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INTERPRETING DISASTER SCIENCE, DEFINING ITS OBJECTIVES AND RANGE

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ABSTRACT. The article aims to define, interpret, and identify the aims of Disaster Science, and to delimit the individual components along the examination of its disciplinary nature.

Definition of the concept of Disaster Science, delimitation of its individual components from its concept, and further terminological examination of related elements. On the one hand, this is conducted with the help of the Internet and the so-called keyword search method in the Google search engine, specifically by searching for definitions, then by collecting the individual publications and the relevant bodies and organisations, and analysing their use of terminology.

The frequency of occurrence of disasters around the world is constantly increasing, their destructive effects can increasingly be felt. Their averting and elimination generally exceed the national level of protection, so the research results should be given priority. Among the conclusions of this publication stands the research priorities of Disaster Research having different disciplines, and due to its multi-, inter- and transdisciplinary nature, there is no unified consensus regarding the methodology and terms. The availability of literature of sociological origin is ensured, however, few works have been produced in Hungary on this topic, for instance, and even in the field of analysis of the effects of natural disasters.

The Author analyses the elements of Disaster Science in an interdisciplinary manner, combining several disciplines, provides insight into Disaster Science and its research areas, and in terms of literary resources, the reader can get to know many, primarily international literature.

Key words: *Disaster science, disaster risk management, discipline, disaster, hazard, risk.*

INTRODUCTION

The first event considered a 'modern disaster' was the Lisbon earthquake of 1755, the interesting thing about which, from a social science perspective, is that it happened on the first day of November, on All Saints' Day, during the period of ideological disagreements between those representing Enlightenment and religion (Etkin, 2016). This extraordinary event attracted the attention of the world of science and art at an international level. The description of the ruins and their depiction on canvas and the dissemination of related information started an international dialogue, which gave impetus to the reporting of disasters. This was the first event where the state introduced a crisis response typical of a special legal regime period other than normal administration which included, among other things, the system of tasks for the elimination and reconstruction of today's disaster control, emergency management, law enforcement, public security, urgent measures related to fatalities, food supply, logistics, the involvement of forces, the construction of more earthquake-proof properties, etc. (Araújo, 2006; Papp, 2021).

In the 17-19th century, several developments of natural science nature were realised, which also helped the development of social sciences, as a result of which the professional study of disasters, the mapping of their characteristics and the results of it, an increasingly comprehensive picture of disasters emerged. Increasing attention was paid to the causes of a disaster.

The twentieth century marked the era of disasters. Based on the statistical data of the 21st century (see EM-DAT, NatCatSERVICE, Reliefweb, Sigma, Statista) a certain increase in intensity is described which requires global action plans for disaster risk reduction and dynamic co-operation in international aid seeking and delivery (see Sendai Framework, 2015, UNDRR). In other words, based on the rising number of disaster events, the system of disaster control is a global response postulate. Regarding this, not only the maintenance of the standards of living (adherence, dependence on serving infrastructures) is the goal of modern society, but also the long-term provision of conditions for survival. This makes the population and the built environment particularly vulnerable and exposed in today's globalised world. A progressive theoretical solution to this can be researched in the field of disaster science, which is in its heyday in terms of topicality (due to the disasters that have occurred) and increasing demand can be observed in terms of their results.

INTERPRETATION, OBJECT, AND PURPOSE OF DISASTER SCIENCE

Disasters are global threats whose significance and professional (here: disaster management-related) analysis is essential and relevant. The theoretical and practical issues of disaster science receive continuous attention, and the results of the discipline help to achieve inter- and transdisciplinary (research) results and their successful implementation into practice. Clarifying the theoretical questions of disaster management research is essential to understanding modern disaster science, taking into account variables from other disciplines to answer its theoretical and practical questions (Papp, 2022).

Disaster science studies the impact of disaster events of natural and built environments in multi-, inter- and transdisciplinary contexts. Furthermore, it studies the environmental, social, cultural, political and economic aspects of the effects of disasters on humans. The subject of disaster science focuses on the planning of effective management of identified disasters, the mitigation of harmful and negative effects, the response to them and the development of strategies aimed at the speedy recovery from them, and the return to normal life. Disaster science is also referred to as an independent discipline, however, when examined more closely, it is a mixture of different ones. It deals with all incidents that cause damage in a populated area. The severity of such events depends on the number of human fatalities, the economic damage and losses, the coping potential and the capacity of the population for recovery and reconstruction. Thus, according to disaster science, a disaster is only such an event whose damage extends to populated areas, i.e., in its interpretation, a flood does not qualify as a disaster if it occurs in an uninhabited area. It deals with risk reduction and management of general and individual events, which in terms of its processing methodology provides horizontal and vertical opportunities for communication between researchers, decision-makers and practitioners around the world. Disaster science covers pre-event situations, such as risk reduction, reduction of probability of occurrence, the building of preventive measures, preparation for the event itself, development of protection against expected disasters, the establishment of emergency systems and development of the existing ones, enhancement of intervention capabilities during the event, expansion and strengthening of response competencies, creation of post-event recovery, mitigation of harm caused, compensation (state, municipal, private and non-profit sectors alike), reconstruction capacities. Fields of investigation for disaster management also include quantification, analysis and modelling of risk and exposure using statistical methods.

