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Activity	Title
1.2	Survey of established practices in EU countries for NDRM

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1 Identification of natural disasters

Hungary has always been endangered by natural disasters. As the country has a downhill character, the most frequent and typical crisis type is flood. Flood protection has thus historically been an important task for its inhabitants. The two largest rivers are the Danube and Tisza. Over 50 percent of the overall territory of Hungary, including two thirds of the arable land, is endangered by flood hazards. On the Danube with a 10 -12 year interval and on the Tisza every 5-6 years, there are larger floods (Janik, 2006 pp.71-76, Vari, 2002).

Table 1: Natural disasters in Hungary from 1970 to 2016

year	disaster group	disaster type	occurrence	Total deaths	Injured	Affected	Homeless	Total affected	Total damage [*1000 \$]
2016	Natural	Flood	1			2282		2282	
2014	Natural	Flood	1			6500		6500	
2013	Natural	Earthquake	1			1800		1800	
2013	Natural	Flood	1			48565		48565	
2013	Natural	Storm	1			14000		14000	
2012	Natural	Extreme temperature	1	16					
2010	Natural	Flood	1	1		2000		2000	440000
2008	Natural	Extreme temperature	1	17	500			500	
2007	Natural	Extreme temperature	1	500					
2006	Natural	Flood	1			32000		32000	
2006	Natural	Storm	1	5	300			300	10000
2005	Natural	Extreme temperature	1	48					
2005	Natural	Flood	2						48000
2005	Natural	Storm	1	4					
2004	Natural	Flood	1			384	9	393	
2003	Natural	Drought	1						100000
2003	Natural	Storm	1	7					
2002	Natural	Flood	1			1430		1430	30000
2001	Natural	Extreme temperature	1	81					
2001	Natural	Flood	1			10000		10000	5000
2000	Natural	Flood	1	1		2000		2000	55000
1999	Natural	Flood	2	8		131441	2054	133495	293400
1999	Natural	Storm	1	40					
1997	Natural	Flood	1						10000
1996	Natural	Flood	1				200	200	
1992	Natural	Drought	1						384000
1986	Natural	Drought	1						500000
1984	Natural	Storm	1	4					
1970	Natural	Flood	1	300					85000

A notable flood in Budapest in 1838 destroyed a large part of the city, while in 1879 the city of Szeged was inundated by the Tisza River. These events resulted in river regulations. More recently, especially severe flooding occurred in 1970 (300 people died, Figure 1). Temperature extremes and storms have become more frequent (see Table 1). Among technological disasters, a potential danger can be related to the nuclear industry (three nuclear power stations; one in Hungary, two in the vicinity) and dangerous waste deposits (4.2 million tons of waste stored). For the public memory, however, the most shocking recent disasters have been the severe thunderstorm in 2006 (which hit a celebrating crowd in Budapest) and the red sludge accident

in 2010 (Figure 2) (which resulted in a restructuring of the disaster management system in Hungary).



Figure 1: Floods in Hungary



Figure 2: Red sludge accident in Hungary, 2010

According to the Global Assessment Report on Disaster Risk Reduction (GAR), a biennial review and analysis of natural hazards published by the United Nations Office for Disaster Risk Reduction, between 1990-2014 there were several type hazards in Hungary (Figure 3).

