

ZRÍNYI MIKLÓS NATIONAL DEFENCE UNIVERSITY
Ph.D Council

The exposition of
RUDOLF NAGY eng. civil protection lieutenant colonel as writer's
Ph.D thesis titled

**Survey of the Theoretical and Practical Problems of Critical
Infrastructure Protection**

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Tutor:

civil protection major-general
Dr. Árpád Muhoray Ph.D

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1. Drafting the scientific problem

As stated in the preamble of the 2008/114/EC Council Directive about the identification and designation as well as the assessment of necessity of protection improvement of the European critical infrastructures, fighting terrorism has priority in critical infrastructure protection, however, 'manmade technological risks and natural catastrophes should also be considered'.

Consequently the disorders of recent years (like contamination of drinking water basis, power cuts, situation accounted for the Russia-Ukraine gas row) generated disaster management questions, first of all population protection questions which inspired the research of critical infrastructure protection. My thesis is based on the performance of the National Directorate General for Disaster Management in the studies of critical infrastructure as well as its activities in transnational agencies.

The motivation for my choice is that relatively few studies have dealt with the complex scientific survey of the protective measures that benefit the elimination of the facts that block, damage or eradicate the critical infrastructure. In my view the triggering effects are the next: deliberate attacks and sabotage against public order and public security, harmful impacts caused by legal crimes against life and property, hackings, accidents and catastrophes.

To perform the duties of critical infrastructure protection requires scientific systematization. Mere defence steps are not enough to solve the problems. The critical infrastructures have escalated so far that only proper resources can defend them against the large scales of danger. Therefore the use of protective components needs to be surveyed.

Before starting analysing, the basic phrases have to be defined. These days, false translation of foreign expressions often result misunderstanding, and it leads to disturbances in experts' coming cooperation.

In Hungary the jobs of the ministries concerning the protection and recovery of the critical infrastructures is coordinated by the Governmental Coordination Committee through the National Directorate General for Disaster Management, stipulated in 'Order of 11 November 2003'. The often amended Action Plan, as the Annex of the Government Decision which identifies the current tasks of fighting terrorism, regulated in detail the duties of the ministries, working sections and Defence Working Sections of the Governmental Coordination Committee related the improvement of the security of critical infrastructures.

As a current professional challenge, disaster management organisation faces inter alia the protection of critical infrastructures. To carry out this mission the Program was issued in the summer of 2008, which was elaborated by the National Directorate General for Disaster Management including my personal work.

Recently I and my colleagues significantly contribute to the preparation of the national implementation of the Directive in 2010. At the beginning of the rotating EU presidency, Hungary as an EU member state has to make a report about the implementation of the provisions. The question is increasing timely due to the energy dependence of EU, including the supply-security impacts of Russia-Ukraine gas row. Possibly, the energy sector of the two sectors identified in the Directive has got priority for this reason.

In my paper I tend to write about the questions appearing on the central public administration level, because while implementing the Directive, the professional disaster management organs will expectedly face featured jobs when they renew the disaster administration. In my view, this activity is based on the disaster management organs' participation in the surveys for nearly a decade, through its regional and local agencies. Directed by the minister of home affairs, the Disaster management organisation also plays a dominant role in the work of the Governmental Coordination Committee which accounts for the governmental coordination.

Working for the National Directorate General for Disaster Management my special field was the protection of critical infrastructure and fighting terrorism from disaster management aspects. My analysis and standard preparation work highly support the synthesis of influential conditions, experience and resources. I am trying to answer the timely questions of the critical infrastructure protection through the experience of my previous job. To answer the questions I am also trying to identify the connection of the defence management and the critical infrastructure protection as well as to elaborate recommendations which serve the unified management of the tasks. I want to adapt its elements to fulfil the requirements of disaster management tasks, and to utilize them in the implementation of professional disaster management objectives.

My studies were completed on 1st July 2010, and focus on the surveys of the correlation of national disaster management and the national model of the critical infrastructure protection established in the future.

2. Main objectives of the research

- a.) **I study** the historical background of critical infrastructure, the conceptual system and its connection with the security basic principles.
- b.) **I search** the critical influential facts between the society and the infrastructures.
- c.) **I explore** the impacts of critical infrastructures on civilisation, and their possible roles in civilisation disasters.
- d.) **I study** the structure of critical infrastructure protection, its transnational tasks, especially presenting the features of EU and other countries which apply improved procedures, with special aspect with the regulations in our neighbour countries.
- e.) **I crawl** the international means and abilities developed to prevent and rehabilitate the injury of critical infrastructure protection created on the basis of the Directive and NATO recommendations.
- f.) **I analyse** the effects of disaster management structure on the efficiency and principles of critical infrastructure protection as well as the possibility of their creation in the national structure.

