Chapter 2
Model of Effective Civil-Military Collaboration in Natural Disaster Risk Management

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Abstract The concept of effective and proactive natural disaster risk management represents a highly complex phenomenon researched in different scientific disciplines. While the nature of the events that trigger risk scenario and resources that need to be protected are quite clearly defined, there is no such similar compliance level regarding the response. In most countries, civil (emergency response units) and military (modelled forces) structures represent the basis for effective natural disasters risk management. Full-scale collaboration and prompt corrective action during mitigation phase are prerequisites for successful task completion, which poses the necessity of effective civil—military collaboration model development. In this paper, the different approaches aimed to effective disaster collaboration are analysed. Also, the side aim of this chapter is stewarded to in-depth, objective analysis of current state in Republic of Serbia within the field.

Keywords Natural disaster · Management · Civil structures · Military structures · Collaboration model

2.1 Introduction

The analysis of numerous definitions of the concept of safety has shown that it is most accurately defined as the state of a protected value without any potential future or current threat to that value, but which is also a goal that is not fully attainable and which should be strived toward. This paper required the identification of the exact connections between natural hazards, the resulting emergencies, impacts, and states, and the ways society responds to them. The resources in the emergency registry system comprise qualified personnel within the protection and rescue forces and material and technical resources required for emergency response, which are no less important if the system is to function efficiently. An active policy aimed at

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disaster risk reduction, adaptation, preparedness, and effective emergency response can substantially decrease fatalities, as well as material and environmental damage (Nikolic and Zivkovic 2010).

For the purpose of this paper, it is necessary to establish correct linkages i.e. connections among natural hazards, derived emergencies, impacts, state and response activities of the society. According to UNISDR (United Nations International Strategy for Disaster Reduction) the next terminology should be used:

- Hazard—a process, phenomenon or human activity that may cause loss of life, injury or other health impacts, property damage, social and economic disruption or environmental degradation. Hazards may be natural, anthropogenic or socio-natural in origin. Natural hazards are predominantly associated with natural processes and phenomena. Anthropogenic hazards, or human-induced hazards, are induced entirely or predominantly by human activities and choices. This term does not include the occurrence or risk of armed conflicts and other situations of social instability or tension that are subject to international humanitarian law and national legislation. Several hazards are socio-natural, in that they are associated with a combination of natural and anthropogenic factors, including environmental degradation and climate change. Multi-hazard refers to the selection of multiple major hazards that the country faces, and the specific contexts where hazardous events may occur simultaneously, cascading or cumulatively over time, taking into account the potential interrelated effects. Environmental hazards may include chemical, natural and biological hazards. They can be created by environmental degradation or physical or chemical pollution in the air, water and soil. However, many of the processes and phenomena that fall into this category may be termed drivers of hazard and risk rather than hazards in themselves, e.g. soil degradation, deforestation, loss of biodiversity, salinization and sea-level rise. Geological or geophysical hazards originate from internal earth processes. Examples are earthquakes, volcanic activity and emissions, and related geophysical processes such as mass movements, landslides, rockslides, surface collapses and debris or mud flows. Hydrometeorological factors are important contributors to some of these processes. Hydrometeorological hazards are of atmospheric, hydrological or oceanographic origin. Examples are tropical cyclones (also known as typhoons and hurricanes); floods, including flash floods; drought; heatwaves and cold spells; and coastal storm surges. Hydrometeorological conditions may also be a factor in other hazards, such as landslides, wildland fires, locust plagues, etc.
- The affected—people who are affected, either directly or indirectly, by a hazardous event. Directly affected persons are those who have suffered injury, illness or other health effects and those who have been evacuated, displaced, relocated or have suffered direct damage to their livelihoods, economic, physical, social, cultural and environmental assets. Indirectly affected persons are those who have suffered consequences, other than or in addition to direct effects, over time, due to disruption or changes in the economy, critical infrastructure, basic services, commerce or work, or due to social, health and psychological consequences.

- Emergency management—the organization, planning and application of measures preparing for, responding to and recovering from disasters. Emergency management is also used with the term disaster management, sometimes interchangeably, particularly in the context of biological and technological hazards and health emergencies. While there is a large degree of overlap, an emergency can also relate to hazardous events that do not cause serious disruption in the functioning of a community or society.
- Vulnerability—the conditions determined by physical, social, economic and environmental factors or processes, which increase the susceptibility of an individual, a community, assets or systems to the impacts of hazards.
- Resilience—the ability of a system, community or society exposed to hazards to resist, absorb, accommodate, adapt to, transform and recover from the effects of a hazard in a timely and efficient manner, for instance through the preservation and restoration of its essential structures and functions by means of risk management.

