* that the classical methods and areas for the protection of the population and the material goods need to be modernized and supplemented by novel elements due to the social and economic impacts of climate change. I assume that the protection against floods requires a nationwide unification, so the professional disaster protection organizations can also help develop the self-reliance of the population.
2. *I suppose that*, the quantity and intensity of the damages with hydrological origin will increase in the coming age, and that will have complex and wide-spread effects. In my opinion the extreme weather, and in that, the hydrological events manipulate the implementation of technical interventions, technical expertise tools, quantity needs, volunteer units' equipment and qualification during the firefighter and technical rescuing work. That's why I find it necessary to recast training courses flood protection and inland waterway protection for law enforcement agencies and voluntary organizations – where they have not been introduced – practice regularly, their equipment with specialized ones fill out. I suppose that the enhancement of voluntary rescue organizations with flood protection tools, the changing of their educational profile will increase the number of staff using the motivation of volunteering increases the level of protection against disasters.
3. *I assume* that a large proportion of the population in our country is affected by the effects of climate change, and, in particular, on hydrological changes, so that attention should be paid to the areas of responsibility for population preparation, which are the rules of good behavior and how to apply them under emergency conditions. I assume that there is a need for an awareness-raising brochure describing the possibilities, tools and necessary knowledge of the flood protection that it pursues by targeting the XXI century telecommunications opportunities, thus contributing to the development of the citizens' security culture.
4. *I prove with practical examples* that in the last decade during municipal protection, the protection's personal and material conditions' insurance weren't

gained appropriate in most cases. In many cases because the lack of personal and logistical ability of the defense, it was necessary to use forces and instruments centrally provided by the state. In my opinion, the flood –and inland water protection's base container serves fine the financial and technical support for municipal water damage remediation tasks in the renewed disaster managements logistical system, which can be delivered to protection's area in the first round. In order to start local government protection in time, the establishment of logistic kits in settlements is necessary.

RESEARCH METHODS

Based on the title of the dissertation, I applied various research methods in order to achieve the research objectives built up and to demonstrate the hypotheses.

I assembled a personal study and research plan, which with I can achieve my scientific goals and substantiate my hypothesizes (basic research).

I have collected and studied relevant domestic and international literature related to the subject, publications, studies, laws, manuscripts, internet resources and their most recent research findings, the experiences of which I used in the relevant chapters of the dissertation.

Based on the independent collection of literature and its processing, as well as personal consultations, I conducted a targeted search in libraries and museums. To achieve the research goals, I applied general research methods, analysis, deduction and synthesis. As a performer and a student I participated in domestic professional conferences, forums and study trips, whose experiences I compared with my previous scientific achievements, deduced my results, modified my results and defined new research objectives. With renowned flood protecting professionals, researchers I made interviews, and I came to understand the wider information gathering related to the topic.

I have been researching the flood related damages and its areas with case studies, hydrological databases and the National Emergency Management Directorate of the Ministry of the Interior, as well as disaster relief yearbooks (2000-2014)

BRIEF DESCRIPTION OF THE PERFORMED INVESTIGATION, IN CHAPTERS

Due to the geographic location of Hungary, the nature of the pool and the extraordinarily high hydrological events, in the past there were serious floods and inland waters, as well as local damages caused by water. In connection with the processing of the subject, I developed my thesis in four main chapters. In the first chapter I presented the floods that are dangerous to Hungary, the flood protection's evolution up till today, our domestic flood situation, and the most relevant the flood protection projects of the present and their impact on security awareness. I compared the advantages and disadvantages of flood protection charges built in traditional and modern technology systems.

After the first closed chapter, I presented the natural catastrophes' features. Through the flood's definition I describe the danger types of the flood, visualize the undesirable phenomena in the dam's body. The subchapter is filled with relevant information, statements and conclusions, which makes it easier to understand the complexity, relevance, importance, the activity system of the flood protection tasks. I introduced the major flood protection projects and the EU's main flood protection investments of the 2014-2020 development cycle.

In the third chapter, I analyzed the role of state performers in flood control in the prevention, intervention and damage elimination process, and examined the order of cooperation. In the flood protection of Danube in 2013, I reviewed the acceptance of the authority's decisions and the parallelisms in the system of tasks, and I proposed the development of flood protection in order to unify information flows and requests for help.

In the fourth chapter I negotiated all principles, methods, options, which helps the populations self-reliance when the flood occurs, and presented the right defensive behavioral rules. According to the previous chapters' results, I drew up those new and modernized opportunities, which support the population and the material goods protection. When analyzing the motivation of volunteering, I presented the possibilities for the use of NGOs during flood control, and I presented new technologies that can be used against flood protection.