From the scientific description of certain disaster events to the development of disaster management as a system of measures and tasks, through international disaster theories, the research lines of world disaster summits, the widespread acceptance of international emergency management co-operations, to the development of a prevention and risk reduction focus, numerous research results have been obtained from which Hungary may also benefit, and the innovative renewal of the domestic defense administration, national defence and disaster management administration system, and the added value of international (disaster) diplomacy may be achieved.

Research on disaster science requires the involvement of multiple disciplines, as disaster science is located at the intersection of natural, social, and economic systems and the built environment.

The path leading to the emergence of disaster science

Disaster science was created at the beginning of the 20th century, and investigated individual disasters with scientific pretentiousness, from the perspective of social sciences (Prince, 1920; Papp, 2021). In the process of researching individual events, and analysing their impact on societies, many theories were born and schools were formed, which led to the delineation of the terminological background related to disaster science (Perry and Quarantelli, 2005; Papp, 2021). Given that several disciplines (earth sciences, environmental sciences, sociology, economics, meteorology, mathematics, engineering, political and legal sciences, etc.) are necessary for the understanding of disaster science, the development of terminology cannot be simple, as different approaches, differentiated methodology, linguistic and cultural diversity produce different conceptual results. There have been several comprehensive works that have tried to examine the basic concepts and explain them according to different approaches. Some works are regarded as classics of this topic, as they are accepted by the international community, and while some works study the results of the past, starting from the classical disciplines, on the basis of newly published ones, but on the basis of new perspectives (Perry and Quarantelli, 2005; Rodríguez et al., 2007; Etkin, 2016). Currently, there is no unified international system of criteria, and the path to the research results is determined by the main mainstream trends and positions of experts related to the discipline, however, it depends on the personality, the initiation of interoperability between the disciplines, and the chemically pure or mixed application of the accepted methodology. Overall, terminological approaches to disaster science vary widely for this reason (Papp, 2020).

The development of disaster science was certainly facilitated by ancient records and observations; numerous events occurred in world history, the analysis of which and the responses (a) formed important system elements, (b) developed into significant disciplines separately, (c) and together formed the systems of tools and tasks of disaster management focused prevention and risk education, preparation, defense, crisis response, intervention, during event damage control and post-event reconstruction as we know today. There were significant part of this, such as the aforementioned

Lisbon earthquake of 1755 or the boat accident in the Canadian Port of Halifax, which occurred on 6 December 1917. A Belgian aid ship and a French munitions carrier collided, resulting in the death of some 2,000 people and injuring 9,000, damaging 1,600 buildings, due to which 31,000 people lost their homes or were seriously affected by their housing situation (Ruffman and Howell, 1994; Scanlon, 1998). Father Samuel Henry Prince has discussed this in his doctoral thesis titled *Catastrophe and social change* (Dahlberg et al., 2016). The thesis studied sociological changes in people living in disaster-affected area, government measures, and conditions for emergency assistance. The paper is also significant since it analyses the disaster from a sociological point of view with scientific sophistication, from the post-occurrence community collapse through the discussion of the relevant disaster psychology to the restoration of the affected areas (Prince, 1920). Interestingly, the Columbia University Publishing House reissued the thesis in 2020, which costs 23-24,000 Hungarian Forints in well-known Hungarian online bookstores. Overall, this was the first scientific paper to study the sociological effects of disasters. The earthquake of 1755, in practice, and the doctoral thesis of 1920, in theory, contributed if not to the whole of the creation process, but certainly to parts of disaster science. Today, some of Father Samuel's theses are considered obsolete and debatable, however, he is considered the father of disaster sociology (Quarantelli, 1998). Father Samuel's work is recognised by many sociologists, social scientists, and experts in disaster analysis; his 1920 paper was even reissued a hundred years later (as a tribute as well), which is a sign of appreciation. According to the Author's judgement, if the father of sociology is Samuel Henry Prince, then the *Handbook of Disaster Research* written by Havidán Rodríguez et al. in 2005 is a ground-breaking piece of modern disaster research. According to the Author's judgement, one of the editors of the mentioned handbook, sociologist Enrico L. Quarantelli is the most influential figure in modern disaster sociology. The 74-author, 32-publication, 638-page book has, according to Springer, 4.44 million downloads (access) to date (an average of 137,000 clicks per article), which is not only significant but also amazing (Perry and Quarantelli, 2005). It is interesting and also an important moment of international discourse that this benchmark paper clearly recognises the 1920 thesis of Father Samuel, while also considers the article of Lowell Julliard Carr in 1932 as relevant, which states, among other things, that all social changes follow a specific sequence pattern, however, also deals with the search for possible analogies of cultural lag, etc. (Carr, 1932). Staying with Springer Publishing, after entering the key word 'disaster science', setting the search period (between 1833-2022), the page found a total of 244,908 results. Narrowing the search of relevance, it shows one article published in the journal of *International Journal of Disaster Risk Science* (Dickinson et al., 2016). The article deals with disaster risk reduction and global communication on the Sendai Framework Agreement. The second book, *Disaster Risk Science* was written by Shi Peijun, a professor at Beijing Normal University, in 2019, and received almost ten thousand downloads. It is interesting to note that Professor Shi Peijun is also one of the editors in chief of a relevant journal called the *International Journal of Disaster Risk Science*. So far, it may be noted that materials regarding the analysis of disasters were written in the first and last third of the 20th century, to which publications after the 2000s commonly refer. In terms of discourse, in addition to the case study of disasters, research on topics related to disaster risk reduction activities and communication, as well as adaptation and resilience are essential elements. This already foreshadows the pillars of disaster science.

