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NATURAL HAZARDS: THEORETICAL ELABORATION AND INTEGRATION WITH SOCIAL SCIENCES

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Abstract

The paper presents the research results introduced as analysis by the North American and Latin American researchers within 1960–2019, which are divided into two directions. The first direction includes the works by predominantly the North American authors from the 1960s to the 1990s, which revised the strategies and plans as a response to recovery caused by devastating natural disasters both inside and outside North America. The research studies under the analysis pay little attention to the integration of the social component into studying natural hazardous disasters. The second direction includes a number of works published in the period from 1981 to the present. Erroneous predictions of the sequence of the events in the 1980s and especially the prediction of Brady-Spence contributed to the emergence of some new research aimed at developing the concept of vulnerability, which had the significant impact on the risk paradigm formation, as well as to reduce the influence or even completely leveling the previous and previously dominant paradigm of physical science as a monopolist in the field of interpretation the impact and meaning of natural disasters. The paper makes an assumption about the need for further theoretical and methodological development of “soft” and “hard” risk attributes with the possibility of adapting them to the existing domestic theoretical and applied developments of natural disaster risk. The development of ideas about the risk construction (prediction) gained from disasters has been uneven.

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1. Introduction

The analysis of foreign (mainly English-speaking) sources on the research topic showed that most of the work completed before 1990 can be divided into two directions. The first direction includes the studies developed primarily by the North American scientists since 1960. They, in most, analyzed the strategies and plans as responses to recovery from devastating natural disasters both inside and outside North America: the most powerful typhoon in East Pakistan and West Bengal in 1970, Agnes in the seasonal hurricane chain in 1972 Atlantic, Pacific tropical hurricane “Lisa” during the 1976 hurricane season and the 1985 hurricane season, and earthquakes in Peru, Nicaragua, Guatemala and Mexico, the powerful El Niño phases in 1982–1983; Hurricanes “Fifi” and “Joan” in 1974 and 1988 respectively. The revision done towards a set of measures initiated to eliminate emergency situations has led to the search and formation of some new regional approaches to actions aimed at restoring the regions affected by the natural disasters. At the same time, in many studies within the first direction, little attention is paid to the integration of the social component into studying dangerous natural phenomena.

A second direction towards the disasters' risk is based on the studies published from 1981 to the present. Erroneous predictions of the sequence of the events in the 1980 – Brady-Spence prediction of the largest earthquake in the region in 1981 in the area of the capital of Lima with a magnitude of 9.2 points (Sol & Turan, 2004) – one of the largest in the entire history of observations, the 1983 Popayan earthquake, the 1985 earthquake in Mexico and the 1986 descent of lahars in Nevado del Ruiz (Seynova et al., 2017), contributed to the emergence of the new studies, where two key topics are vividly seen. First, the concept of vulnerability was developed (Medica & Zoboli, 2016), which had the significant impact on the formation of the risk paradigm, as well as on reducing the influence or even leveling out the previous and previously dominant paradigm of physical science as a monopolist in the field of natural disasters interpretation. Second, a number of studies have been conducted on the relationship between a natural disaster and civilization development, and vice versa. Most scientific papers have emphasized the importance of environmental and territorial factors that determine the risk of natural disasters, and especially in relation to hydrometeorological hazards (Berdnikov et al., 2018; Leroy, 2006).

2. Problem Statement

In the academic works of the North American and Latin American researchers within 1960–1990, partly or completely excluded the risk component, which reflects the information on social, economic and political variables, which are characteristic to the location of natural disasters and their consequences. Subsequently, the social component of risk was integrated into the concept of natural disaster risk, but it is still subject to theoretical and methodological development, there is no universal definition of natural disaster risk.

3. Research Questions

The paper raises a number of issues: when, in foreign studies on the risk of natural disasters, it becomes necessary to integrate the information on social, economic and political variables and find the

aspects that appear under the influence of it; disaster risk research between ‘north’ and ‘south’ has developed evenly or unevenly; under what conditions the risk of a natural disaster can be assessed and whether these conditions can be single out.

4. Purpose of the Study

The paper aims to study the foreign academic experience, which will enable to trace the key stages of theoretical and methodological development of the disaster risk and the integration of social sciences as one of its components. We make an assumption about the need for further theoretical and methodological development of “soft” and “hard” risk attributes with the possibility of adapting them to the existing domestic theoretical and applied developments of the risk caused by a natural disaster.

5. Research Methods

The paper is the result of an abstract review of a number of English-language academic publications from two periods: from 1960 to 1990 and from 1981 to the present. The selection of scientific publications for the subsequent analysis was carried out according to keywords and the relevance of the integration of knowledge from the field of social sciences, some publications in specialized foreign journals. More than 90 English-language publications were analyzed.