The disaster risk management system at different levels (national, regional and global) is of great importance for the effective and efficient management of disaster risks (Janackovic 2015; Janackovic et al. 2018). It is necessary to have a clear vision, plans, expertise, guidelines and coordination within and across the involved sectors, as well as to ensure the participation of relevant stakeholders (Vasovic 2016). Strengthening the management of disaster risk management in order to prevent or mitigate consequences requires readiness, reaction, renewal and rehabilitation. In addition, it is also necessary to strengthen cooperation and partnership within all mechanisms and institutions for the implementation of instruments relevant to disaster risk reduction and sustainable development (Musicki 2016).

2.2 Background—Legislative and Subjects

The incidence of natural disasters with catastrophic characteristics indicates that the number of emergencies and other hazardous events increases annually, together with loss of life, material damage, and disruption of ecosystem functions (Vasovic et al. 2016). On a global scale, the current Sendai Disaster Risk Reduction Framework (Sendai framework 2015), which legally succeeded the Hyogo Framework for Action (Hyogo framework 2005), states the primary outcome for the 2015–2030 period: a substantial reduction of disaster risks and losses concerning lives, livelihoods and health, and losses of economic, physical, social, cultural and environmental assets of individuals, businesses, communities, and countries. The Sendai targets closely correspond to sustainable development goals (The Global Platform for Disaster Risk Reduction 2018).

The following global targets will determine the achievement of the primary outcome and goal (they have a dual nature as they are also viewed as sub-goals):

- Substantially reduce global disaster mortality by 2030,
- Substantially reduce the number of affected people globally by 2030,

- Reduce direct disaster-related economic loss in relation to global gross domestic product (GDP) by 2030,
- Substantially reduce disaster damage to critical infrastructure related to healthcare and education and disruption to basic utilities by 2030,
- Increase the number of countries with national and local disaster risk reduction strategies by 2020,
- Enhance international cooperation to provide adequate and sustainable support for developing nations to enable them to implement the disaster prevention framework by 2020,
- Substantially increase people's opportunities to access multi-hazard early warning systems and disaster risk information and assessments by 2030.

Taking into account the experience gained through the implementation of the Hyogo Framework for Action, and with the expected outcome and goal in mind, there is a need for a focused action of countries within and across all sectors at the local, national, regional and global levels in the following four priority areas:

- understanding the risk of disaster,
- strengthening the disaster risk management system for the purpose of managing the risks of disasters,
- investing in disaster risk reduction in order to strengthen resilience, and
- improving readiness for effective response in the event of a disaster and "building a better system from that pre-disaster" during reconstruction, rehabilitation and reconstruction.

The Sendai Disaster Risk Reduction Framework supportive platform offers precise data on the adverse effects of natural hazards (death, damage, affected households, etc.). The supportive platform can be used as a valuable tool for analysing the adverse effects, with a caveat that it heavily depends on up-to-date data.

In the European Union, the INSPIRE Directive provides a relevant innovation pertaining to natural hazards, defining natural risk zones as "vulnerable areas characterised according to natural hazards (all atmospheric, hydrologic, seismic, volcanic and wildfire phenomena that have the potential to seriously affect society because of their location, severity and frequency), e.g. floods, landslides and subsidence, avalanches, forest fires, earthquakes or volcanic eruptions". The INSPIRE directive provides the added benefit of an active online monitoring system.

2.3 Approaches and Models

Disaster risk management is a complex activity involving large number of different actors. In order to manage risks effectively, it is necessary to define basic management principles (Nikolic and Vasovic 2015). The disaster management law is a starting point for defining the context of governance, i.e. basic principles of managing and coordinating activities between different actors. The Serbian Law on Disaster Risk

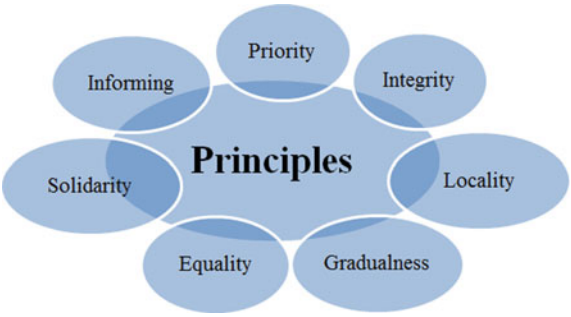

Fig. 2.1 Guiding principles of disaster risk management according to the Serbian Law on Disaster Risk Reduction and Emergency Management (2018)

Reduction and Emergency Management, which is defined in accordance with the Sendai framework and relevant directives of the European Union, identifies seven basic guiding principles of disaster risk management, as shown in Fig. 2.1.