The link between disaster science and disaster risk management

Disaster science does not have an organisational or research group or state responsibility, some of its parts can be linked to someone or something, although they have been dealing with its theoretical and practical questions, goals, methodology and object of investigation for several decades.

Since the 2015 Sendai Framework Convention, disaster risk management has become an increasingly common term, which is the application of disaster risk policies and strategies to prevent new disaster risks, and mitigate existing ones, helping to strengthen resilience and reduce disaster losses. Disaster risk management is covered in more than eighty different journals that identify the moments of international dialogue. An aid to disaster risk management is the planning system, which, as a curiosity, should already be adapted to sustainable development and climate change adaptation plans from 2015. The reason for this lies in the fact that 2015 was not only relevant for disaster management, and disaster risk reduction/ management aspects but also for the adoption of the seventeen sustainable development goals and the Paris Climate Agreement.

Disaster reduction is of paramount importance in the disaster management assessment of sustainability and the fight against the negative effects of climate change (Uitto and Shaw, 2016). According to Indrajit Pal et al., the Sendai Framework for Disaster Risk Reduction (SFDRR), Paris Agreement, and Sustainable Development Goals (SDG) promote the effectiveness of (disaster) risk reduction mechanisms and government activities in this direction by addressing central issues such as sustainable, fair (impartial) economy, society and environmental development (Pal et al., 2020). Based on the knowledge of disasters, data collection and statistical analysis results, recommendations can be proposed to the government and decision-makers (Papp, 2019). Indrajit Pal et al. (2020) say disaster risk management (SFDRR) contributes to sustainable development and the SDGs support disaster risk reduction (Pal et al., 2020).

The United Nations Office for Disaster Risk Reduction (UNDRR) co-ordinates international policies, dialogues, co-operation between governments, NGOs, civil organisations, and disaster relief efforts globally. In other words, the UN is responsible for the operation of the International Disaster Assistance System, for risk-related communication, for building a prevention-centred system of tasks, as well as for promoting national resilience, training professionals, forming networks and creating protection capabilities proportionate to each threat, and for managing international offerings. The world disaster management conferences of 1994, 2005 and 2015 were milestones of this. At an international level, the 2005 Hyogó Action Plan, which was taken into account in the 2015 Sendai Disaster Risk Reduction Framework, can be considered an achievement. As its technical successor, it contains seven objectives, justifications supporting four priorities for action and thirteen guiding principles for the 2015–2030 period. The Sendai Framework Convention brought about significant changes in the thinking and practical implementation of Disaster Risk Reduction (DRR) (Ferencz and Teknős, 2020). In the spirit of prevention, the scope of action has been broadened, i.e., emphasis has been placed on environmental and sustainability aspects, technological and biological hazards and risks, including pandemics, health resilience, etc. on governance structures at local levels, facilitating the measurement of disasters with data, strengthening disaster statistics, integrated and inclusive economic, structural, legal, social, health, cultural, educational, environmental, technological, political and institutional measures (UNISDR, 2015). The overall objective is to reduce exposure to hazard, reduce vulnerability to disasters as far as possible, increase preparedness, strengthen responsiveness, and enhance recovery capabilities.

The existence of consistent, reliable, accessible data is essential for the effectiveness of disaster risk management, ensuring their continuous access, storage and transmission. Quantitative data helps to carry out planning, organisation and decision-making tasks before, during and after the event, to ensure satisfactory governance (for risk-based policy decisions), to motivate adaptation to negative impacts, to assess economic damage and costs, to build and develop early warning systems and to create disaster databases.

The priorities of the Sendai Framework Convention include the measurability of the characteristics of disasters, their trend variables and their demonstration with data, which are simplified products of certain reports, foundations on which decision-making task preparations and specifically government decisions are based. Therefore, disaster science relies on disaster statistics, and in many cases – as in this monograph – uses it as a method of disaster analysis (Mileti, 1999; Dilley et al., 2006; Kelman, 2006; Nel and Righarts, 2008). Different databases use different methods, so there will be differences in terms of data as statistical inputs. In any case, this monograph uses data from the EM-DAT database, while for NatCatSERVICE and Sigma, the author analyses only reports drawn from their data. Based on the foregoing, three databases should be considered globally. Although there are differences in their methodology and the range of registered events, disaster risk can be determined based on data from Sigma, NatCatSERVICE and EM-DAT.

