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CLASSIFICATION OF NATURAL AND MAN-MADE EMERGENCIES

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Abstract:

Improved or developed methodologies for analyzing various types of emergencies make it possible to predict them. However, these methods are generating debate on a number of issues, one of which is the problem of identifying the determining factors that shape the risk of natural and man-made emergencies in the study area. Addressing this and a number of other issues requires the use of specialized methods, which have been largely neglected to date. Many hazards are multifaceted (floods can be devastating for cities, paralyzing for flooded roads, or depleting agricultural lands). Based on the areas affected by the disaster, natural risks are classified by their magnitude.

Key words: Earthquake, Flood, Tectonic Movements, Danger, Emergency Situations

Introduction

A man-made emergency is a condition in which, as a result of a man-made emergency occurring at a site, territory, or water area, normal living and working conditions for people are disrupted, a threat to their lives or health arises, and damage is caused to property, the national economy, and the surrounding natural environment. The concept of risk is based on the premise that the constant presence of potentially harmful substances in the environment creates a varying degree of real risk to human health. The probability of risk arising is always present in the world. A key element of the risk concept is its comprehensive assessment.

The risk concept aims to achieve an acceptable level of risk, that is, the level of risk at which the economy and society (or an individual) can exist or are willing to tolerate for the sake of their activities [1];[2];[3].

Important risk categories when analyzing and managing natural and man-made safety [4] are individual, potential, collective, social, technical or material, and environmental risk [5].

The listed risk categories are used in a comprehensive accident risk assessment, as required by regulatory documents. The first category is individual risk. It assesses the risk to a person as a vulnerable entity from specific hazards or threats. This type of risk is of primary importance because the assessment includes an analysis of the risk to human life. It reflects the likelihood of loss of health or death [6].

An unacceptable (unacceptable) risk zone is an area where people are not permitted, with the exception of those ensuring the implementation of an appropriate set of organizational, social, and technical measures (specialized construction of engineering structures, introduction of additional protection, control, and warning systems, etc.) aimed at reducing the risk to an acceptable level [7][8][9].

A high-risk zone is an area where a limited number of people are permitted to temporarily remain in the course of their official duties.

A conditionally acceptable risk zone is an area where the construction and placement of new residential, social, and industrial facilities is permitted, provided that a set of additional risk-reduction measures is implemented. An acceptable risk zone is an area where any construction and placement of the population is permitted [5][10][11].

Critically important facilities are those facilities whose disruption (or cessation)

leads to loss of control, destruction of infrastructure, irreversible negative changes (or destruction) of the economy of a country, constituent entity, or administrative-territorial unit, or a significant deterioration in the safety of the population living in these territories for an extended period of time [6]. The risks of emergencies can be structured by the level and scale of their consequences and management capabilities. For example, risks affecting individuals or communities can be addressed by applying the experience of previous generations and rationally interacting with the environment. Risks affecting the socio-economic development of society can be mitigated at the national level, while economic and planetary risks can only be mitigated by engaging the entire global community [12][13][14][15][16].

Methodology

The following research methods were used: cartographic, comparative, descriptive, statistical, analytical, and zoning.

The problem of forecasting an emergency or other multifactorial process or phenomenon is methodologically solved in the following ways:

1. Using mathematical modeling, constructing a forecasting model for calculating forecast parameters;
2. By constructing semi-empirical forecasting models;
3. By constructing empirical forecasting relationships;
4. By constructing forecasting expert systems based on expert assessment;
5. By formalizing cause-and-effect relationships between the types and parameters of the process sources and the phenomena and parameters of its
consequences.

For forecasting based on mathematical modeling, using semi-empirical or empirical calculations for forecasting parameters, a large amount of information with a high level of reliability and parameterization is required. Information on the sources and consequences of natural and man-made emergencies is primarily qualitative, preventing the use of mathematical, semi-empirical, or empirical modeling methods to develop a methodology for short-term (operational) forecasting of natural and man-made emergencies that has practical application.

Results and Discussions

Natural and man-made emergencies are primarily the result of a combination of various natural and man-made processes and phenomena. However, the presence of a particular process or phenomenon is necessary, but not sufficient, for the occurrence and spread of emergencies.