The aforementioned principles of guidance have the following meaning:

- *Priority principle*—the management of disaster risks and the reduction of consequences is of primary national importance, with the protection of human life having the advantage over protection of any other goods or assets;
- *Integrity principle*—all activities of risk assessment and application of risk reduction measures are integrated into plans and programs in all areas of public administration and all units involved in disaster management; all of these actors' activities need to be adequately coordinated, with cooperation and partnership among them being crucial for effective and efficient disaster risk reduction and mitigation;
- *Locality principle*—since disasters are unwanted events of a local character, local government and authorities have to spearhead risk management, relying on national support if required for an adequate response.
- *Gradualness principle*—local resources are used first, and if the local community does not have sufficient coping capacity, additional assets and units, including the police and armed forces, can be used;
- *Equality principle*—all persons have the right to equal treatment in emergency situations, regardless of gender, age, religious affiliation or any other category; risk reduction measures should be applied to persons with disabilities, elderly persons, children, and all other high-risk groups;
- *Solidarity principle*—participative character and solidarity in all disaster risk reduction activities, as well as proposing and undertaking measures during protection and rescue activities, are crucial for efficient response;
- *Informing principle*—the society must be thoroughly and promptly informed of the risks of disasters, as well as of how to protect against the consequences of adverse events.

These general principles for disaster risk management are implemented in the disaster risk management system. Disaster management includes a set of activities whose primary task is to reduce or eliminate the negative consequences of unwanted events. The process is organized in the form of a cycle, and different authors usually

define four basic phases or concepts comprising readiness and the ability to respond, recover and mitigate consequences (Khan et al. 2008; Warfield 2008; Otman et al. 2014). However, Lettieri et al. (2009) stated that all disaster management activities can be classified into three phases: pre-crisis (preparedness and mitigation), crisis (response to disaster), and post-crisis (recovery and return to normal functioning). Support for the implementation of this cycle involves human, technical, financial and organizational resources, whose efficient use is the basis of an effective response to the onset of a disaster. Moore (2008) describes disaster and emergency management systems in detail, emphasizing many external factors affecting the system, primarily the natural environment and the state of the society, and also considers the technological factors, the legal factors and local community management style. Disaster management cycle enables effective preparation for responding to adverse events and mitigating the effects these events produce on the functioning of the community. Vatsa (2004) points out that the consideration of vulnerability and risk as key assets is essentially disaster risk management.

Representative disaster management cycles including all four basic phases are presented in Table 2.1. As significant common features, the need for cooperation between stakeholders and timely dissemination of all the information are highlighted. Sanjay and McLean (2003) stress the importance of cycle modelling and simulation based on the detailed analysis of disaster events and entities of interest.

The rapid return of a society to a functional state is the basic task of activities in the disaster risk cycle. Effective coordination of the activities of all stakeholders and the rational use of available resources are the key aspects that influence the effectiveness of the response to adverse events with larger-scale consequences to the local community. Kusumasari et al. (2010) state the importance of available resources for the local government in the process of adequate disaster response.

Table 2.1 Representative disaster management cycles

Model	Main properties
Ahmed (2008)	Traditional model including disaster risk management and mitigation, which identifies pre-disaster and post/disaster activities
Chen et al. (2006)	Integration is the most important, where different stakeholders coordinate their activities and exchange data
Ulrich Boes (2008)	Two additional phases are included and efficient information flow between actors and phases identified as crucial for adequate response
Moe and Pathranarakul (2006)	Importance of integration and identification of key factors of successful activities
Khan et al. (2008)	Cycle diagram defines pre-disaster, disaster strike, disaster response, and post-disaster phase
Ritchie (2004)	Holistic approach to disaster management, based on detailed strategy evaluation, stakeholder collaboration, and resource management

Coping capacity of a community is higher if there are enough available resources to respond to a disaster. The algorithm of typical activities in disaster management cycles is presented in Fig. 2.2.

