

# The Analysis of Economic Impact of Natural Disasters

**Ionela-Daniela GĂITAN (BOTEZATU)<sup>1</sup>**

<sup>1</sup>PhD Student, „Stefan cel Mare”  
University of Suceava, Romania,  
[ionela\\_danielag@yahoo.com](mailto:ionela_danielag@yahoo.com)

**Abstract:** Natural disasters are unexpected events that cause significant material, human, economic and ecological damage, which cannot be countered with their own resources, which is why an in-depth knowledge of the factors that trigger them and an in-depth assessment of possible strategies to reduce the consequences of these events are needed.

The frequent occurrence of these events requires the implementation of an adequate risk management system.

The article aims at a thorough analysis to identify the negative effects of natural disasters on the economy and the factors that influence them. Knowing these factors can help us to create strategies for the negative effects of natural disasters.

Thus, in the first part of the paper I presented a conceptual approach to natural disasters and their economic impact, in the second part of the article I achieve an analysis of the economic impact of natural disasters worldwide, followed by an analysis of them on continents and conclusions.

The problem that I chose is one of great importance, given that natural disasters appear more and more frequent and are much more difficult to forecast and manage.

In the elaboration of this paper I used qualitative research based on the use of methods such as comparative analysis, data processing and analysis, documenting reports, studying reference works and studies.

**Keywords:** *natural disasters; impact; economic losses; risk; frequency.*

**How to cite:** Găitan (Botezatu), I.-D. (2019). The Analysis of Economic Impact of Natural Disasters. *Logos Universality Mentality Education Novelty: Economics and Administrative Sciences*, 4(1), 43-55. doi: 10.18662/lumeneas/12

## **1. Introduction**

Natural disasters should not be a surprise for people, because they are not single events. These are the results which often occur as a result of the natural systems that always exists.

The effects of natural disasters can be amplified by the activities of people, such as travel, which can spread contagious diseases.

In the case of extreme events such as volcanic eruptions or earthquakes, the exact timing of disasters cannot be predictable. But even in this situation, natural disasters should not surprise us. The main risks of a region can be identified if we wish and if we try to do this. For example, the analysis of main risks can be done using scientific research or historical records.

Every year, there are approximately 700 catastrophes with victims worldwide. These have a clear potential to weaken social development, to destabilize an entire region or country from an economic and political point of view. In these cases, the measures taken by governments are not sufficient, and international aid is needed to ensure an effective emergency program.

Disaster is synonymous with the notion of catastrophe, but not all disasters are catastrophes. A disaster occurs when the effects of the disaster extend over large areas and the impact is so great that the community has no longer the capacity to function.

The duration of a natural disaster can range from a few minutes, such as earthquakes, to several months or even years, in the case of droughts or epidemics.

## **2. Conceptual approaches of the impact of natural disasters on the economy**

The most of natural disasters have a catastrophic impact, and it is less obvious that they have a low frequency of production. The severity of natural disasters is in close relation with the context, the totality of the victims, the emotional state of the population (fear) etc.

Catastrophic natural disasters do not include only one extreme catastrophic event, but they can be made up of a multitude of risky events with common impacts, for example floods that occur one after the other. (Nakau, 2004)

The standard way to measure disaster damage involves a separate examination of the number of casualties, injuries, people affected and the financial damage caused by natural disasters, such as earthquakes or floods.

Natural disaster definition presents these extreme events such as a situation that exceeds the capacity of the local administration, requiring outside help for external assistance. (Wallemacq, House, 2018)

In our days, the damage caused by natural disasters has increased significantly compared to the damage caused by natural disasters in the past, and this is due to the growth of the global population, the construction of new residential areas, the non-fulfillment of a plan of urbanization, increased mobility worldwide and dependence on technology economies.

The occurrence of natural disasters can lead to the discontinuation of the entire economic activity, and for certain types of activities substantial losses can trigger the inability to pay, respectively the insolvency.

The economic impact of natural disasters can be viewed as indirect, direct or macroeconomic. (Sahin, Yavuz, 2015)

Thus, the direct impact refers to temporary costs, such as temporary accommodation, treatment costs, food and clothing, the costs of infrastructure destruction, loss of material goods, losses in agriculture, respectively losses to institutions from private or public sector. Knowing the direct impact that a natural disaster has on the population helps us to assess the risk and to make a possible forecast.

Compared to the direct impact, the indirect economic impact of natural disasters is much more complex, and this can be observed after a longer period of time. One such example is the destruction of jobs that affect production.

The macroeconomic effects such as those arising from the occurrence of extreme risk events are closely related to the level of development of a country. Thus, in developing countries the impact produced by events is more destructive, while in developed countries is not observed a significant impact.