The factors that cause natural and man-made emergencies are different in nature. By generalizing data on the sources of emergencies, the factors that cause natural emergencies are identified as being of natural origin. Natural factors contribute to the emergence of complex natural and man-made emergencies in various territories. Man-made emergencies are caused by factors of man-made origin.

In the northern regions of the region, podzolic and sod-podzolic soils with peat-bog areas have developed. In a rather cold climate (the sum of temperatures above +10°C does not exceed 1600°C) and excessive moisture (annual precipitation is 225–230 mm), heat exchange is very weak – 2–4 m^2 per day, which determined the prevalence of southern dark coniferous taiga vegetation – fir, spruce, and Siberian pine with an undergrowth of shrubs (mountain ash, honeysuckle, etc.) and dwarf shrubs.

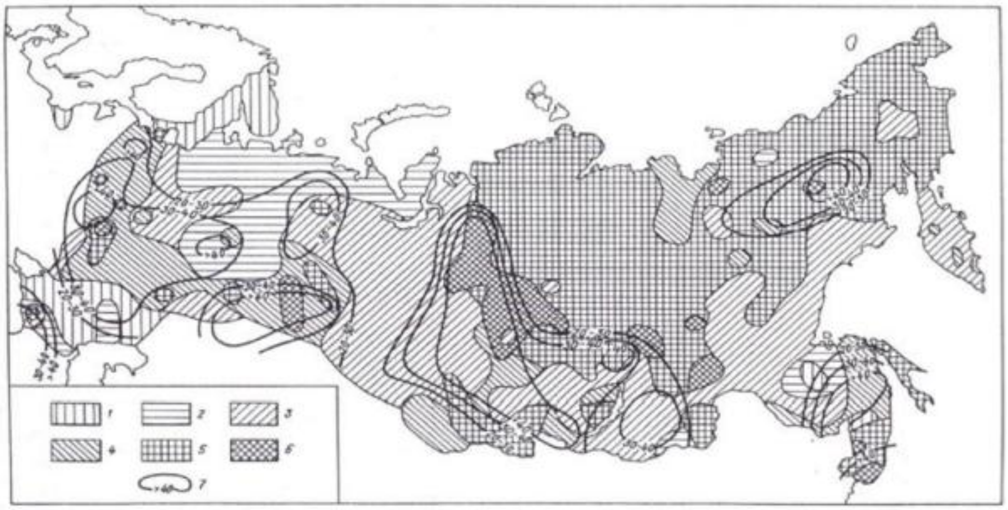

Figure 1. - areas with maximum flood level elevations of 0.3 m (slightly hazardous); 2 - areas with maximum flood level elevations of 0.3-0.7 m (low hazard); 3 - areas with maximum flood level elevations of 0.8-1.4 m (moderate hazard); 4 - areas with maximum flood level elevations of 1.5-2.0 m (high flood hazard); 5 - areas with maximum flood level elevations of 2.1-3.2 m (high flood hazard); 6 - areas where maximum flood level elevations are more than 3.3 m above coastal flood level (extremely hazardous); 7 – lines of equal probabilities (in %) of exceeding coastal flooding levels.

International cooperation in forecasting and prevention is important to maintain and develop, as such processes can spread over fairly large areas and cause damage to several regions and countries. At each of the above-mentioned events, programs were considered and adopted aimed at resolving a specific range of natural and technological safety issues.

The expected results of implementing the Sendai Framework are: disaster risk reduction and a reduction in economic losses from the impact of disasters on the economies of territories, a reduction in the number of victims and fatalities resulting from the occurrence of various types of hazardous phenomena, and a reduction in adverse consequences for the economies, society, culture, environment, and infrastructure of countries around the world.

It should be noted that the risk magnitude increases meridionally—from west to east (from low to high levels of the integrated risk index in the regions). This distribution of the integrated risk index value among the regions can be explained by the fact that it corresponds to the increasing continentality of the climate within the district. Climatic conditions within the district often contribute to sudden weather changes and the occurrence of hydrometeorological hazards (strong gusts of wind, including storms, heavy precipitation, etc).