3. Hypotheses

My scientific findings are based on the completion of the following hypotheses:

1. It can be verified that the establishment of infrastructures is a process affected by the society's development and environmental features.
2. I believe that disaster management operation is required for function of critical infrastructures as demanded by the member states, and the social and economic features.
3. I suppose that the studies of international expectations and experience as well as the recovery of damages result efficient consequences for organising the critical infrastructure protection.

4. Research methods

In my studies carried out at the NDGDM I relied on the reports of surveying critical infrastructures. I was also highly supplied by the documents of the International Department of NDGDM which department functions as a national contact point concerning critical infrastructure protection.

Methods applied over research:

- a) I used national, international and internet sources,
- b) I studied the laws and technical literature, related documents,
- c) I attended related conferences, lectures and projects, and consulted with national and international experts,
- d) I relied on national and international as well as my own theoretical and practical experience,
- e) I considered the following basic aspects:
 - pursuit scientific foundation
 - apply system approach
 - draw conclusions
 - adapt experience of researched international institutes as much required
- f) In my paper I applied my own statements and proposals based on objective facts and survey principles.

5. Brief review

Chapter 1 writes about the correlation of the social development and the critical infrastructures. To explore this feature the first step is to review the procedures which created the living conditions for civilizations where human communities are developing. Through the historical sources I identify the first forms of critical infrastructures which are indispensable for communal labour division, and so the efficient fulfilment of needs. Over further investigation I present the interactions as a result of social changes as well as the development of critical infrastructures. I highlight the facts which affect the security of critical infrastructures involved in societies' rising and cover of needs.

Chapter 2 answers the questions of vulnerability of modern critical infrastructures. In the modern world we face security challenges which affect the availability of critical infrastructures. Terrorism being one of the primary threats nowadays, I pointed out its several aspects. Terrorism has been escalating geographically, in communication and psychically, therefore I survey in detail how critical infrastructures became targets and means as well. I also analyse the ways of prevention.

Concerning all-vulnerability the biggest risk is the disaster-related vulnerability of critical infrastructures. I do not only monitor the consequences of climate change but also identify the possible critical infrastructure-related impacts and the forms of response.

Through the comparison of vulnerability and the social embedding of critical infrastructures, I identified the risks of vulnerability of critical infrastructures.

Chapter 3 reviews the national protection structure inside and outside Europe, and in the neighbour countries as well. To meet international expectations I especially point out the concepts and rules of international agencies applied to protect critical infrastructures.

Chapter 4 deals with the branch results reviewing the national state of critical infrastructure protection. Doing analysis by systemic approaching the National Program of critical infrastructure protection I extend the aspects of national structure of critical infrastructure protection. The current standards and results of critical infrastructure protection in national public administration are closely linked to the disaster management structure, especially the operations of professional disaster management agencies. Identifying the theory and analysing the practice I point out the correlations of them.

Chapter 5 integrates the validation of Hungary's national interests, and the means and procedures which guarantee the compliance of international requirements. To found the establishment of the structure I primarily identify the demands for national critical infrastructure protection and expected positions, and the conditions provided by the proper economic environment as well.

Following the general features of the system structuring I clarified the objectives and identified the tasks, then I prescribed the system components in order to accomplish these tasks. The system components are as follows: National Coordinator, European Critical Infrastructure Protection Contact Point, National Critical Infrastructure Protection Consult Forum. To found the efficient cooperation of the public and private sphere I suggest organise branch consult agencies. The regional defence administration organ may carry out the supervision through the professional support of the Directorates for Disaster Management. At last, as the system stability supply element, in the framework of the primary responsibility of the operator – involving the security contact clerk employed by the operator – performs the critical infrastructure protection duties.

Unifying my survey results presented previously and embedding the mentioned elements I established the structure of the National Critical Infrastructure Protection.

6. Summarized consequences

The operation of the structure of National Critical Infrastructure Protection is extremely vital due to the civilisation development, updating of social structures, manifestation of religious, ideological, political, economic and welfare conflicts, the complex technology of the operation of infrastructures, and the adverse change of certain environment conditions.