The specialized studies carried out in the last decades have shown that there is a significant negative correlation between the level of development of a country or a region (provinces) and the frequency of disasters, which cause loss of human lives and/or significant material losses. (Petrescu, 2008)

### **3. Aims of the research and the methods used**

This article aims to identify the negative effects of natural disasters on the economy and the factors that influence them.

In the elaboration of this paper I used qualitative research based on the use of methods such as comparative analysis, data processing and analysis, documenting reports, studying reference works and studies.

### **4. Analysis of the economic impact of natural disasters occurring worldwide**

People who have recently experienced a natural disaster perceive the world as a more risky place. People update their perception of the underlying risk after they have encountered a disaster. They report high unrealistic probabilities of another disaster occurring in the coming year, of greater severity. These perceptions persist for many years. (Cameron, Shah, 2013)

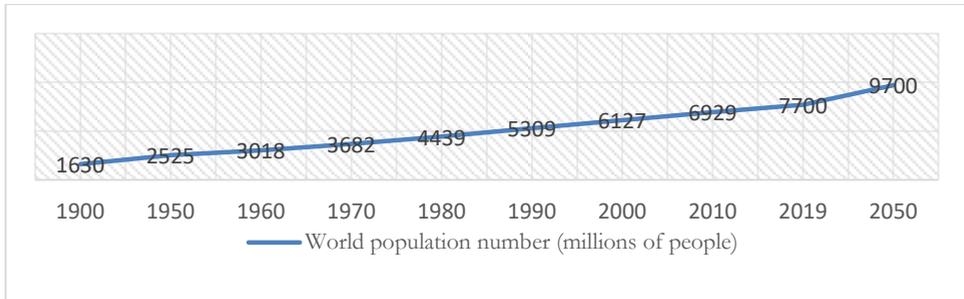
According to the Sendai Framework for Reducing Risk of Natural Disasters 2015-2030, the effects of natural disasters have been divided: in relation to the people (deceased, missing, injured, sick, affected, evacuated, moved and victims), in relation to the houses (houses completely destroyed, houses damaged, crops and forests destroyed, animal losses, educational centers affected, hospitals affected), related to infrastructure (roads destroyed) and economic losses.

The material and financial losses that occur as a result of a catastrophe are obtained by summing up the value of the goods, costs with infrastructure, properties, crops, materials, the costs of recovery, the costs of unrealized production until recovery and the intervention costs.

Natural disasters cause economic losses, such as infrastructure damage, increase unemployment and public spending used to rescue people affected by these events and losses from production and raw material.

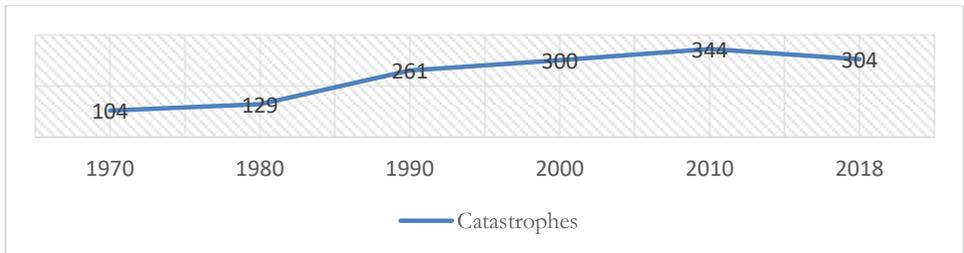
Natural disasters can exert considerable pressure on a country's public finances and subsequently can have a negative impact on public debt. Public finances can be affected by natural disasters through three channels. First, the government's revenue base may decline as a result of a natural disaster, because a decline in economic activity involves low taxable income. Also, the administration and collection of taxes can be prevented during the period after a natural disaster. Second, governments have to cope with increased pressure on public spending. Third, governments must restore the infrastructure destroyed by a natural disaster. (Klomp, 2015)

Currently the number of natural disasters is growing and is closely linked to the impressive growth of the world population over the last decades.



Source: data were processed from <https://news.un.org> and <http://revistapolis.ro>, accessed in November 2019.

**Figure 1.** Evolution of the number of world population in the period 1900 - 2050 (millions of people)



Source: data were processed from <https://www.swissre.com>, accessed in November 2019.

**Figure 2.** The number of natural and technical catastrophes recorded worldwide during the period 1970 - 2018

It has been shown that in the last 50 years there is a tendency to increase the dynamics of the population affected by disasters, despite the fact that there has been a lot of intervention with preventive measures. Although disaster losses have increased exponentially, it has been found that the number of disaster victims has increased to a lesser extent than the damage caused.