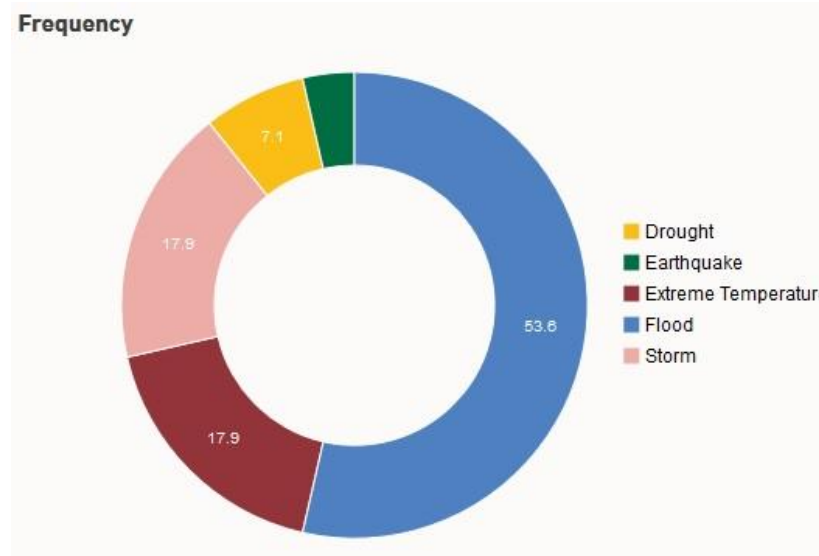


Figure 3: Frequency of the natural disasters in Hungary

Internationally reported losses place extreme temperature as the leading hazard in terms of mortality in Hungary between 1990 - 2014 (Figure 4).

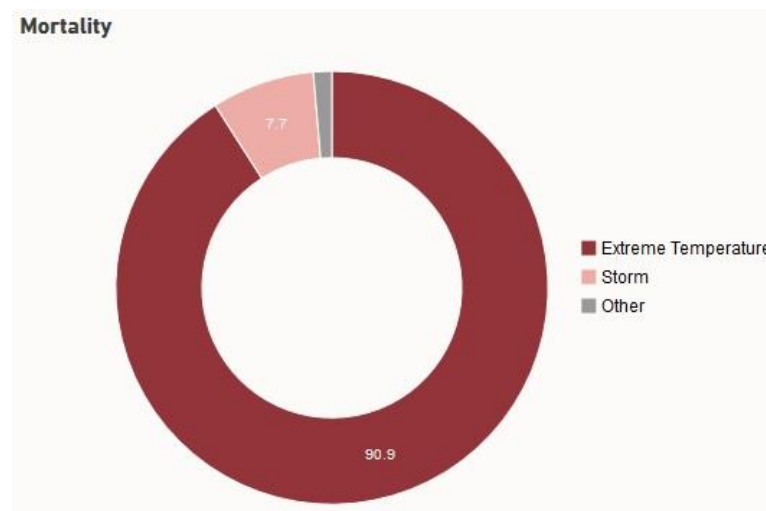


Figure 4: Mortality of the natural disasters

In Hungary, disaster was officially defined first in 1999 (Disaster Management Law 1999) and further clarified in 2011 (Disaster Management Law CXXVIII /2011). Disaster is an event that endangers people and people’s goods or infrastructure to such an extent that it is not possible to cope within the normal responsibility and cooperative framework of institutions. A description

of conditions related to this special legal order is given in the New Fundamental Law (articles 48-53).

Civil protection activity started in 1937 (protecting civilian life and property against air offensives during the war). In 1950 the civil protection system was reorganized with the priority task still “protection against air offensives”, though often involved during other types of crisis response (under the Ministry of Defense). From the end of the 90’s the civil protection law (XXXVII /1996) enumerated the main tasks of civil protection (as it is stated in the Geneva agreement). Following the disaster management law in 1999, the Civil Protection Directorate became a part of the disaster management system (Hoffmann and Nemeth 2010).

The disaster management and civil protection systems are in general separated from the army. However, in case of natural disaster the army can be involved (Defense Law 2004, later 2011 article 36/2). Army involvement can be initiated by the government or army authorities (the leader of the armed forces or the minister of internal affairs).

There are distinct institutions assigned for specific hazards. However, recent changes have led towards an all hazard approach. From 2012, all civil protection and most firefighting tasks were moved under the disaster management authorities. Also, flood protection issues of water management were moved under the Ministry of Interior (previously under the Ministry of Environment). Based on the new disaster management law, the disaster management authorities (National Directorate General for Disaster Management, NDGDM) located within the Ministry of Interior and regional directorates, have a supervising position over the cooperating institutions.

2 Analysis of risk management

2.1 Established practices for risk management

2.1.1 Implementation of the Flood Directive in Hungary

The content of the Commission Directive 2007/60/EC on the assessment and management of flood risks (26/11/2007):

- Designation of managing authority
- Preliminary flood risk assessment (Art. 4(3))
- Areas of potential significant flood risk (Art. 5(2)) – completed (2011.DEC) (see Figure 5)
- Flood hazard and risk maps (Art. 6(2)) – completed (2013.DEC)
- Flood risk management plans (art. 8(2)) – completed (2015.DEC)

National reports were made due to the EU Directive: Preliminary Flood Risk Assessment in 2011. The report can be found in Hungarian language in the page of Vízügy, www.vizugy.hu.



