

The Global Context of Major Disasters - An analytical reading of the implications of the general situation, challenges and ways to cope -

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Received: 02/2024

Published: 07/2024

Abstract:

The reality of major disasters globally is witnessing a terrible development and an unprecedented escalation in terms of their nature, origin, changes, suddenness, scope, frequency, severity of their impact and aggravation of their catastrophic consequences. In fact, these violent phenomena have become a chronic issue that is troubling the international community, burdening it and putting it to the test by openly threatening its collective security and disrupting its development path, where the current situation cannot be postponed but rather requires urgency; and the imperative to remedy the situation before it is too late, by understanding the causes and identifying the vulnerabilities. Everyone is required to voluntarily engage in the development of a new roadmap that adopts agendas with concrete solutions and effective mechanisms for "preparedness, response, response and mitigation of undesirable effects", while intensifying consultation and coordination efforts, multifaceted cooperation and solidarity, and exchange of expertise, in order to create a strong and resilient structural environment that can overcome obstacles and achieve the desired goal.

Keywords: Major disasters, Threats and challenges, Impacts and severe losses, Response and intervention, Recovery and reconstruction.

Introduction

Major disasters are among the most prominent precursors and challenges facing all humanity, as they are considered a direct threat that casts a shadow on their security and development; they constitute a burden that weighs on them because of the dire consequences that result in loss of life and damage to property and infrastructure; social unrest and negative consequences that affect the balance of their bonds; economic losses due to the high cost of reconstruction; and the large circulation of funds to meet the needs of urgent spending to recover several vital sectors.

Major disasters continue to occur in our present, and have become part of our daily lives; an inescapable fact and a reality that imposes itself without permission, as their news spreads 'through communication media, airwaves, news tape, television screens', as if they have taken the media as a platform or platform, addressing us and looking at us through strong visual language; exclusive scenes showing the ruins and destruction of cities due to the remnants of a disaster (earthquake, flood, hurricane, fire or other unfortunate events). Therefore, everyone is concerned and obliged to deal with this situation and what it dictates; and coexist with what is

required by its conditions, by striving to adapt to it gradually, by trying to deepen the understanding of these violent phenomena and what they conceal within them; studying the references of origin or conditions of occurrence, whether natural or human, while investing in the development of sensing and warning mechanisms, protection methods, preparedness and response measures, effective response steps, and intensifying cooperation and solidarity, in order to achieve the least consequences and avoid bad scenarios.

During the last decade, the reality of major disasters globally is witnessing a dangerous and unprecedented escalation, as indicated by the latest statistics and many scientific studies and periodic reports of specialised UN bodies, where earthquakes are the most destructive and deadly disasters, and events related to climate change and its extremism are the most frequent due to global warming and its terrible consequences, and developing countries are more vulnerable and exposed to several types of these risks. The period '2022-2023' was characterised by tragic events and tragic outcomes represented by significant deaths and significant material losses, which is why it was considered the stage of major disasters par excellence ; the situations were harsh lessons and a practical experimental model that allows it to become a measure and a tool that enables the evaluation of performance and the degree of reaction, diagnose the disease and identify the weaknesses of the current situation. These influential experiences are also another opportunity to review accounts and benefit from mistakes; and a starting point to re-evaluate and build approaches with multiple dimensions to win the bet and draw a clearly defined vision for a better future that overcomes obstacles and responds to aspirations, the most important of these facts will be presented and detailed in the body of this scientific research paper.

The progression of understanding the complexities of major risks and the consequences that result from their materialisation raises a strong impression of a fundamental question: 'What are the causes of the exacerbation of major disasters and the critical stage at which they have reached globally ? "What are the reasons for the increase in the stakes of major disasters and the critical stage reached by the resulting situations at the global level ?. What are the shortcomings and delays in dealing with them? What are the prospects for effectively confronting them in order to prevent or mitigate their grave repercussions ? " These questions require an attempt to reach a satisfactory answer, by interpreting the symptoms and aspects of this dilemma, and putting them into a special mould in the form of a message or an urgent humanitarian appeal that 'danger is imminent; it stares us in the face everywhere and at all times'. In order to achieve the expected importance of this study, a descriptive approach was followed with an analytical approach, based on steps with purposes, while trying to crystallise a special vision of the current scene and the developments of its events, as well as a review in the language of numbers; an extrapolation of the state of affairs by evoking live testimonies; i.e., using real evidence and proofs and their consequences; using an interactive method to illustrate and clarify.