In each chapter you will find a detailed description of the problem, a description of the relevant norms, the details of the proposed method, and finally a summary of the chapters, deductions of the conclusions, and a summary of the conclusions.

SUMMARIZED CONCLUSIONS

In my dissertation, I've done an analysis and evaluation of the flood protection, as the most characteristic emergency task system in our country, the protection of the population and the material goods. According to this, **I have found** that today, due to the global climate change, flood security has changed, new challenges, threats and risks have become more complex.

During the historical review, **I highlighted** that the basics of the current flood protection system of Hungary were in the 19th century, however, at the same time, it is necessary to continually research the technologies that are used to replace manual forces during the emergency period. The goal of the current big projects is the foundation of water management and lowering the peaks of the flood height. The social-economic aspects of the floods are decisive in the primary organization of the public safety tasks, during which **I have investigated** the measures to protect the residential and material goods that shape the modern civil defense and disaster management system of our time. **I have analyzed** the system of the flood defense participants, and **concluded**, that particular provisions, the values of the traditional defense have redesigned and filled out the residential and material goods' organized defense. By presenting the modern possibilities of flood protection and evaluating the legal provisions, **I have supplemented** the population's self-defense capabilities with new elements according to the century's defense-social needs. **I am convinced** that the actuality and continuous development of public safety tasks can not be undermined and underdeveloped today, as the number of new challenges and the increasing destructive effects of disasters have proved. **I have proved** that in the context of climate change, one of the XXI. century's greatest environmental and safety challenges the flooding, which against providing an effective and up-to-date defense is an enormous challenge for humanity. Due to the increase in the number, frequency and intensity of the floods, settlements on the one hand aim to plan the prevention of interventions on the one hand and on the other hand to prepare for the emergency situations of the population as the basic task of everyday life. In order to prevent this, on local scale we could reduce the flood risk by exploring the floods causes,

developing risk maps, developing flood and shower rain reservoirs. But as **I explained** in my dissertation, good management of water in the XXI. century town is a real challenge, so the settlement cannot avoid other issues of climate change and water management such as water resources protection, sewage treatment, water as a recreational element. Because of the scale and intensity of devastation and defensive costs of flooding, the importance of forecasting is increasing, which basically defines the technologies that can be used in defense. Analyzing the advantages and disadvantages of flood protection devices, I have presented the tools that can become effective during the protection. **I have found** that not all the flood phenomenon can be expected from the contribution of the state forces, and in many cases the local government cannot protect it against local, rapid flood events (flash flood). The potential for protection against slow floods is better known than the protection against flash floods, as the nature of the flash flood is very limited, while the possibilities of prevention are far more favorable. On the side of the local government, for example, the activities of prevention can include systematic cleaning of the river basin, maintenance of wells, careful planning of construction procedures in floodplains or near watercourses, construction of reservoirs, flood reservoirs for "extra water" or regular informing and preparation of the population. Because of the more frequent and intensified domestic floods, meteorological events - which are closely related and close correlation of flood events can be an atmospheric phenomenon - to better understand the hazard warning system, which is closely linked to the dissemination and propagation of media surfaces providing reliable data for the population. When analyzing the population's self-defense activity, **I came to the conclusion** that the preparation of the population for the threatening effects of flooding is necessary and indispensable. In this context, it is necessary to prepare for the handling of unusual emergency situations and to apply the rules of conduct to be used in extreme situations. I wanted to draw attention to the importance of training, with a certificating complement, by developing and providing further training for the population. In my opinion, that is based on my researches, the flood protection information of the population differs from one county to another, but on average the period of publication of the information is more than 10 years. During the analysis of the development of the info communication technologies **I have ascertained** that a novel approach to informing the population in this regard is essential. The adaptation of the opportunities and methods provided by the social media to the public's emergency reporting needs further development. During the analysis of the Hungarian system of voluntary rescue organizations, I examined the motivations of volunteering,

evaluated the conditions of operation of the rescue organizations in flood control, and, according to the special needs of the country, **I prepared** a training course for the training and preparation of these organizations, and also prepared a possible way to upgrade their specialized equipment. Beside the volunteering, I examined the activities of the professional disaster management organizations and compared them with the defense management activities of the state administration and the local government at the time of the flood risk. In a tabular form I set up a system of pre-flood prevention, intervening and restorative problems. In order to eliminate the parallelisms identified in the analysis of the system of tasks, **I made a proposal** for the advancement of the current system of disaster prevention (NEO-PVIR) in line with the information level and quality of the 21st century.

NEW SCIENTIFIC ACHIEVEMENTS

1. On the basis of a wide-ranging analysis and analysis of the development of flood protection, I summarized in a unified structure the development of flood protection since the Hungarian conquest. Based on my own system of criteria, I presented the institutional structure of today's flood defense, which is based on historical analysis, and I realized it by the consolidating the divertive sources of our present day.