Figure 5: Preliminary flood risk maps

The flood hazard and risk maps were completed and published in 2013 December (Figure 6).



Figure 6: Hazard and risk maps

The risk management possibilities in Hungary first of all, structural measures:

- Heightening the dikes

- Building reservoirs

Heightening the dikes are very expensive and in some cases soil problems occurring, but the reinforcements of the dikes are continuous. The Vásárhelyi plan's improvement has ongoing projects along the Tisza river. Two projects are in the pre-procurement phase. The projects are the Szamos – Kraszna river reservoir and the Beregi reservoir constructions. According to the professionals, along the the Danube no space for reservoirs, that can moderate the floods.

Non-structural, legal and regulatory measures:

- Good national and international cooperation (WG-F, ICPDR FP-EG, Border Comm.)
- Precise flood forecasting: continuous development
- Raising awareness: municipality flood defence plans
- Recalculation of the design flood level (DFL, in Hungarian 'mértékadóárvízszint', MÁSZ) legal update on 100 year defence
- Sustainable floodplain management (plans): short and long term measures

After 2013 Danube flood more than 160 plans for settlements were carried out in 2014 (Figure 7).

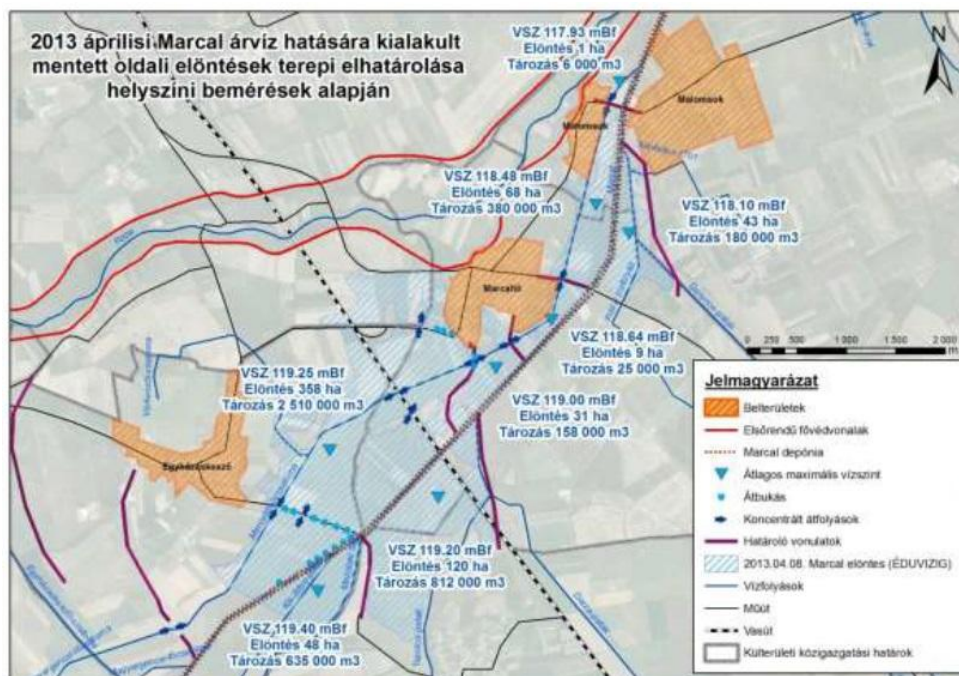


Figure 7: Flood defense plan

The recalculation of the design flood level was made in 2014 for all 2800 km diked rivers. The floodplain management plans were also made in 2014. The dikes are made to the actual

design flood level of water. DFL water level is calculated from the historical flood level heights and the frequency of the floods.

3 Analysis of responsible institutes

The highest level of planning and coordination of disaster related actions is the government. The minister of interior is responsible for disaster management (the NDGM belongs to this ministry). The Coordination Steering Committee for Disaster Management (KKB, from 01.2012 the name was changed) is an intergovernmental committee (with several expert teams, members are ministers, the head is the premier) and coordinates the highest level decision making allowing for cooperation among several involved institutions. The structure of disaster management in Hungary can be found in Figure 8.