Introduction of the Basic Systems and Disciplines of Disaster Science

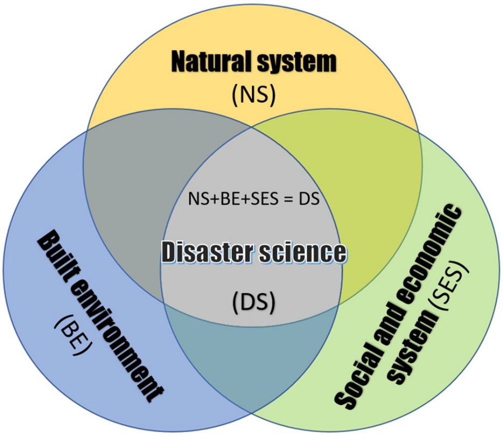

Fig. 1. *Basic System of Disaster Science*
Source: edited by the Author

Figure 1 shows disaster science at the intersection of natural, social, economic systems and the built environment. Two of the three factors are related to humans, while the natural environment is not, although the anthropogenic origin is all part of the natural environment. In the case of disaster science, these basic systems are also worth mentioning as they are the agents that can be clearly damaged, harmed or physically hurt by disasters. The natural system (NS) consists of natural elements, factors, however, anthropogenic activity does belong to this group. However, it is important that human activity is concentrated in the built environment (BE) and in the social and economic system (SES), in which it does not matter whether natural or human-related systems predominate in a given geographical area (Dúll and Dósa, 2005). In many cases, as a result of green innovation and sustainable urban development, there are green surfaces that look natural in the artificial environment (these will be the natural environment in summary). The natural environment is significantly affected by the climate system due to its changes (Kuti and Nagy, 2015). The built environment itself is a settlement, a city, an agricultural area, industrial parks, etc. Whichever base system we look at, all of them can be damaged, and vulnerable, i.e., the subject of the study of disaster risk reduction should cover these systems. At international levels, the disaster system is regarded as the primary object of study defining disaster risk science and is the most and most frequently dealt with, which can be considered from two sides, such as structural and functional aspects (Shi, 1991; Shi et al., 2020).

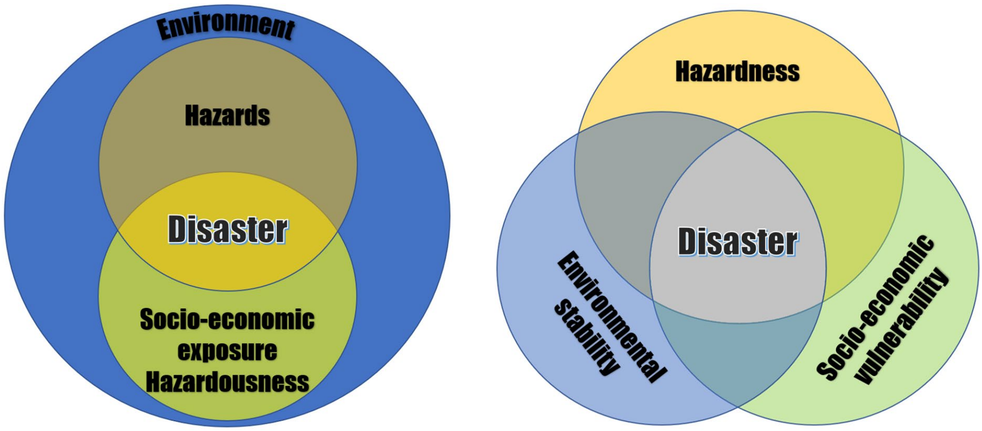

Fig. 2. *Conceptual Model of the Disaster System by Structural (left) and Functional (right) Division*
Source: Edited by the Author based on the works of Shi, 2005 (Shi, 2005).

According to the principled models created by Professor Shi Peijun, disasters arise from the presence of hazards and socio-economic exposure (Wisner, 1994). This also confirms the results of previous research, according to which a disaster, as a qualified event, must have its effects in a human-populated environment, i.e., even if there is a hazard that destroys in a non-populated area, it is not a disaster either. Disasters are an integral part of the environment, however, in accordance with the global principles for disaster risk reduction, which have intensified since 2015, it is imperative to reduce the likelihood of occurrence of the causes leading to their occurrence (the hazards according to this chart), but also to reduce exposure. This includes increasing the disaster resilience of society, increasing the resilience of the economy and its individual segments, reducing the effects of the domino principle, and organising control of dependence and interdependence.

An illustrative formula can be attached to the right side of Figure 2:

DF = S \ H \ V which is

Disaster Frame = Sensitivity \ Hazardousness \
Vulnerability (of environmental stability) (Shi, 2005).