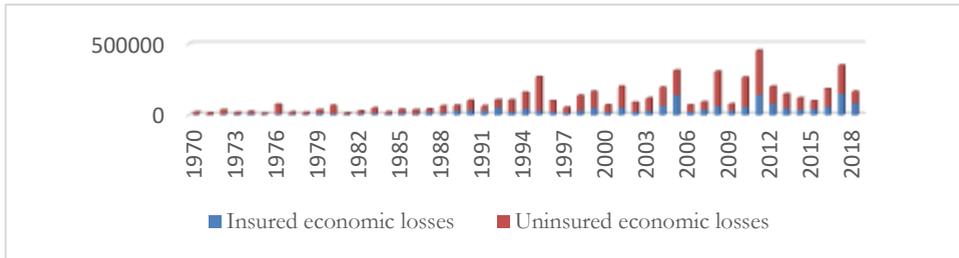
*Source: data were processed from <https://www.swissre.com>, accessed in November 2019.*

**Figure 3.** Evolution of the number of victims registered as a result of the occurrence of natural and technical catastrophes worldwide during the period 1970-2018

In 1970 and 2010 there were two extremely risky events with huge human and material damage, namely cyclone Bhola (November 13, 1970) and the earthquake from Haiti (January 12, 2010). The consequences of these two extreme risk events are also important. In the case of the population affected by the Bhola cyclone, the population that survived the storm triggered a civil war against the leaders of Pakistan, because they did not get involved in the population aid campaign (the aid campaign was conducted by the US and the UK). As a result of this war, the state of Bangladesh was born. The population of Haiti that survived the devastating earthquake in 2010 faced a cholera epidemic, which was caused by the worsening supply of drinking water, which resulted in the deaths of approximately 1.100 people.

In 2018, natural events with low and medium risks have taken place worldwide, but their cumulative impact cannot be underestimated. Thus, in 2018 were insured economic losses of natural disasters represented 76 billion dollars, of which half were produced by secondary events.

In the chart below I have presented an evolution of the insured and uninsured economic losses, registered as a result of the natural and technical catastrophes, during the period 1970-2018 (in billions of dollars, reported to the prices from 2018).



Source: data were processed from <https://www.swissre.com>, accessed in November 2019.

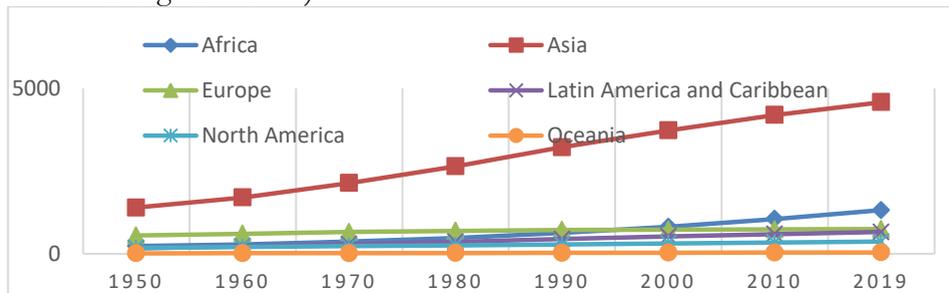
**Figure 4.** Evolution of the insured and uninsured economic losses during the period 1970-2018 (billions of dollars)

It can be seen in the chart presented above that over time the population has focused on ensuring the goods to reduce the losses arising from natural and technical disasters.

### 5. Analysis of the economic impact of natural disasters on continents

In this part of the paper I presented an analysis of the economic impact of the natural disasters recorded on each continent on the world.

Thus, starting from the assertion that the number of natural disasters is in direct relation with the growth of the population worldwide, I have presented, in the following chart an evolution of the number of population on continents, observing increases of the number of population in Africa, Latin America and Caribbean, Asia and North America and a decrease in the number of population in Europe (due to population aging and declining birth rates).



Source: data were taken and processed from <http://revistapolis.ro> and <https://www.worldometers.info>, accessed in November 2019.

**Figure 5.** Evolution of the number of population on continents between 1950-2019 (millions of people)

The value of the global economic losses, resulting from disasters, in 2018, was worth 165 billion dollars, of which 155 billion dollars was due to natural disasters, the rest being caused by technical disasters. This recorded loss value was much lower than in 2017 (approximately 350 billion dollars). In 2018, the value of the losses from disasters recorded was 0,19% of the global gross domestic product (GDP).

In table 1, I have presented the economic losses registered by regions in billions dollars and percent of the global gross domestic product registered in 2018.