At regional and local levels, the county and local defense boards are in charge of decision making for crisis response and preparation (the structure of the boards was changed from 2012). Defense boards are under central coordination; the members are stakeholders (local authorities, representatives of disaster management authorities, army, police, health care system, water management system (Disaster Management Law 9-17 §).

At the local level, crisis preparation and response is the mayor's responsibility. During a special order event, the mayor or the leader of the general assembly have the decision-making power, without the necessity of calling for the defense boards (at local level the representative of the disaster management authorities can replace the mayor in decision making (Disaster Management Law 46§). Local and regional defense boards coordinate the preparation, planning and response in the fields of their competence.

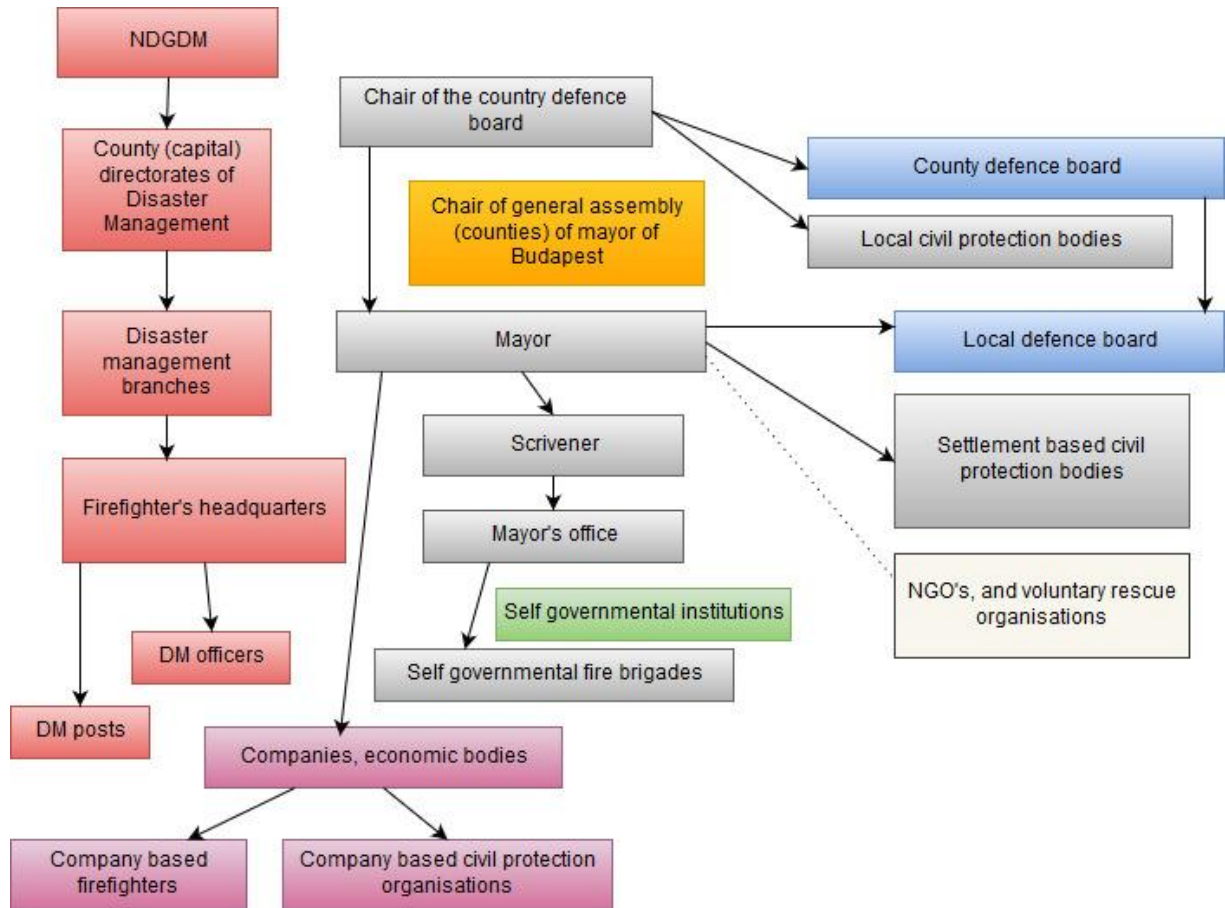


Figure 8: The structure of disaster management in Hungary

Official disaster management authorities are under the supervision of the minister of interior. The minister of interior is in charge of running the official disaster management institutions, and preparing reports on risk assessment and disaster management planning and performance to Parliament (DM Law 8 §). The disaster management authorities are the following: the NDGDM (central body with competence for the whole country), regional (county) directorates of disaster management (regional bodies, under the supervision of the central body), local branches and disaster management post (see Figure 8). These institutions are primarily in charge of professional disaster preparation and response, coordinating the activities of stakeholders in disaster management.

There are other stakeholders and cooperating organizations – among these the Hungarian army forces, rescue institutions, the national meteorological services and rescue NGO's. These institutions have agreements with the disaster management authority.