The development of a disaster depends on the sensitivity, hazardousness, and vulnerability of environmental stability, which (see Figure 2) together determine the state and operation of the disaster system. Vulnerability plays a key role in the development of disasters (Burton et al., 1993). Vulnerability is used to characterise the effects of threats on communities. It has many aspects, which consist of physical, social, economic, environmental parts.

Risk analysis is also necessary to reduce vulnerability

Risk: probability of occurrence of certain types of disasters in a given space and time (Papp, 2020).

Risk = Hazard (H) × Vulnerability (V) × Capacity (C).

This formula is interpreted by Stefan and co-author Daniele Ehrlich as meaning that the capacity should be replaced by the exposure, which is how they describe it:

R ah = H ah × E a × V ah = Risk (ah = subscript, the type of hazard and its geographical area) = Hazard × Exposure (ah = subscript, indicates the coping capacity of the affected area and its residents) × Vulnerability (ah = subscript, the affected area and its residents).

Based on this formula, vulnerability depends on the type and intensity of the threat. For instance, properties can be prepared to a certain extent (according to standards) against earthquakes, making them more earthquake-proof, yet still sensitive to the effects of floods. As for the threats, human activity causes the most problems, so the human factor is even more dominant than the natural one (White, 1978). Hazard and exposure can be used for physical parameters or demographic data sets.

A hazard is a phenomenon, human activity, circumstance, or material element that can cause injury or other health effects, damage to property, loss of livelihoods and services, and economic disruption or environmental damage. Hazard is the probable occurrence of the causes of certain disasters, for which it is essential to create and implement the technical-technological conditions of predictability. Its source always arises from social, biological, and physical system interactions. Highlighting natural hazards (geophysical, meteorological, climatic, hydrological, biological, extraterrestrial), their severity depends on the physical nature of the extreme phenomenon, and human development decisions. Extreme phenomenon: it is basically an unusual event, it does not necessarily cause damage.

The interactions between environmental stability, hazardousness and vulnerability certainly affect the function of the disaster system (Shi et al., 2014). In the complex interpretation of disaster science, it is important to analyse (disaster) vulnerability, since (a) the classical and problem-oriented school of disaster science deals with it in detail, (b) it analyses, collects and examines the related figures of disaster events, (c) it is necessary for identifying the causes of disasters, (d) based on the above formulas, the risks and hazards of a community, society and its natural and built environment, hazarding factors, and the exposure to effects are all definable, and those serve primary information about plans related to risk management, disaster reduction, and civil defence.

The link between disaster science and disaster theories

The detailed analysis of schools related to disaster theories is not covered in this publication, however, the excellent Hungarian doctoral thesis *Study of models of co-operation in Southeast Asia used in the protection against natural disasters for Hungary and Central Europe* written by Bendegúz Papp is highly recommended, especially its first chapter which is devoted to schools (Papp, 2020).

Papp discusses the emergence of several theoretical trends in connection with the research of disasters, among which the social sciences, natural sciences, anthropology, and heuristic trends should be highlighted, since their analytical and evaluative professional content, methods of study, represented values, theoretical frameworks, concepts, and the subject of their study all contributed to a better understanding of disaster science. Disaster science is made scientific if it has a theoretical basis, i.e., the definition of concepts and phenomena under study is indispensable. The vast majority of the works related to disaster science, disaster risk science, disaster risk reduction, etc. belong to the schools of natural and social sciences (Papp, 2021).

Interpretation of certain disciplines that make up disaster science

As for disaster science as a discipline, the vast majority of research is multidisciplinary, interdisciplinary and transdisciplinary in nature. This is explained by the fact that individual publications and professional opinions cross disciplinary boundaries. Today, so many schools of disaster theory have emerged and research networks have developed, resulting in at least a multidisciplinary research approach.

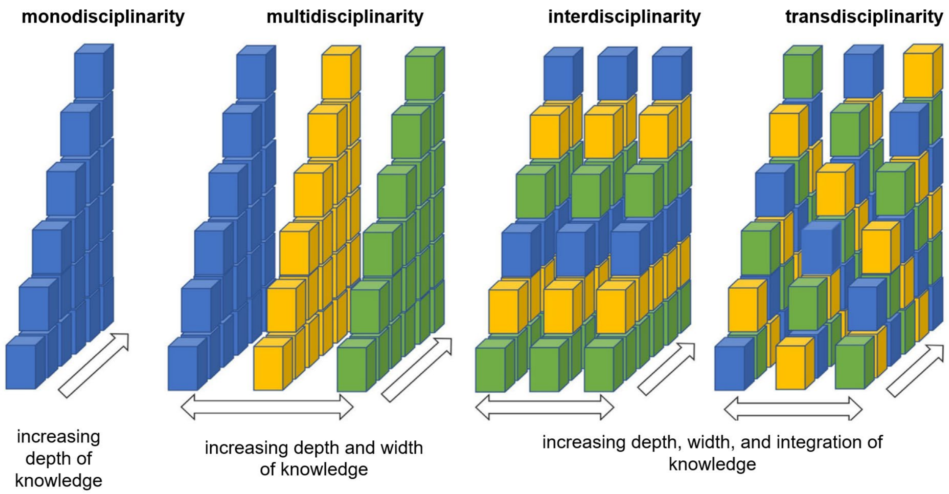

Figure 3. *Illustrating the degrees of disciplinary integration across the boundaries of the scientific field (Peek and Guikema, 2021)*