Over my studies surveying the social embedding of Critical Infrastructures it has been verified that consequences of terrorism have priority concerning the purposeful vulnerability of citizens' life and property security and the consequent severe situations.

The critical infrastructures have expanded so much that they generate transborder impacts. The means to fight them are insufficient, and the fight is impossible due to the lack of implementation of community legal standards. Presenting the foreign examples of critical infrastructure protection I tried to verify that the national risk management has to be built on unified prevention principles established by the member states cooperation.

Demonstrating the former branch surveys and practice experience I proved that the national structure of disaster management can be an efficient agency to response crisis if it involves the whole society, and integrates the new actors and forms of EU regulation.

Applying my studies I have created the concept of the National Critical Infrastructure Protection Structure which is founded on the national disaster management structure, and guarantees the implementation of the EU law harmonization and international duties, as well as the cooperation of the branch and defence administration of the Republic of Hungary.

7. New scientific findings

1. **I proved** that the development of critical infrastructures is the result of evolution of social and economic environment, the criticality of which can be reduced by organising them into a complex structure applying the theses of network theory. Another way is to raise their dependency on resources from regional to global level. Consequently, the local vulnerability of critical infrastructures with global elements and the attacks against them can decreasingly lead to the collapse of the structure on higher level.

2. Assessing the experience of real life disaster management and analysing the emergencies due to the damage of critical infrastructure, **I justified** that disaster management structure has to play an important role in the proper development of critical infrastructure protection.
3. Synthesizing the requirements of Hungary's international commitments, the professional experience of disaster management organs, and my scientific findings **I elaborated** the National Critical Infrastructure Protection Structure including the priority of terror attack, based on all-vulnerability approach and applying incident-centered approach.

8. Use of my findings in practice, suggestions

Following my thesis I suggest:

- Continue the risk assessments,
- overshadow the disaster vulnerability of referred structures,
- accommodate the regulation of economic activity to the security requirements,
- expand the risk division techniques in the critical infrastructure affected areas,
- increase the governmental-level international cooperation in the field of critical infrastructure protection,
- reflect the power-devices dislocation of emergency services,
- update the legal background of critical infrastructure with respect of the term required in the Directive,
- amend the related laws if required,
- repeat assessment of the terror vulnerability of critical infrastructures,
- revise the defence-related training structure so that it matches the risk factors of new type.

The statements of my thesis

May found the planning guide of security documentation which can be made on the future regulation, and which can fix the preparation tasks, the technical conditions, and the ability of cooperation between the endangered settlements and the emergency services.

May support the mayors as local civil protection commanders of endangered settlements by malfunction of critical infrastructures, in taking and harmonizing defence measures, and the development of proper local defence structure.

May be useful to test the completion of critical infrastructure protection duties during disaster management exercises.

May be adapted in the elaboration of the detailed national regulations and the revision of disaster management Code completed in the near future.

9. The writer's list of research publications

1. Rudolf Nagy: Critical infrastructure protection and its disaster management aspects in the mirror of terrorism, *Kardés Toll* 2006/3 ISSN 1587-558X, p. 56-64
2. József Padányi - Rudolf Nagy: The tunnel of hope, *MűszakiKatonaiKözlöny*, 2006/1-4 ISSN 1219-4166 p. 167-174
3. Rudolf Nagy: Survey and state of critical infrastructure in Hungary, *Katasztrófavédelem*, August 2007. ISSN 1586-2305, p. 4-5