2. During the analysis of weather parameters and historical flood protection data, I have shown that, due to the threat of climate change, today there is a greater chance of extreme catastrophic events. Based on this assumption, I have shown that the high level of precipitous rainfall or rapid snow melting on the one hand causes the population to respond swiftly, which can be better managed by locally created volunteer rescue organizations - in cooperation with professional disaster protection organs. In order to increase efficiency, I have worked out concrete alternatives for the development of the personnel, technical means and qualifications of rescue forces.

3. For the sake of obtaining unified information, I analyzed the flood’s information flow of today, and I have found that in many cases, along with traditional paper-based data disclosures, parallel operation of modern IT devices is typical. Based on these, I have worked out the concept of further development of the Emergency Information and Communication System (NEO-PVIR), defined the requirements

for the IT system, and as a component of emergency communication I proposed to create a social media in emergency situations.

4. In order to improve the resilience of the population, I have created and prepared an easy-to-learn knowledge to help people understand the use of innovative flood protection devices that can stand alone in defending their values and lives.
5. In order to develop the flood protection training of volunteer rescue organizations in settlements and districts, I developed an educational topic on a missing basis.
6. With this thematic, I propose to prepare volunteer rescue organizations for two days of further training for the preparation of flood protection tasks, which can be implemented annually on a repeating basis.

RECOMMENDATIONS OF THE THESIS

I recommend using the results of the dissertation and my research mainly in education and preparation, as follows.

1. To the attention of defense specialists involved in the fight against the flood during the flood protection period;
2. Leaders in charge of organizations where voluntary assistance is a regular task, that is actively involved in disaster control as a professional force, public employee or local government leader;
3. Researches, analyzes, evaluations, interpretations and extensive literature published in my dissertation for the disaster management experts provide practical assistance in the planning of flood protection planning, in daily operational activities;
4. 4) Training of all units of the National University of Public Service and training materials of the Disaster Education Center and other educational institutions dealing with the topic;
5. In the case of mayors and public safety reporters;
6. PhD students who want to deal with the development of flood protection through the effects of climate change;
7. Use for other basic research.

PRACTICAL APPLICATION OF THE RESEARCH RESULTS

I propose to use the findings of my dissertation, the findings, conclusions and results of my research as follows:

1. Support the decision-making of the responsible leaders of the field.
2. Contribute to the change of attitude of decision-makers.
3. The results of my dissertation can be used to modernize the internal rules of the BM OKF.
4. Includes statistics and data-supporting information for teachers and researchers of this topic.
5. It can serve as a basis for researching the further development of voluntary rescue organizations.

LIST OF PUBLICATIONS OF THE AUTHOR IN RELATION TO THE SUBJECT

PROOF-READ BOOKS, TENDERS, NOTES (ON-LINE, TOO)

1) Tibor Petró: The effects of war on our ecosystem. In: János Csengeri – Zoltán Krajnc (ed.) Human Protection - Development of peace operations and emergency management procedures Budapest: National University of Public Service, (2016) 509−549. o. ISBN 978-615-5305-35-1
2) Tibor Petró: Water damage, European outlook. In: János Csengeri - Zoltán Krajnc (ed.) The complexity of military science and warfare in the 21st century. Budapest: National University of Public Service, (2015) 47−60. o., ISBN 978-615-5527-47-0

EDITED ARTICLES IN PROFESSIONAL MAGAZINES (ALSO AVAILABLE ON-LINE)

In Hungarian language authoritative magazine

1) Tibor Petró: Emergencies caused by the floods of Hungarian streams, smaller rivers, the possibilities of defense. Hadmérnök, Vol. V. Number 2. (2010), pp. 178−198., ISSN 1788−1919, http://www.hadmernok.hu/2010_2_petro1.pdf

2) Tibor Petró: Road Traffic and Security connection in Tunnels. Hadmérnök, Vol. V. Number 2. (2010), pp. 232-242., ISSN 1788−1919, http://www.hadmernok.hu/2010_2_petro2.pdf

3) Tibor Petró: The situation of local water damage control today, the task of defense. Hadmérnök, Vol. VI. Number 1. (2011) pp. 172−180., ISSN 1788−1919, http://portal.zmne.hu/download/bjkmk/kmdi/hadmernok/2011_1_petro.pdf

4) Tibor Petró: The state of flood protection today. Műszaki Katonai Közlöny, Issue 2. (2013), pp. 283−297. ISSN 1219−4166, http://www.hhk.uni-nke.hu/downloads/kiadvanyok/mkk.uni-nke.hu/kulonszam2013julius/eloadasokpdf/14Petro%20arvizvedelem%20helyzete%20napjainkban.pdf