**Table 1.** The economic losses of regions (billions of dollars and percent of global gross domestic product recorded in 2018)

Regions	billions of dollars	% gross domestic product
North America	80	0,36%
Latin America and Caribbean	5	0,08%
Europe	21	0,09%
Africa	1	0,06%
Asia	55	0,18%
Oceania/Australia	2	0,14%
Seas/Space	1	0,00%
<b>Total</b>	165	
<b>Total worldwide</b>		0,19%
<b>Average over the last 10 years (inflation adjusted)</b>	220	0,28%

Source: data were taken and processed from <https://www.swissre.com>, accessed in September 2019.

**Table 1.** Regional distribution of natural disasters in 2018 according to total number of events and victims, and insured and economic losses

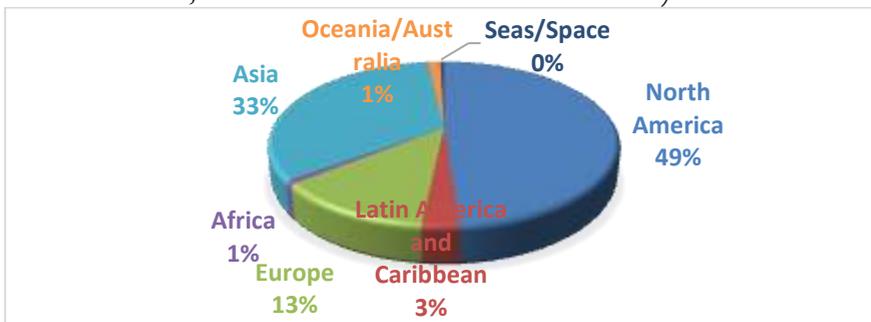
Region (continent/country)	Number of disasters	Victims	Insured losses		Economic losses	
			(billions dollars)	%	(billions dollars)	%
North America	68	329	52,9	62,5	80,5	48,8
Latin America and Caribbean	20	959	1,3	1,5	4,9	2,9
Europe	44	676	7,7	9,1	20,7	12,5
Africa	53	2.488	0,2	0,2	1,3	0,8

Asia	104	8.823	20,4	24,0	54,7	33,2
Oceania/Australia	9	216	1,6	1,9	2,3	1,4
Seas/Space	6	32	0,6	0,7	0,7	0,4
<b>Total worldwide</b>	<b>304</b>	<b>13.523</b>	<b>85</b>	<b>100,0</b>	<b>165</b>	<b>100,0</b>

Source: data were taken and processed from <https://www.swissre.com>, accessed in September 2019.

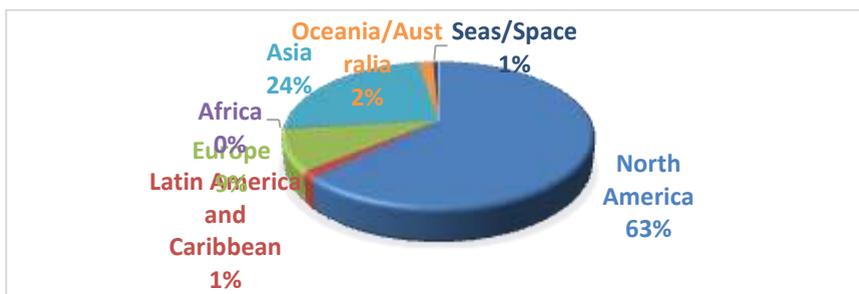
It is clear from the table above that the largest losses, respectively the largest damages, were paid in North America, where insurers paid 52,9 billions of dollars, followed by Asia, where insurers paid 20,4 billions.

In the following charts I have presented the situation of the catastrophes from the point of view of the insured damages and of the economic losses suffered, North America having the majority percentage (62,5% of the total insured losses worldwide and 48, 8% of the total economic losses recorded), followed by Asia (24% of total losses insured worldwide and 33,2% of total economic losses recorded).



Source: data were taken and processed from <https://www.swissre.com>, accessed in November 2019.