In the preparation phase, the most important steps are to identify the domain of the problem more precisely, distinguish the key concepts, and define the goals. In order to achieve the desired results, it is necessary to define key performance indicators and establish benchmarking procedures (Janackovic et al. 2013, 2018). Key performance

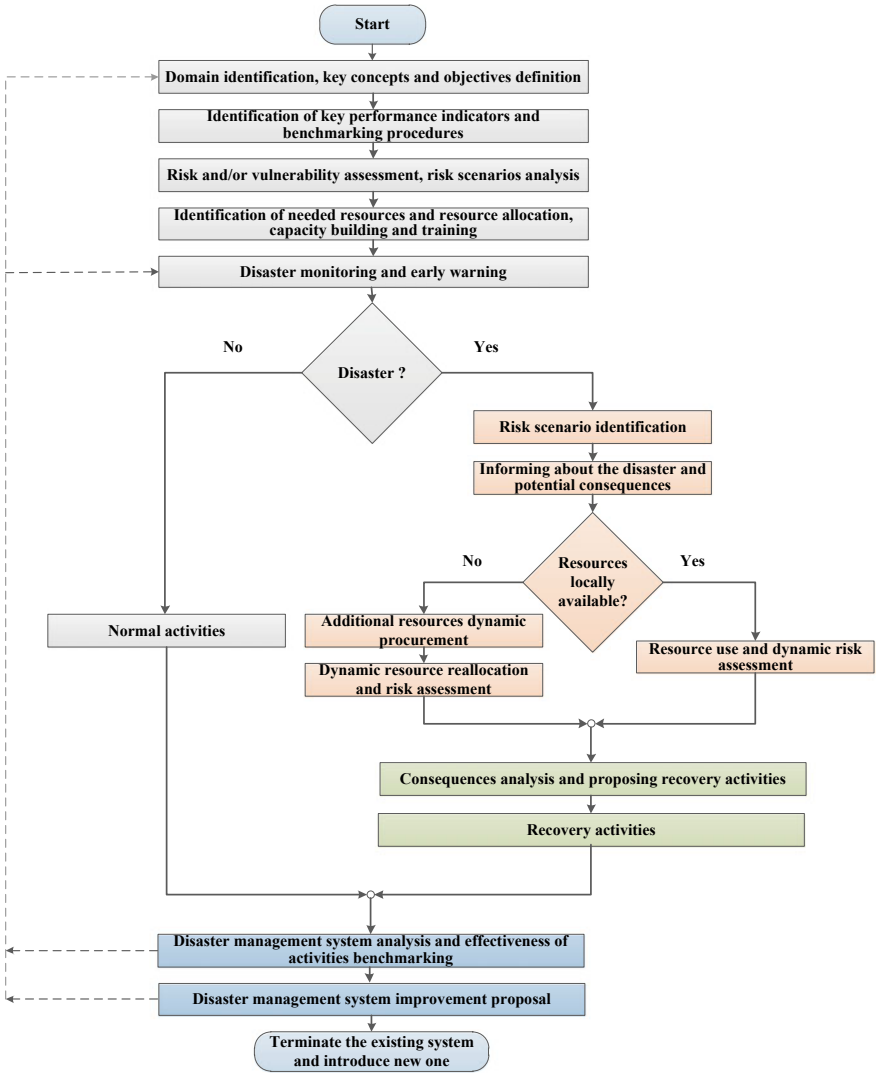

Fig. 2.2 The algorithm of typical activities in disaster management cycles

indicators can be identified by applying different methods of multi-criteria analysis (Janackovic et al. 2013). Precise definition of risk or vulnerability in the community is the next important step, associated with the creation of detailed risk scenarios and possible loss prediction. To eliminate consequences, certain resources are needed, and they need to be obtained and appropriately allocated. Building of human capacities is of particular importance, as is the development of successful monitoring and early warning systems.

When a disaster occurs, a risk scenario is identified, and the public and stakeholders are informed about potential consequences. Based on the available information, the availability of resources that can be further obtained and dynamically allocated is subsequently considered. A dynamic risk assessment is crucial in the decision-making process at this stage, as it affects the response. After the end of the adverse event, the consequences are analysed in detail, and the recovery activities suggested. It is important to constantly improve the existing system based on the evaluation of its performance, as well as to consider the reality of the applied risk scenarios (Vasovic et al. 2018a, b).