1- The reality of major disasters and their repercussions globally in numbers:

The data of the statistical interactive chart ⁽⁰¹⁾ indicates that the stakes of major risks are rising and increasing, especially with regard to climate-induced disasters and their extremes. Also, through the interactive map ⁽⁰²⁾ that shows the risk level index for the countries of the world, this factor focuses on measuring the level of disaster risk from natural events and the negative consequences of climate change in 193 countries, where it is calculated based on the average exposure, fragility, structural characteristics and conditions of the society, in addition to the capabilities and measures it takes to face the negative effects of various hazards in the short and medium term ¹.

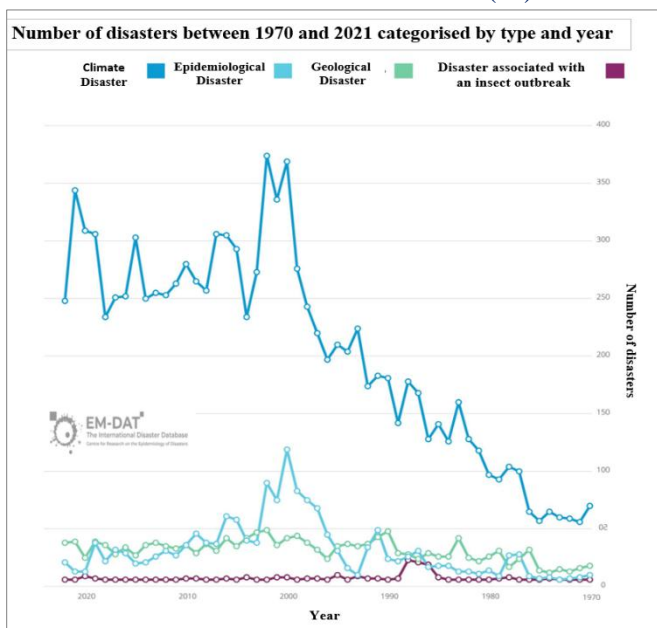
Through the statistical interactive chart ⁽⁰³⁾ of the number of disasters worldwide and the size of the resulting losses, we can derive a number of facts and points:

□ Attention to major risks has become a conviction and inevitable, due to the high rate of exposure to disasters and crises, and the increase in the number of people who suffer; and those who have direct contact with these phenomena and effects, especially in the countries of the South. It is estimated that the number increased from 3.2 billion people during the period 1980-1999 to more than 4.3 billion people during the period 2000-2019 globally, with the possibility of gradually reaching the 6 billion barrier in the coming decades by 2050 ².

□ According to the United Nations and World Bank classification of countries, the size of the cost and losses considered during the period 1980-2023 doubled, in human terms, exceeding 2.5 million deaths; low-income countries and developing economies recorded 91 per cent of all deaths globally, while the economic consequences and financial expenditures exceeded the \$3.5 trillion barrier for the same time period, as total damages increased by 350 per cent, from \$52 billion per year in the 1980s to exceed \$200 billion per year by the end of the current decade ³.

□ The experience of the outbreak of the Covid-19 pandemic is a living proof; the countries of the world were put to a real test and at stake, because of which the global health system experienced severe pressure, exhaustion and confusion, and countries witnessed paralysis and collapse of their health care sector, in addition to the severe repercussions on the economic and social aspect due to the repercussions of the pandemic, which had a special impact that the world suffered great losses in a short and unprecedented period, as it was characterised by the comprehensiveness of the threat and impact globally, as the number of victims of the virus epidemic reached more than 6.5 million deaths, and the infections exceeded the barrier of 700 million infections. 5 million deaths and more than 700 million infections, and the economic cost is very high, the amount of financial potential allocated to confront the pandemic reached 12 trillion dollars, and the global economy experienced a terrible recession and an almost complete cessation of activities, exchanges, commercial and other movements; and the cancellation of about 225 million permanent jobs ⁴.