5) Tibor Petró – Dr. Júlia Hornyacsek: Possible place and role of churches as social organizations in flood control. Műszaki Katonai Közlöny, Vol. XXII Number 2. (2012) pp. 124-139. ISSN: 1219−4166, http://193.224.76.2/downloads/konyvtar/digitgy/tartalomjegyz/muszaki_katonai_kozl_2012_2.pdf

6) Tibor Petró: The flood control tasks of the local governments during flood protection. Műszaki Katonai Közlöny, Vol. XXI. issue (2011) pp. 21−34., ISSN: 1219−4166, http://www.hhk.uni-nke.hu/downloads/kiadvanyok/mkk.uni-nke.hu/kulonszampdf/petro%20tibor.pdf

In foreign language magazines published in Hungary

1) Tibor Petró: The case of the disaster management for the youth in Hungary, the possibilities of the improvement of preparation system, Hadmérnök, Vol. VI. Number 1. (2011), pp. 181−189., ISSN 1788−1919, http://portal.zmne.hu/download/bjkmk/kmdi/hadmernok/2011_1_petro2.pdf

2) Tibor Petró, Dr. László Földi: Transformation of flood protection system according to the legislative changes in our country, Hadmérnök, Vol. VII. Number 3. (2012), pp. 1-8. ISSN 1788−1919, http://hadmernok.hu/2012_3_petro_foldi.pdf

PUBLISHED IN THE PUBLICATION OF A NATIONAL PROFESSIONAL CONFERENCE

1) Tibor Petró: The idea of renewing the youth disaster protection competitions "Prepared against disasters" Scientific Conference, BM OKF, Pécel, February 24, 2011. http://www.katasztrofavedelem.hu/letoltes/konferencia/2/petro_ifjusagfelkeszites.pdf

PROFESSIONAL-SCIENTIFIC CURRICULUM VITAE OF THE DOCTORAND

Name: Petró Tibor

Place and time of birth: Nyírbátor, 1969.08.03.

Professional experience

I met with the Defense Administration until 2000 by the Hungarian Defense Forces - in various positions, including in the organizational system of the Budapest Chief of Defense, and in nearly 8 years in the Pest County Disaster Management Directorate I gained extensive knowledge in the field of disaster prevention. As Head of Civil Protection, I have gained a wealth of experience in preparing, intervening and restoring natural and civilian emergencies. Due to the extreme weather conditions, I took part in the elimination of damages caused on local government owned properties, bridges, roads and drainage systems for years. I have collected personal experiences both in the organization of flood protection and in the development and execution of various public protection and information tasks. Among other things, I participated in the works of the defense of the Danube floods in 2001, 2002, 2006, 2010 and 2013 and Tisza flood in 2001. Meanwhile, I am a member of the Budaörs City Volunteer Fire-Fighting Public Benefit Association and then I chair my work in the area of damage elimination and prevention. As a member of a voluntary life-help organization, I try to make use of my experiences. As Vice-President of the Hungarian Civil Protection Alliance for Youth, among other things, I am responsible for the preparation of the disaster preparedness for youth and the protection against floods within the system of population preparation. As a member of the MPVSZ Emergency Intervention Unit, I take part in defense and executive work during the emergency period. The Zrínyi Miklós National Defense University counted as a teacher from 2009 in my field of work, in the field of disaster prevention,

civil defense, local government administration and defense administration. During my research and work I cooperated with renowned researchers, professionals and organizations.

My studies: I obtained my first diploma at the Automotive Engineering Faculty of the János Bolyai Military Technical College in 1990. I was then made a lieutenant. This was followed by the acquisition of university degree at the Miklós Zrínyi National Defense University, Faculty of Management and Organization, Military Technical Manager in 2000. To gain a better understanding of defense management, I first graduated from Corvinus University's Environmental Management Department in 2005 and then at Corvinus University's State Administration in 2008.

Language skills: I have a basic C-type English language exam with advanced middle class C Spanish augmented with military language.

My professional career: After the college, my first post of officer was the Hungarian Defense Forces at Kinizsi Supplier and Consignment Colonel (1991-1992) as an individual vehicle repair commander. After dislocation, I continued to work as a vehicle recruitment officer at the János Irinyi Supplier Regiment (1992-1994). After that, I was appointed Chief Planning Officer at the Accumulation Command of the Capital (1994-2000). From the Hungarian Defense Forces in 2000 I was transferred to a Pest County Disaster Management Directorate on request. I worked here first as an office manager and then as branch manager until 2009. I taught students at Miklós Zrínyi National Defense University, and later at National Civil Service University.

My recognitions: Interior ministry souvenir for handling the snow situation (2013).

Budapest, 10. of April, 2017

Tibor Petró