4. Rudolf Nagy: Activity of professional disaster management in fighting terrorism, *Katasztrófavédelem*, Sept 2007. ISSN 1586-2305, p. 22-23
5. Rudolf Nagy - Árpád Vincze: Food security from the aspect of environment security, *Katasztrófavédelem*, Sept 2007. ISSN 1788-1919, p. 38-45
6. Meteorological emergencies and responses, *Katasztrófavédelem*, Jan 2008. ISSN 1586-2305, p.19
7. Rudolf Nagy: Community environmental infrastructure, *Katasztrófavédelem*, Jan 2008. ISSN 1586-2305, p. 19
8. Rudolf Nagy - László Halász: Correlation of monitoring and population alarm system with critical infrastructure protection, *Hadmérnök*, Volume 3, issue 2, ISSN 1788-1919, p. 67-77
9. Rudolf Nagy: Security of drinking water supply, *Katasztrófavédelem*, Oct 2008, ISSN 1586-2305, p. 22
10. Olexander Alexandrov - Rudolf Nagy: Gas explosion in city of Jevpatorija in Ukraine, *Védelem, Katasztrófa- és Tűzvédelmi Szemle* Volume 16, issue 3, ISSN 1218-2958, p. 33
11. Rudolf Nagy - László Földi: National program for critical infrastructure and their protection, *Polgári Védelmi Szemle*, Issue 1, June 2009, ISSN 1788-2168, p. 57
12. Rudolf Nagy: Significance of culture anthropology in dimensions of disaster management
13. Olexander Alexandrov - Rudolf Nagy: Use of air devices to fight extended forest fires in Ukraine, *Repüléstudományi Közlemények*, Volume 221, issue 4, Oct 2009, HU ISSN 1789-770X
14. Rudolf Nagy: Survey of connection of national disaster management tasks and certain global effects, *Hadtudományi Szemle*, Volume 2, issue 4, Dec 2009, ISSN 2060-0437, p. 17-25
15. Rudolf Nagy: Impact of climate change on critical infrastructure protection, *Nemzet és Biztonság, Biztonságpolitikai Szemle*, Volume 3, issue 2, March 20 10. ISSN 1789-5286, p. 35-44
16. Árpád Muhoray - Rudolf Nagy: Disaster management system against security of vital infrastructures, *Rendészeti Szemle*, Volume 58, issue 4, April 2010, ISSN 1789-4689, p. 3-18
17. Olexander Alexandrov - Rudolf Nagy: Disaster management issues of Ukraine-Hungary frontier cooperation, *Polgári Védelmi Szemle*, Dec 2010. ISSN 1788-2168, p. 143-171

Read publications in foreign languages

18. Rudolf Nagy: The role of disaster management in fighting terrorism with regard to the critical infrastructure, In: *Sbornik z 3. ročníku doktorandské konference, „Nové jevy v aliančním zabezpečení obrany”*, Univerzita Obrani, Fakulta Ekonomiky a Managementu, Brno, ISBN 978 80 7231 267 2, 18 Apr 2007, p. 104-113. second publication
19. Olexander Alexandrov - Rudolf Nagy: Принципи та шляхи запобігання надзвичайним ситуаціям, *Надзвичайна Ситуація*, May 2009., p. 46-49.;

Essays

20. Rudolf Nagy: Disaster management tasks of critical infrastructure and its defence against terrorist attacks, essay, *Országos Tudományos Diákköri Konferencia*, Zrínyi Miklós National Defence University, 2007

21. Strategic programs of public bodies: Environment prospect – Environment- and climate security, Hungarian Academy of Sciences, Budapest, 2010. (as member of author team)

10. Scientific career profile

Personal particulars

Place and time of birth: Budapest, 16 Sept 1969

Graduation: university

Qualification: certified defence administration manager

Jobs:

1992-1997: National Defence Force 93. Chemical Detection Regiment (training officer)

1997-2000: National Defence Force Chemical Security Information Centre (subdivision head)

2000-2003: National Defence Force Replacement Depot and Training Headquarters (training chief officer)

2003-2010: National Directorate General for Disaster Management (deputy head of department)

2010- : Disaster Management Training Centre (head of specialized group)

Missions:

1998-1999: Hungarian Technical Contingent (Croatia)

2001-2002: Hungarian Technical Contingent (Croatia)

Studies

1984-1988: Irinyi János Chemical Secondary Technical School

1988-1990: Chemical Defence College (Russia)

1990-1992: Bolyai János Military Technical College (majoring chemical security)

1999-2003: Zrínyi Miklós National Defence University (military head faculty)

2004-2006: Zrínyi Miklós National Defence University (majoring defence administration)

2006-2009: Zrínyi Miklós National Defence University, Military Technical Ph.D Course

Courses

- Judicial and Security Ministry, Security and Crime Prevention Institute: emergency conflict managing training
- The centre for Civil-Military Relations Naval Postgraduate School, Monterey, California, Civil-Military responses to terrorism

Membership

- Military Science Association, Civil Protection section
- Security Special Examination Committee, disaster management and fire safety subcommittee
- National security regional Integrated Training Centre, Disaster management Modular Committee
- List of consultants and exam board chairmen of disaster management and civil protection

- With Innovation for Security and Defence, Scientific Council

Language skills

Russian *extended with professional military language, advanced level, C*

Serbian *extended with professional military language, advanced level, C*

Croatian *extended with professional military language, advanced level, C*

Budapest, May 2011

eng. civil protection lieutenant colonel

Rudolf Nagy