**Figure 61.** Regional distribution of natural disasters after the economic losses recorded in 2018



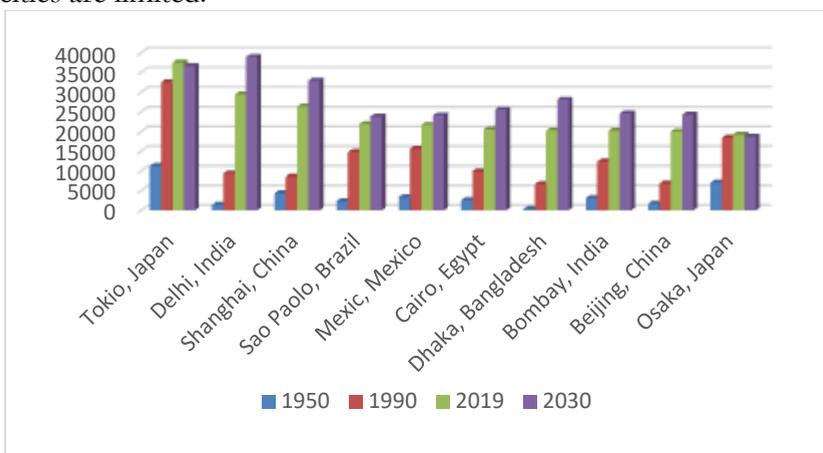
Source: data were taken and processed from <https://www.swissre.com>, accessed in November 2019.

**Figure 7.** Regional distribution of natural disasters after the insured damages in 2018

The population of the world has begun to realize that extreme risk events do not occur even at 100 years, but are repeated every few years. An negative effect of continuous urbanization is that a lot of economic activities and people will gather in risky areas. (Harrison, Williams, 2016)

The expansion of large cities also strongly encourages the concentration of population and economic assets, which increases local vulnerability to extreme risk events.

A large part of the world's population, 4,22 billions, or 55,3%, lives in urban areas today. By 2050, 66% of the population is expected to live in cities, urban centers, peri-urban areas and agglomerations. Most of this growth will occur in cities from Africa, Asia and Latin America, where the rate of expansion of informal settlements is high and urban management capacities are limited.



Source: data were taken and processed from <https://populationstat.com>, accessed in September 2019.

**Figure 8.** Evolution of the population number in the 10 major cities of the world in the period 1950-2030 (thousands inhabitants)

Through the Sendai framework 2015-2030 and the 2030 Agenda have been made efforts to develop urban resilience, recognizing the importance of the actions of local and national governments in creating safe, resilient and sustainable human settlements.

The increasing of economic impact of natural disasters from all the states of the world has led to an increase in requests for detailed evaluation of the possible strategies to reduce the consequences of these events.

The consequences of extreme risk events can range from the impact on human health to prices on housing, transportation infrastructure, time lost in the workplace and in providing education, property damage and

psychological stress. Moreover, financial costs are important and have effects in the field of insurance and public compensation schemes. (Haddad, Teixeira, 2015)

At the European Union (EU) level, through the FP7-Environment program, between 1 February 2010 and 31 January 2012, the project CONHAZ - Cost of natural disasters, was developed, with a budget of approximately 1.114.239,30 euros, of which 899.487 euros was the EU contribution, coordinated by Helmholtz-Zentrum for Umweltforschung GMBH-UZF Germany. The objective of this project was to make an overview of the methods that can be used in estimating/evaluating the costs of natural disasters, necessary for global budget planning and policy prioritization.

It has been found that, in practice, direct costing methods are frequently used, and indirect costing methods are rarely applied (one reason is the lack of reliable data sources).

## 6. Conclusions

At the global level we encounter catastrophic risks, which have increasingly serious consequences. They not only create high economic costs, but also have a direct impact on people in terms of displacement of families and loss of human life.

The best measures to mitigate the effects of natural disasters can be taken only after a thorough knowledge of the phenomenon.

Lately, there has been an increase in the interest of the population affected by natural disasters and catastrophes to insure the goods, in order to reduce the material losses. In the short term, natural disasters have a negative impact on the economy (due to material and financial losses), but in the long term, in developing or poorly developed countries, these phenomena can have positive effects (due to investments made for reconstruction).

The damages caused by natural disasters have increased significantly nowadays, due to factors such as the construction of new residential areas without respecting an urbanization plan, the dependence of the economies of technology and the increase of the mobility worldwide.

The increase of the number of natural disasters is in direct relation with the growth of the world population in the last decades.

There are often articles in the media about the costs involved in a natural disaster, but when estimating these costs, the direct economic costs are emphasized, and the indirect costs (the costs of reconstruction) are left

on the secondary level. Natural disasters not only affect the economic development of a country, but also the rest of the world, considering that in this globalized era there are interconnected production networks.

Serious effects of natural disasters are presented in poorly developed or developing countries, due to poorly prepared institutions to cope with these events, lack of forecasts or evacuation programs. At the same time, in these countries the capacity to recover from natural disasters is reduced.

Compared to natural disasters, human-made disasters, such as technological accidents, occur less often, but they also greatly affect society and the environment.

It has been shown that the expansion of large cities increases the vulnerability to the production of express risk events by encouraging the concentration of population and economic assets.

Early risk identification is necessary to mitigate social losses and effects and to achieve economic recovery in a short time.

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