The characteristic of cross-disciplinary research promotes the updating of previous positions and trends related to disaster science. In connection with the changing environment and demographic variables, the classical contexts are constantly in need of renewal. For instance, the epoch-making paper written by Father Samuel Henry Prince in 1920 is already considered an ‘old school’ work in 2022, since with the development of natural and social sciences, it no longer corresponds to some scientific-research conceptual methods. At the international level, it is more noticeable that several researchers come together and work on the elaboration and processing of a problem, each author bringing along their own scientific aspects (Peek and Guikema, 2021) (Figure 3). The majority of the authors of Hungarian disaster research with scientific degrees are active in the military-technical discipline and are generally professional members of some national defence, law enforcement body or organisation. This limits the Hungarian-related theoretical framework, methodology and subject of investigation of disaster science. Information, and resources may be found in the publications accessible in The Scientific Library of Hungarian Scientific Works, The Library of the Hungarian Academy of Sciences, and via Google Scholar and Public Service Knowledge Portal.

In the case of researchers in different disciplines, it is important to emphasize that the application of a common professional and scientific language, methodology and dental framework is the key to the success of the research. It increases the effectiveness of communication, a better understanding of the research area of the study (Klein, 1990; Siedlok and Hibbert, 2014; Davidson, 2015; Kelman, 2018; Miller et al., 2018).

Disaster science focuses primarily on the structure, function, properties, and dynamics of disaster management systems (Figure 4). Research on the functioning of disaster management systems includes achievement products (written materials) dealing with threats, socio-economic impacts, vulnerability, and environmental stability. Overall, these are also areas of research.

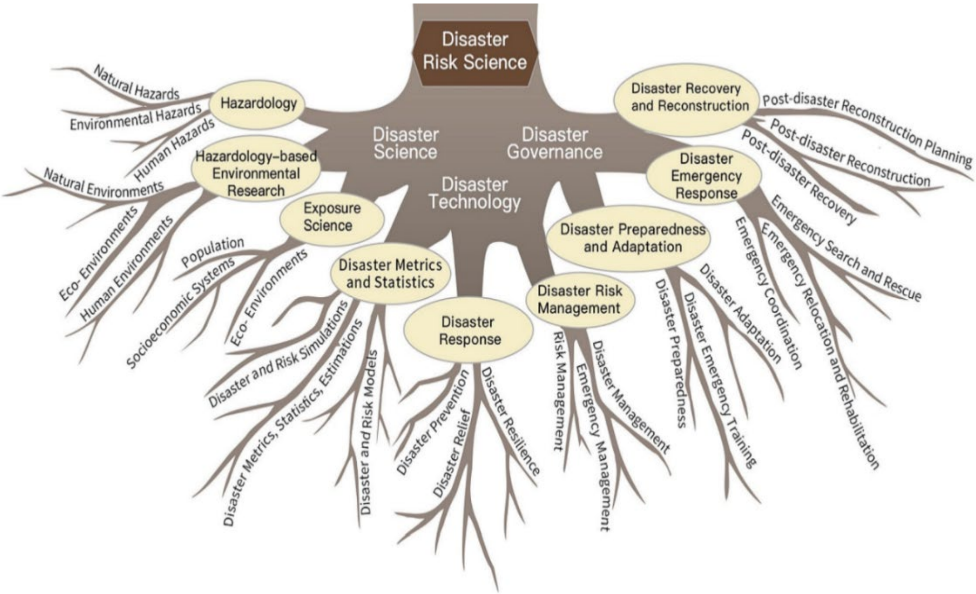

Fig. 4. *Framework for disaster risk science research – Diagram of the three-layer disciplinary structure (Shi, 2005)*

Within disaster risk science, the authors place the disaster science itself, disaster technology (which deals with the technical and technological background of disaster response, as well as disaster management options, disaster monitoring, monitoring, forecasting, early warning, modeling), and disaster management. The latter means administration, governance, management, planning, and organization. Disaster risk science can be broken down into three main pillars: research-analysis, engineering-technology and management-planning contents, which are further divided into nine main areas, culminating in a total of twenty-seven research areas. According to Professor Peijun Shi et al., disaster risk science as a superdisciplinary field requires researchers to be proficient in areas such as earth sciences (geology, geography), atmospheric sciences, oceanology, geomathematics, geophysics, geochemistry, geometry, geospatial studies, mathematics, physics, chemistry, life sciences (biology, ecology, medicine, pharmacy, etc.), economics, management, information science and technology, language and literature, history, philosophy, sociology, political science, and law. Overall, the disciplinary elements of disaster science as a discipline are formed by the research areas included in the diagram of the three-layer disciplinary structure.