2.4 Collaboration During Disaster Management

Numerous actors are involved in the disaster management process. Their adequate cooperation is crucial for the success of the process. Collaborative operations introduce the procedures in which persons who observe different aspects of a problem can constructively discuss the differences and look for solutions that go beyond their limited visions (Malenovic et al. 2016). The essence of this process is to generate new solutions and measures, arising from different viewpoints, based on different knowledge and experience of the actors involved. Basic characteristics of collaboration models are structural representation of collaborative work, identification of key aspects of performance, definition of aspects and ways of interaction among individuals and groups in a system. Effective collaboration requires trust, definition of common goals, mutual understanding, joint use of resources, and efficient interaction. Decision-making and response is based on a mutual understanding of actors and the available data for specific actions that define activities of individuals and teams. An efficient collaboration during emergencies is of major importance for adequate response. Inadequate information exchange and collaboration increase the probability of damage due to adverse events. According to Patel et al. (2012), the following factors are important for the analysis of collaborative activities: domain, support, tasks, interaction, team characteristics, individual characteristics, and additional factors (trust, performance, goals, and experience). Efficient integration of complex disaster management systems is based on organizational, human, technical, and environmental factors, as shown in Fig. 2.3.

The specific properties of disasters (slow-onset or fast-onset) significantly influence the response and the use of available resources. Fast-onset disasters require much faster decision-making and allocation of available resources. Particular emphasis is

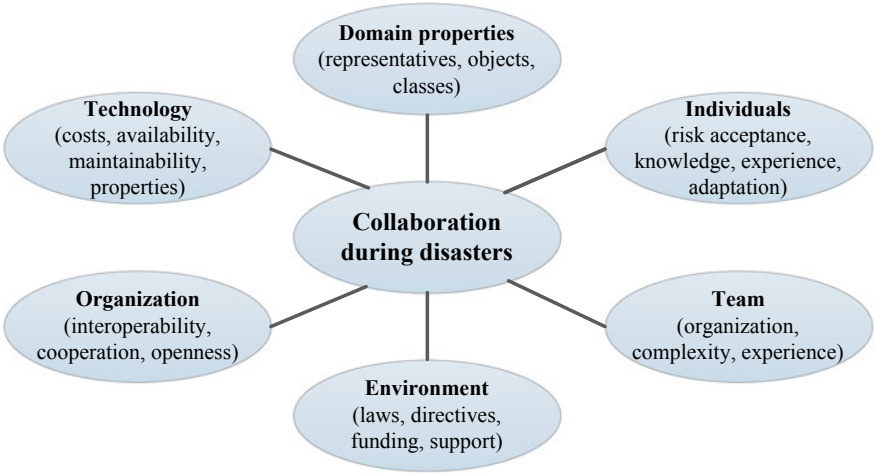

Fig. 2.3 Factors of efficient collaboration during disaster management activities

placed on the characteristics of individuals who can accept the risk and make the right decision in critical situations by adapting to the conditions according to their previous experience and knowledge. Individual reactions may differ in critical situations. An individual is commonly a part of a team, whose complexity and organization, as well as decision-making procedure, affects the outcomes. Therefore, it is important to effectively coordinate activities and to adequately select team members who can respond to all teamwork requirements. Teams are parts of larger organizational units, whose flexibility and openness must enable co-operation and interoperability, which is crucial during and after the onset of adverse events. In these situations, technical equipment is very important. The equipment characteristics, availability, adequate maintenance and usage costs often represent a significant limiting factor during disaster management.

2.5 Serbian Experience

In Serbia, various modalities of emergency response are specified in the overall strategy, the laws and the by-laws, from the standpoint of either environmental protection or human wellbeing. The newly-emerging environmental conditions impose a need for a new way of organizing social security activities. This, in turn, imposes the need for changing the manner of the previous operation, organization and implementation of measures and procedures related to organizing the safety of the society. Comprehensive analysis and monitoring of the situation in the society and the environment should precede the preparation and implementation of support operations to civilian

Table 2.2 Projection of losses due to natural hazards in Serbia

Sector/natural hazards	Estimated losses by sectors	
	Economic losses (in millions of dinars)	Human life losses
Agriculture/floods	From 3.100 up to 8.500	A few to dozens
Water affairs/floods	Approx. 1.960	–
Agriculture/hail, extreme precipitation, extreme wind conditions	Approx. 7.316	A few to dozens
Agriculture/draughts, frost	Approx. 4.0000	No
Energy production, heat/extreme cold	Approx. 716	A few to dozens
Road maintenance, ice, snow	Approx. 3.500	–
Human losses on the highways, regional and local roads caused by natural hazards	–	From 105 to 131
Commercial air traffic	From 54 up to 72	———
Total	From 16.648 up to 48.572	From a few up to 160

authorities in case of unrestricted threats to the community. The trend in the emergence of natural disasters with the characteristics of a catastrophe shows that the number of emergencies and other hazardous situations increases annually, adding both material damage and human fatalities, as shown in Table 2.2.