Further research could explore the specifics of the occurrence and spread of hazardous natural phenomena and emergency situations within districts, populated areas, and other administrative-territorial units. Studying such specifics of hazard spread will make it possible to establish clearer boundaries for the spread of emergencies and hazardous natural phenomena within populated areas.

Conclusion

Natural and anthropogenic emergencies, their classification and evaluation are determined in direct dependence on the knowledge of factors that create a risk for society and explain the spatial distribution of hazardous events according to the results of this work. This analysis showed that emergency risks are multidimensional, i.e., they can be individually distinguished into different types of risk - personal, social, technical, material and environmental risks and require a more specific management & mitigation strategy. The study also indicated that natural and technological accidents occur due to the interplay of various natural and anthropogenic drivers; climate and geographical conditions have an important role on shaping intensity distribution of pressures, especially hydrometorological hazards like floods, storms and extreme precipitation. The results emphasised the significance of risk zoning and forecasting in determining location-specific vulnerability levels to assist emergency preparedness and response. These results suggest that better disaster risk reduction policies in pursuit of more resilient communities and infrastructure systems are feasible by integrating risk classification, spatial analysis, and forecasting frameworks. In addition, the study highlights the need for improved global cooperation and agreements on a global scale — such as through the Sendai Frameworks — to reduce losses from disasters and enhance societal resilience. Future studies also need to create more detailed local-level assessments of hazard occurrence and propagation using geospatial technologies and advanced predictive models, with the aim of reducing ambiguity in emergency boundaries for natural hazards that have occurred in the past or will occur in the future (i.e).

References

[1] Gosstandart of Russia, *GOST R 22.1.02-95, Safety in Emergencies—Monitoring and Forecasting: Terms and Definitions*. Moscow, Russia, 1995.

[2] Gosstandart of Russia, *GOST R 22.0.03-95, Safety in Emergencies—Natural Emergencies: Terms and Definitions*. Moscow, Russia, 1995.

[3] Gosstandart of Russia, *GOST R 22.0.04-95, Safety in Emergencies—Biological and Social Emergencies: Terms and Definitions*. Moscow, Russia, 1995.

[4] Gosstandart of Russia, *GOST R 52104-2003, Resource Saving: Terms and Definitions*. Moscow, Russia, 2003.

[5] Gosstandart of Russia, *GOST R 22.0.05-94, Safety in Emergencies—Technogenic Emergencies: Terms and Definitions*. Moscow, Russia, 1994.

[6] Standartinform, *GOST 31937-2011, Buildings and Structures—Rules for Inspection and Monitoring of Technical Condition*. Moscow, Russia, 2014.

[7] Centre for Research on the Epidemiology of Disasters (CRED), "Website," 2018. [Online]. Available: http://www.cred.be. [Accessed: Oct. 20, 2018].

[8] E. Bryant, *Natural Hazards*. Cambridge, U.K.: Cambridge University Press, 2006.

[9] United Nations Office for Disaster Risk Reduction (UNDRR), *Sendai Framework for Disaster Risk Reduction 2015–2030*. Geneva, Switzerland, 2015.

[10] Intergovernmental Panel on Climate Change (IPCC), *Climate Change 2021: The Physical Science Basis*. Cambridge, U.K.: Cambridge University Press, 2021.

[11] International Organization for Standardization, *ISO 22320:2018, Security and Resilience—Emergency Management—Guidelines for Incident Management*. Geneva, Switzerland, 2018.

[12] Federal Emergency Management Agency (FEMA), *Guide for All-Hazard Emergency Operations Planning (CPG 101 v2)*. Washington, DC, USA, 2010.

[13] World Health Organization (WHO), *Emergency Risk Management for Health: Overview*. Geneva, Switzerland, 2013.

[14] Centre for Research on the Epidemiology of Disasters (CRED), *EM-DAT: The International Disaster Database*. Brussels, Belgium. [Online]. Available: https://www.emdat.be. [Accessed: Jun. 2, 2026].
[15] International Organization for Standardization, *ISO 31000:2018, Risk Management—Guidelines*. Geneva, Switzerland, 2018.
[16] K. Smith, *Environmental Hazards: Assessing Risk and Reducing Disaster*, 6th ed. London, U.K.: Routledge, 2013.