The frequency of occurrence of disasters around the world is constantly increasing, their devastating impact affects more and more people, causing death, suffering and significant economic damage (Kopcsó and Balázs, 2016; Teknős and Debreceni, 2022). Their elimination usually goes beyond national level, requires international co-operation, and more efficient and faster implementations require global action programmes (Hetesi and Kiss, 2018).

CONCLUSIONS

In international co-operation, not only practical, specific intervention and post-event activities are important, but also multi-, inter- and transdisciplinary theoretical research. In connection with the research of Hungarian literature on disaster science, *it should be noted* that few works exist on natural disasters in Hungary, therefore, further analytical and evaluation work is needed in this area, the feasibility of which would be supported by a unified disaster database based on Hungarian data, researching domestic peculiarities. However, this was not only a challenge in literary research, but also in the identification, typing and tendential examination of events of natural origin – the monograph studied only this. The development of theoretical disciplines of disaster research can be traced back several decades, nowadays several theoretical trends and schools have been developed. It should be noted here that the research priorities vary, and this is reflected in international research in disaster science. Several renowned experts prefer disaster risk science or disaster risk reduction, while some prefer operational tasks, and others study sociological aspects to a greater extent. The analytical work was made more difficult by the fact that a very different set of concepts is used in International Disaster Science and Disaster Management than in Hungarian terminology. The use of common language and the use of uniform professional jargon is emphasized by several recognized researchers, and almost all materials that deal with conceptualisation and terminological analysis in detail suggest common collective terminological use. This will also make research into disaster science more understandable, which will have a methodological impact on disaster statistics.

In relation to the research of disaster science, although the performance of a researcher is extremely outstanding in a global context, it is rather the common thinking that is characteristic. It could also be said that (a) theoretical and practical issues are discussed in multi-author journal articles and books, (b) considering words and opinions of one another, (c) and the research results of other studies are further developed and considered. Regarding disaster science the multi-, inter-, transdisciplinary versions of research and topic processing can clearly be found. The difficulty of research lies in this, as one field of science can influence another with its own system of aspects, and disaster science is an extremely broad discipline, so the probability of this can be realized. This is both an advantage and a challenge, although it cannot be called a disadvantage, as excellent writings have been created that have created, improved and supported disaster control systems of countries.

REFERENCES

Araújo A. C., 2006, The Lisbon Earthquake of 1755–Public Distress and Political Propaganda. *e-Journal of Portuguese History,* **4**, pp. 1–11.

Burton I., Kates R. W., White G. F., 1993, *The Environment as Hazard*, Guilford Press, 290 p. New York

Carr L. J., 1932, Disaster and the Sequence-Pattern Concept of Social Change. *American Journal of Sociology,* **38**, pp. 207–218.

Dahlberg R., Rubin O., Vendelø M. T., 2016, *Disaster Research: Multidisciplinary and International Perspectives*. London, Routledge, Taylor & Francis Group, 256 p.

Davidson R. A., 2015, Integrating Disciplinary Contributions to Achieve Community Resilience to Natural Disasters. *Civil Engineering and Environmental Systems,* **32**, pp. 55–67.

Dickinson C., Aitsi-Selmi A., Basabe P., Wannous C., Murray V., 2016, Global Community of Disaster Risk Reduction Scientists and Decision Makers Endorse a Science and Technology Partnership to Support the Implementation of the Sendai Framework for Disaster Risk Reduction 2015–2030. *International Journal of Disaster Risk Science,* **7**, pp. 108–109.

Dilley M., Chen R. S., Deichmann U., Lerner-Lam A. L., Arnold M., 2006, *Natural Disaster Hotspots: A Global Risk Analysis*, World Bank, Washington DC, pp. 1-29.

Dúll A., Dósa Zs., 2005, The natural environment – in an environmental psychological approach. *Tájökológiai Lapok,* **3**, pp. 19–25.

Etkin D., 2016, *Disaster Theory: an Interdisciplinary Approach to Concepts and Causes*, Elsevier, 386 p., Amsterdam.

Ferencz Z., Teknős L., 2020, Ways to Reduce Risks to People's Health and Life. In: Z. L. Antal; Z. Ferencz; A. Páldy (szerk.) Éghajlatváltozás és egészség [Climate Change and Health],129–156, Budapest.

Hetesi Zs., Kiss T., 2018, Human and nature. Way out of the impasse, University of Public Service, 78 p. Budapest.

Kelman I., 2006, Acting on Disaster Diplomacy. *Journal of International Affairs,* **59**. pp. 215–240.

Kelman I., 2018, Lost for Words amongst Disaster Risk Science Vocabulary? *International Journal of Disaster Risk Science,* **9**, pp. 281–291.

Klein J. T., 1990, *Interdisciplinarity: History, Theory, and Practice*, Wayne State University Press, 331 p. Detroit

Kopcsó I., Balázs R., 2016, Finding consensus on the scientific approach of standardized disaster research based on the Utstein Guidelines. *Honvédorvos,* **68**, pp. 5–12.