6. Findings

Increasing concerns about vulnerability (before and after disasters) and society development have influenced the emergence of modern risk research and scientific paradigms for studying natural disasters in the Latin and North American regions. At the same time, when such research began to conduct in the social sciences, the natural sciences were in a better position due to the large-scale funding and applied nature of studying the consequences of the natural disasters. However, the parade of some unsuccessful forecasts done in the 1980s led to an increase in funding for social research and new attempts to predict not only the particular natural disasters, but also some geological and meteorological phenomena accompanied them. The experience of Latin America, which lagged noticeably behind the North American countries in the research potential regarding to studying natural disasters, despite their devastating consequences for the region, was indicative. However, in the 1980s, new science research and disaster monitoring centers were established in several Latin American countries. However, over the next decade, this did not have any significant impact on bringing social and natural scientists together aimed at combining efforts to find the ways to reduce a risk from disasters.

The significant impetus for the development of new scientific research on natural disaster risk was the International Decade for Natural Disaster Reduction, announced by the UN General Assembly. However, sociologists were in no hurry to insist on additional research (Tierney, 2014), especially in the developed countries of the northern part of the world.

The proclaimed decade has raised concerns about the importance of social aspects and the regional contribution of several countries to the study of a disaster risk in the southern part of the world. For

example, in 1992, the Latin America Social Research Network for Natural Disaster Prevention (LARED) was established. Initially bringing together just 16 researchers interested in applying a social approach, the Network expanded significantly over the next ten years and significantly influenced the development of a conceptual and methodological framework for researching a disaster risk around the world (Marulanda et al., 2010). In the period from 1993 till 2005, The network initiated more than a dozen multinational comparative research projects that allowed the development of new theoretical and applied aspects of disaster risk (Faas & Barrios, 2015): the development of ideas about vulnerability and the social structure of a risk, the interdependence of a risk with the environment, the consequences of small and medium-sized natural disasters for the population. The perspectives of local risk management in Latin America can also be attributed to the LARED Network. However, the main result of the Network was not so much the adaptation of already existing conceptual developments on the compilation of a disaster risk, but the development and dissemination of approaches that can identify the characteristics of natural disasters, which are typical to the southern regions. The research confrontation between the north and the south has served as a source of pooling efforts for scientists to study the complex characteristics of a disaster risk (Birkenholtz, 2012; Turner, 2009).

In the 2000s, after the third major Hurricane “Mitch” in the 1998 Atlantic hurricane season, the natural disaster in the Venezuelan state of Vargas in 1999 and the El Niño phenomenon 1997-1998 the era has come when the challenges of climate change and the call for adaptation strategies could no longer remain without international attention. During this period, the pace of social science research on risk and natural disasters skyrocketed, but their actual number was declining.

However, the risk caused by a natural disaster reflects the apparent or latent probability of loss and damage in the future. If comprehensive information is available, the risk can be subject to assessment (in particular, actuarial calculations) depending on the values of its attributes (Stefanovic, 2003). In the decision-making process, the actuarial calculation of a risk should also include the perception particularities regarding to a risk and its consequences, caused by a natural disaster, expressed through the social, cultural and economic assessment. Such an actuarial assessment and the subsequent development of the risk indicators should be based on the understanding of the mechanisms by which a risk is generated, as well as on a number of verifiable and measurable “hard” physical characteristics and “soft” social attributes.

“Hard” attributes (or risk factors) include the information on such aspects as: potential geophysical phenomena, their magnitude, intensity and probability of recurrence; physical and geographical features of locations of natural disasters; characteristics of the constructing materials of the affected buildings and dwellings, and the equipment used in a risk region; the total cost of infrastructure and expended production assets. “Soft” risk attributes reflect the information about social, economic and political variables specific to the location of natural disasters and their consequences, indicators of the region's vulnerability, opinions of the population (often their interpretation) regarding a natural disaster, its consequences and preventive (and) or liquidation measures, the information on the level of population readiness for the consequences of a natural disaster, etc. Despite the abundance of the diverse information at the country level regarding to a disaster risk (Goryushina, 2020), there is a lack of qualitative and quantitative data at the local and regional levels.

7. Conclusion

The study determined that the risk of natural disasters was based on foreign fragmentary studies covering the prediction (including) of earthquakes and some individual failed predictions of the scientists. In particular, the Brady-Spence's forecast had significant implications for the world science, which began to consider the risk of earthquakes in conjunction with the impact on the socio-political and economic sphere.

The development of ideas about the risk construction (prediction) gained from disasters has been uneven. In the 1950–1970s, the main role in scientific approaches towards risks caused by disasters and their consequences for humans (including seismic, volcanic, geodynamic, meteorological and hydrological phenomena) was assigned to the natural science methods.

The foreign experience in analyzing the disasters risks demonstrates the impossibility of assessing it without comprehensive information based on the synthesis of natural and social sciences, field research data, as well as on a general understanding what the risk is and its interrelated components.

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