Identification of integration needs in terms of:

- taking preventive action for risks and mitigating the consequences of disasters;
- building, maintaining and improving the ability to respond;
- protecting people, property, and environmental resources;
- resource protection, rescue and recovery in emergencies;

has led to the establishment of the Sector for Emergency Management (formerly Sector for Protection and Rescue).

The Sector for Emergency Management of the Serbian Ministry of Interior is the authorized body to handle activities pertaining to protection of citizens' life, health, and property, and the environment. Furthermore, it handles the preservation of the conditions necessary for life and the preparation to resolve the crises resulting from natural disasters and other major accidents, technical and technological accidents, and other hazardous circumstances caused by natural, techno genic, or man-made disasters. The Sector for Emergency Management was created by the reorganization of several parts of different state administration bodies, specifically through:

- Integration of functions, employees, and property of the Protection and Rescue Department of the Ministry of Interior, the Emergency Situations Department of the Ministry of Defence, and parts of organizational units of the Ministry of

Environment, Mining and Spatial Planning that deal with risk management and chemical response;
- Establishment of a separate Emergency Response Service.

The Emergency Management Sector seeks to build, maintain and improve the ability of the entire nation to prevent risk-taking, respond to challenges and mitigate the consequences of various disasters that can affect a given region. The Emergency Management Sector unites all existing resources for emergency protection, rescue and response.

The Emergency Management Sector performs the following tasks:

- normative, administrative, organizational-technical, preventive, preventive-technical, educational, and informative-educational tasks; other tasks related to organization, planning, implementation, and control of protective measures for the environment, health and property of citizens; preservation of conditions necessary for life; preparation for dealing with fires, natural disasters from technical and technological accidents, the effects of dangerous substances and other conditions, disasters of larger proportions that could endanger the health and lives of people and the environment, specifically by drafting and proposing laws, norms and recommendations that meet the requirements of the European Union in the field of emergency protection and rescue, with the aim of complete legal regulation for job tasks and performance;
- establishes institutional, organizational and personal conditions for the implementation of emergency protection and rescue;
- takes preventive measures to prevent the outbreak of fire and mitigate the consequences of natural disasters, technical and technological accidents, etc. and prevents health threats to citizens due to the effects of hazardous substances and other hazards;
- provides professional training of members of organizational units within the Sector's area of operation.

In order to acquire the necessary knowledge in the field of personal and collective protection, citizens who are not employed in any civil protection organization are trained in the National Training Center for Emergency Situations.

On the other hand, the National Security Strategy of the Republic of Serbia, National Emergency Management and Rescue Strategy and the National Defence Strategy of the Republic of Serbia define the possible challenges, risks and threats, both in war and peace, to be handled by the Ministry of Defence. The effects of non-armed threats to security, from the military point of view, have not been sufficiently studied despite the fact that non-armed security threats act in peace, and that taking measures against threats to security is an integral part of the strategy of Serbia.

According to the Military doctrine of the Serbian armed forces, the planning, preparation, and implementation of preventive measures are the basis for preventing the emergence of unrestrained threats to the safety of society. Non-malicious threats include natural disasters, industrial and other disasters. Natural disasters affect many human lives and destroy and degrade the environment, causing major material losses

and damage. Preventing, mitigating and eliminating the consequences of natural disasters is the responsibility of state bodies and other designated bodies, with proper regulations and engagement of services, with adequately trained personnel, and with procurement, use, and maintenance of equipment and resources. Depending on the volume and types of hazardous substances, civilian structures are forced to seek military assistance in the event of accidents in order to eliminate the resulting consequences. Based on the discussion above, in view of the possibility of consequences, reduction or elimination of the resulting consequences and depending on the scope and complexity, the engagement of forces has the character of an operation.