Kuti R., Nagy Á., 2015, Weather Extremities, Challenges and Risks in Hungary. *Academic and Applied Research in Military and Public Management Science,* **14**, pp. 299–306.

Mileti D. S., 1999, *Disasters by Design: A Reassessment of Natural Hazards in the United States*, Joseph Henry Press, 371 p. Washington.

Miller T. R., Baird T. D., Littlefield C. M., Kofinas G., Chapin E. S., Redman C. L., 2008, Epistemological Pluralism: Reorganizing Interdisciplinary Research. *Ecology and Society,* 13, pp. 1-17.

Nel P., Righarts M., 2008, Natural Disasters and the Risk of Violent Civil Conflict. *International Studies Quarterly,* **52**, pp. 159–185.

Pal I., von Meding J., Shrestha S., Ahmed I., Gajendran T., 2020, *An Interdisciplinary Approach for Disaster Resilience and Sustainability*, Springer, 535 p. Singapore.

Papp B., 2019, Disaster Risk Data and its Terminological Difficulties. A Statistical Review. *Delta, VedeckoOdborný Časopis Katedry Protipožiarnej Ochrany,* **13**, pp. 5–21.

Papp B., 2020, Disaster Vulnerability as a Key Concept in Disaster Management – Terminological Review. *Magyar Rendészet,* **20**, pp. 93–109.

Papp B., 2021, *Study of models of co-operation in Southeast Asia used in the protection against natural disasters, adaptation opportunities for Hungary and Central Europe*. PhD thesis. Doctoral School of Law Enforcement, Faculty of Law Enforcement, University of Public Service, 249. p. Budapest.

Papp B., 2022, The Main Theoretical Issues of Regional Disaster Management. In I. Kovács; L. Frigyer; T. Tirts (editor): *Multidisciplinarity: the Diversity of Police Science*, pp. 120–129. Budapest.

Peek I., Guikema S., 2021, Interdisciplinary Theory, Methods, and Approaches for Hazards and Disaster Research: An Introduction to the Special Issue. *Risk Analysis,* **41**, pp. 1047–1058.

Perry R. W., Quarantelli E. L. (eds.), 2005. *What is a Disaster? New Answers to Old Questions*. Xlibris, 442 p. Philadelphia.

Quarantelli E. L. (eds.), 1998, *What is a Disaster? A Dozen Perspectives on the Question*. London, Routledge, 326 p.

Prince S. H., 1920, *Catastrophe and Social Change*. PhD thesis, Columbia University, 151 p., New York.

Rodríguez H., Quarantelli E.L., Dynes R. (eds.), 2007, *Handbook of Disaster Research.* Springer, 661 p. New York.

Ruffman C. D., Howell A. (eds.), 1994, *Ground Zero: a Reassessment of the 1917 Explosion in Halifax Harbour*. Nimbus Publishing Ltd. – St. Mary's University, 484 p.

Scanlon T. J., 1998, Disaster's Little Known Pioneer: Canada's Samuel Henry Prince. *International Journal of Mass Emergencies and Disasters,* **6**, pp. 213–232.

Shi P., 1991, Theory and Practice of Disaster research. *Journal of Nanjing University,* **11**, pp. 37–42.

Shi P., 2005, Theory and Practice on Disaster System Research in a Fourth Time. *Journal of Natural Disasters,* **14**, pp. 1–7.

Shi P., Lu L., Wang J., Chen W., 2014, Disaster System: Disaster Cluster, Disaster Chain and Disaster Compound. *Journal of Natural Disasters,* **23**, pp. 1–12.

Shi P., Ye T., Wang Y., Zhou T., Xu W., Du J., Wang J., Li N., Huang C., Liu L., Chen B., Su Y., Fang W., Wang M., Hu X., Wu J., He C., Zhang Q., Ye Q., Jaeger C., Okada N., 2020, Disaster Risk Science: A Geographical Perspective and a Research Framework. *International Journal of Disaster Risk Science,* **11**, pp. 426–440.

Siedlok F., Hibbert P., 2014, The Organization of Interdisciplinary Research: Modes, Drivers and Barriers. *International Journal of Management Reviews,* **16**, pp. 194–210

Teknős L., Debreceni K. A., 2022, Disaster Management Aspects of Global Climate Change. In: A. Molnár; D. Wenczel (eds.) Third International Conference on Effective Response: Conference Proceedings. Budapest, Hungarian Red Cross pp. 45-55.

Uitto J. I., Shaw R., 2016, *Sustainable Development and Disaster Risk Reduction*, Springer, 287 p. Tokyo

United Nations: *Sendai Framework for Disaster Risk Reduction 2015–2030*. Geneva, UNISDR, 2015.

White G. F., 1978, Natural Hazards and the Third World: A Reply. *Human Ecology,* **6**, pp. 229–231.

Wisner B., Blaikie P., Cannon T., Davis I., 1994, *At Risk Natural Hazards, People's Vulnerability and Disasters*. Oxford, 134 p. Routledge,