Disaster management institutions are centralized, though primary response and planning rests at the local level (with the mayors), supervising and coordination is the task of the disaster management authorities. Within the official disaster management hierarchy, leaders are appointed on a top-down basis (Figure 9); though initiatives are accepted from the local levels as well (website of NDGDM). In the governance of disaster management, also the top down approach is dominant, e.g. the government decides about the guidelines of disaster prevention, education and response, and coordinates the work of county defense boards and these boards coordinate the actions of local defense boards (DM Law 6-14§).

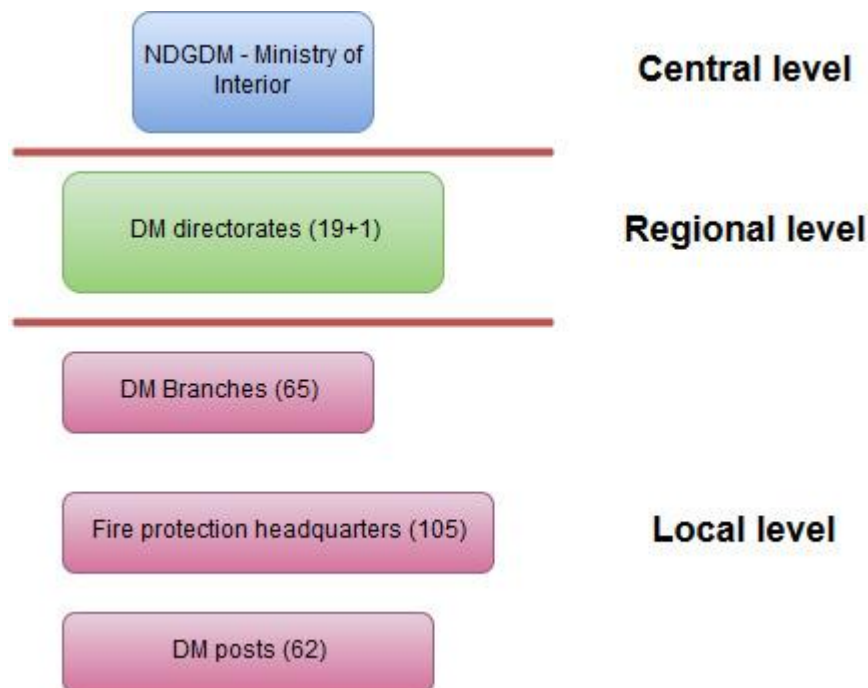


Figure 9: Disaster management authorities in Hungary

4 Assessment of risk management aspects

In Hungary, both the constitutional and legislative environments for disaster management are new, implemented from 2012. There have been important changes in DM, especially concerning organization and responsibilities. The formulation of the DM Law was partially a result of experience with financial deficits during earlier disasters, and investigations on disasters and on the DM sector as a whole.

Just to give some examples: investigations after the severe thunderstorm in 2006 and floods in 2009-2010 pointed to the necessity of clear responsibility lines, education and emergency

exercises, improvement of coordination among the stakeholders during disaster recovery, clear supervisory roles, and the importance of local disaster management planning. The red sludge disaster showed discrepancies of improper task division in supervising low and high threshold Seveso companies, procedures of issuing building permits, and dangers of improper implementation of EU requirements into the national legislative system.