Pursuant to Article 51 of the Charter of the United Nations, the National Assembly of the Republic of Serbia, in accordance with the Constitution of the Republic of Serbia, defined the missions of the Serbian Armed Forces. One of the missions of the Serbian Armed Forces is the third mission, the mission of—supporting civil authorities in countering threats to security in case of natural, technical, technological and other disasters. The Serbian Army can be used in peacetime and in emergencies in accordance with the available resources and spatial and weather conditions.

Confronting non-armed security threats is a complex non-combat operation, a planned and prepared process in which limited military resources in a given space and for a certain period of time are deployed for non-combat activities to support the accomplishment of the mission. Non-combat operations include: information operation, civil-military operation and civilian government support operations in combating non-armed security threats.

Operations of support to civil authorities in countering non-armed security threats are the highest and most complex form of non-combat activities of civilian structures and defence forces, in which their content is streamlined and directed to achieve the set goal, by means of unified leadership and command, according to a unique project, in a certain space and at a certain time.

Support operations to civilian authorities:

- preserve the life of the population;
- support the local self-government bodies in the protection of infrastructure;
- renew basic public services; and
- create an environment for successful activities of international humanitarian organizations.

The Law on Defence, as it relates to the participation of the forces of the Ministry of Defence and the Serbian Army in the implementation of tasks as part of the mission of supporting the civilian authorities in countering security threats, states that in case of natural and other large-scale disasters in which human life and health, animals, and property are endangered, units of the Serbian Armed Forces, at the request of bodies responsible for the protection and rescue of people and property, may be deployed to assist the population, in accordance with a special law.

In order to protect and save people, property and cultural assets from natural disasters, technical and technological accidents and disasters, consequences of terrorism and other major accidents, the Chief of the General Staff of the Serbian Armed Forces, or the head of the competent command of the Serbian Armed Forces, based

on the special authority of the President of Serbia, measures for the conduct of preparedness and the use of parts of the Serbian Armed Forces. This also helps eliminate any harmful consequences that may result from unsuspected threats to security. The support operations to civilian authorities in countering non-armed security threats fall within the range of crucial or essential to negligible levels.

A variety of threats affect the preparation and execution of operations, which have a different impact on the preparation and execution of operations. Threats arise from an operational environment that contains physical, temporal, technological, informational, political, social, economic and military dimensions.

The physical dimension of the operational environment includes the mathematical-geographic, physical-geographic and socio-geographic characteristics of the geospatial surrounding.

The physical dimension consists of:

- space expressed through physical and geographical characteristics;
- time as astronomical weather and as a climatic event; and
- human potential.

The influence of the time dimension is growing in importance because it determines the speed of the operation, which refers to the execution of tasks and activities and the achievement of goals in the unit of time.

The technological dimension of the operating environment can be considered in a material or non-material sense.

The information dimension of the operating environment implies the existence of command-information systems, a developed communication system, fast data and real-time information transmission, complete information protection, and processes that are collected, processed, exchanged, used, and protected by information.

The political dimension of the operational environment is determined by the political goals, commitments and constraints that reflect certain interests.

The social dimension of the operational environment is reflected in the public opinion and its attitude towards the operation, respect for international humanitarian law, provision of support for the accomplishment of the operation, and management of civilian and military cooperation.

The economic dimension as a factor of the operating environment is determined by the readily available resources of the zone of operation and the zone of interest and by the approved degree of their exploitation.

The military dimension is a direct expression of the political, economic, technological, and informational dimension and, as such, it is directly dependent on them. Bearing in mind the importance of military activity and the level of technological development, the military dimension of the operational environment has a decisive influence on the preparation and implementation of an operation to support civilian authorities in countering non-armed security threats.

Members of the Serbian Armed Forces, who possess the necessary qualifications and expertise, may serve as members of the Republic Headquarters for Emergency Situations due to natural disasters, and are appointed to/relieved from duty by the Government of the Republic of Serbia.

Support to civilian authorities in eliminating the consequences of natural disasters is classified as a non-combat operation, so the Serbian Armed Forces are not the carriers of the operation, but only act in support of other defence system forces. The Serbian Army does not train additional forces to support civilian authorities in the event of natural disasters, but deploys the existing forces, according to their primary purpose. Personnel are deployed to temporary units with a designated structure and number of troops. The forces are conditionally divided into command, execution, security, and support forces. The command forces in the civilian government support operation are unique command and control systems with the task of permanently collecting, processing and exchanging relevant, accurate and timely information with all the other forces involved in the operation. Situational knowledge is a prerequisite for timely decisions and their effective implementation. A commander's command is exercised in specific circumstances, given their diversity. Civil-military cooperation is particularly prominent in this operation.

Support to civilian authorities can include a temporary unit comprising both types of military, and the prevalence of one over the other depends on the type and degree of vulnerability and specific conditions. Depending on the development of the situation, units of the army can perform:

- engineering activities: identifying and removing obstacles, creating and maintaining communications, creating and determining embankments and channels, arranging scaffolding and crossing points;
- military-military actions to units of the military police and, if necessary, parts of special units, delimiting and securing the vulnerable area, controlling the movement of people and assets, preventing criminal activity, and protecting important facilities;
- airborne operations to helicopter units: air transport and evacuation, aerial reconnaissance, firefighting, traffic situation control; and
- maritime activities, by engaging units and river resources in river transport tasks, water rescue and evacuation, scouting and coastal surveys, and river and traffic control on inland waterways.

Support teams are heavily engaged in logistical support tasks. Logistic support is realized through:

- health care, medical care of the victims, and veterinary care of cattle;
- technical support, technical care of material assets, and supply of spare parts and energy;
- quartermaster support, supply of food products, clothing, footwear, food, water and accommodation;
- transport support, securing means of transport, transportation of people and property; and
- construction support, clearance of terrain and repair of damaged infrastructure.

Preparations of temporary structures and their functioning are particularly complex due to the diversity of forces involved in the operation, the increased needs of the local population, and the inability to predict the evolution of events and their

consequences. The provisional units of the Serbian Armed Forces are formed for the implementation of a specific mission and can be tactical and operational, harmonized and sized in accordance with the missions and tasks.

2.6 Conclusions

The management activities of the natural hazard and environmental and social management system are mutually dependent and consistent with the underlying goal of protecting and continually improving the quality of life. The management system for protection against natural disasters represents a continuous cycle of planning, implementation, review and continuous improvement of the impact of protection at the level of the organization that implements the management system (ISO 2009, 2018). The natural hazards risk management system should be seen as a helping tool in the development and implementation of management principles in all areas, from the primary to the tertiary sector of the economy, i.e. within all interactions between society and the environment.

Thus far, 17 goals of sustainable development have been defined, and they should be achieved by 2030. All of these goals work in conjunction with the following thematic areas of the UNDP Strategic Plan: sustainable development, democratic governance, peace building, climate change, and resilience to shocks and crises, and they are all indirectly connected to the preservation of the natural environment and the existing resources, i.e. the current quality of life. They are implemented on a voluntary basis and according to different national realities, capacities, and levels of development of UN members, but always in compliance with national policies and priorities. To monitor progress, measurable indicators suitable for all aspects of sustainable development have been introduced. It is crucial to note that sustainable development goals can only be achieved with responsible, reliable, and effective management of natural hazards. On the other hand, analysis of Sendai targets clearly reveals the strong interconnection of both social wellbeing and environmental quality concerns.

Further research should be aimed at determinants that are equally important for the development of society, preservation of the environment, and strengthening of resilience to natural and other hazards.

2.7 Recommendations

Understanding the importance of risk from natural disasters is the first component in promoting and strengthening the concept of security culture at the level of individuals, organizations and countries. Safety culture is the first component in the development of an effective system of protection for all levels, but it is based on realistic consideration of the risks associated with natural hazards. Traditional social-environmental

development indicators have a restricted scope since they evaluate changes in only one part of the subsystem, as if it were completely separated from other parts or the entire eco-social system. Thus, these indicators do not reflect the reality of close interconnectedness within the natural processes, especially those that can potentially lead to considerable hazardous effects. Therefore, it is necessary to create joint sustainable development goals and Sendai targets indicators. Regarding monitoring programmes, several composite indicators are currently in use, created in order to better understand the global interdependence of different sustainable development aspects. Of the current indicators, the Human Development Index is followed in Serbia and included in the List of Sustainable Development Indicators. However, there is a lack of disaster-resilience indicators, which is something to be considered in the near future. The resources of the Serbian Armed Forces should be seen as an important subject of protection and rescue of people and goods from the consequences of natural disasters within the Serbian disaster management system, although they are not the carrier of the operation, but only provide support to other forces of the disaster management system. Even if the Serbian Army does not have a permanent force for those purposes, or their mission of supporting civil authorities is not their primary activity, they have become an indispensable element in deployment due to their efficiency and speed of response.

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