The DM system has become more centralized; responsibility lines and supervision are clearer, and at all levels of disaster management. At the local level, risk assessment, and for the high risk settlements, obligatory DM plans have been introduced. At the same time, mayors get help in coordinating and organizing DM tasks. There have been organizational changes concerning water management and municipal firefighters. The NDGDM coordinates other bodies during disaster response and holds a supervisory position. Special importance is given to education and settlement-based civil protection duties. In the new curricula of education there are elements of crisis management at all levels. From 2012, civil protection duties of the inhabitants have become more defined.

After implementing the new system, there probably are many things yet to be changed, and it will be revealed in reality if this system is more able to cope with crises than the previous ones. Potential bottlenecks of the system can be the result of novel elements like the newly introduced emergency call system, which requires time to get used to. Other potential difficulties can appear concerning the divided supervision of water management; water quality monitoring remains at the environmental authorities while flood protection is under the disaster management authorities. The system is not yet tested.

Another important consideration is a long-standing shortage of finances for flood protection and DM. This is difficult to change because of the present economic situation in Hungary. There has been a plan to implement a DM fee from industrial plants. However, partially due to legislative discrepancies, and the lobby against this from private enterprises, this part of the DM law has been withdrawn. At the same time, there is still no unified insurance system for high disaster risk areas. As a result, there remains an overall lack of finances in the sector.

In addition to awareness-raising, the idea of involving inhabitants through obligatory civil protection exercises and voluntarism is promising, and it might be a cost effective solution. Involving local people in disaster response is a good idea, since public acceptance of local help is higher than the ranking of official help from the central government. The future is evidently

towards the involvement of private parties – outsourcing certain tasks and increasing the level of volunteering. There are examples of this at present in Hungary. However in the new system there is still a lot to be done in these fields.

As Hungary is an EU member, legislative and organizational elements of EU civil protection are implemented in the national legislation. The experience of this particular country in reforming the DM system can be a useful reference point for other countries facing reforms in the future.

In Hungary from 2012 there has been a new crisis management system introduced. It has involved a substantial reform compared with the previous system. Based on a critical evaluation of the former system, the new system is more centralized and involves new institutions (the disaster management referee).

An important element of the new crisis (disaster) management system has been institutionalizing the help to politicians to fulfill crisis management related tasks and decision making. From 2012, a new position of the disaster management referee is established. They are employees of local governments, trained for helping the mayors in crisis management tasks. Their duties include: cooperating with crisis management authorities, preparing risk assessment plans and disaster prevention plans. They are trained by the Education Center for Disaster Management. The reasons for establishing the position of referee was related to the cases when mayors did not have qualifications for disaster response. During an emergency state the mayors' executive responsibility is overtaken by the directors of crisis management of the local authorities. In this way it is ensured that the response can be done by professional experts, timely and accurately.

Clarification of responsibility. The new crisis management system introduced in Hungary in 2012 clarified the supervision over related institutions in disaster management and in industrial supervision. As the disaster management system has many supervising institutions, in case of a disaster there is a leading – supervising institution. In such a way the appropriate response as well as a clear responsibility line is kept. This is of special importance in the case of supervision of industrial objects – obtaining permissions from several institutions (environmental, mining directorates, local authorities, etc.) in order to avoid discrepancies (like in the case of the red sludge disaster) it is important to have one authority for supervising.

5 Analysis of EU master curricula

In Hungary there is not much educational institutes for risk management professionals in specialisation for natural disasters. One can find only two Universities in Hungary that has specialisation for surface waters management and risk management for environmental objects. The two courses are not in master programme, just in a post-graduate programme.

Table 2: Identification of relevant courses

Title	Type	Master curriculum	Lecturer	Organisation	ECTS credits	Equipment needed	Additional information
Flood modeling and risk mapping	Subject in a post-graduate course		Dr. Józsa János	BME, Department of Hydraulic and Water Resources Engineering	6		
Biostatistics, probalistic models and risk management I.	Subject in a post-graduate course		Ittzés András	Szent István University Faculty of Horticultural Science	5		
Biostatistics, probalistic models and risk management II.	Subject in a post-graduate course		Ittzés András	Szent István University Faculty of Horticultural Science	5		

6 Literature

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Global Assessment Report (GAR) on Disaster Risk Reduction (2015), United Nations