Illustrative Interactive Chart - Statistical (01):

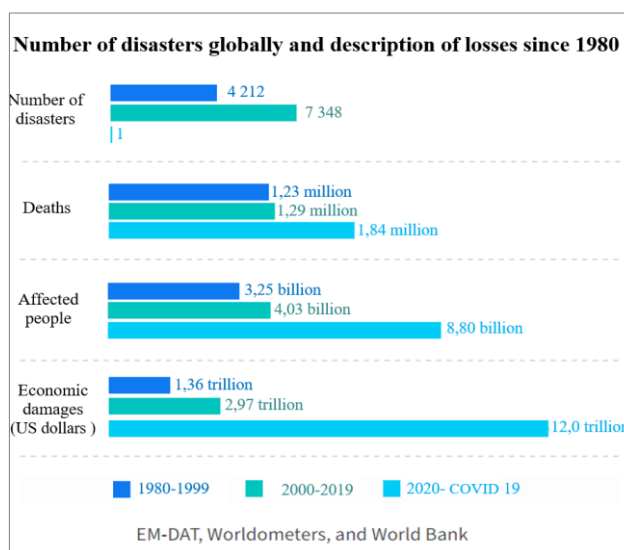


Interactive chart and illustrative map (02):



□ The periodic report that reviews the extent of the implementation of the agendas and regulations of the Sendai Framework for Disaster Risk Reduction published and updated in January 2023, in addition to statements of international official organisations of the United Nations and its relationship with development during three decades and across the world, revealed that the distribution and statistics of the scene of major disasters and their consequences over periods of time, calls for sounding the alarm. Since 1980, more than 11,000 disasters have occurred globally, and their incidence has doubled in the last three decades, and there are analyses based on special indicators that predict that it will increase fivefold in the coming decades compared to the previous ⁵.

Interactive Explanatory - Statistical Chart (03):



□ The periodic data of the follow-up report on the implementation of the Sendai Framework confirmed that developing and poor countries are more vulnerable to the effects of major natural and man-made hazards, especially those directly related to climate change, resulting in significant human and material losses, compared to developed countries, due to the following objective reasons ⁶:

- Geographical location plays a very important role, as most third world countries are located in areas that are periodically exposed to the recurrence of various high-risk and high-impact hazards.

- The weakness of the warning and response system, and the absence of serious framing and activation of intervention and relief plans for the majority of these countries, as they rely only on addressing the phenomenon in a post-disaster manner.

- Weak governance, lack of qualitative development, dilapidated socio-economic structure, concentrated and poorly distributed population growth, and over-supply of natural resources. This inevitably leads to the creation of environmental pressures that increase the effects of various hazards.

- Most of these countries rely on international aid and support in the event of disasters to overcome them and resolve the crises.

- The delivery of aid to the affected areas is hampered by weak infrastructure, poor local administration, and fragmented capacities to deal with and find appropriate solutions.

- There is a relationship between the fragile state of states and major risks. Countries that suffer from multifaceted vulnerability, internal conflicts, and economic, geopolitical and social crises, the effects and consequences of major disasters are extremely severe and severe on many levels.

□ The first half of 2023 witnessed large losses from disasters, initially estimated at \$194 billion, due to the consequences of the devastating earthquake that hit Turkey and Syria, making it the eleventh deadliest disaster in the world in modern history. Losses are expected to rise further following the Morocco earthquake, the Libyan Derna floods, the heat wave that swept

Western and Central Europe, the Mediterranean and the Middle East, and other events during the last quarter of 2023 ⁷.

□ The world is likely - God forbid - to witness in the near future the emergence of many challenges characterised by new developments and new variables; as a result of changing climate patterns and increasing repercussions due to their dangerous extremes, where international efforts aimed at preventing and mitigating the harmful aspects of various major disasters have not yet reached the required level, as it is considered a fundamental issue that concerns all actors in the world and falls within the priorities of the international community, which requires putting aside political and other differences and engaging in what is called: 'humanitarian diplomacy towards major disasters'. Integration in this noble endeavour and supporting it in all ways is a collective responsibility of solidarity, under the banner of official governmental and non-governmental organisations and bodies, under the supervision of the United Nations; it contributes to unifying the international system, framing its vision, enhancing its capabilities and creating a front against the threats and stakes facing all humanity Under a UN endeavour launched in 2004 under the title: 'Towards a more secure, just and humane world and future. Our Shared Responsibility' ⁸.

1- Chronology of the reality of major disasters globally for the year 2022/2023:

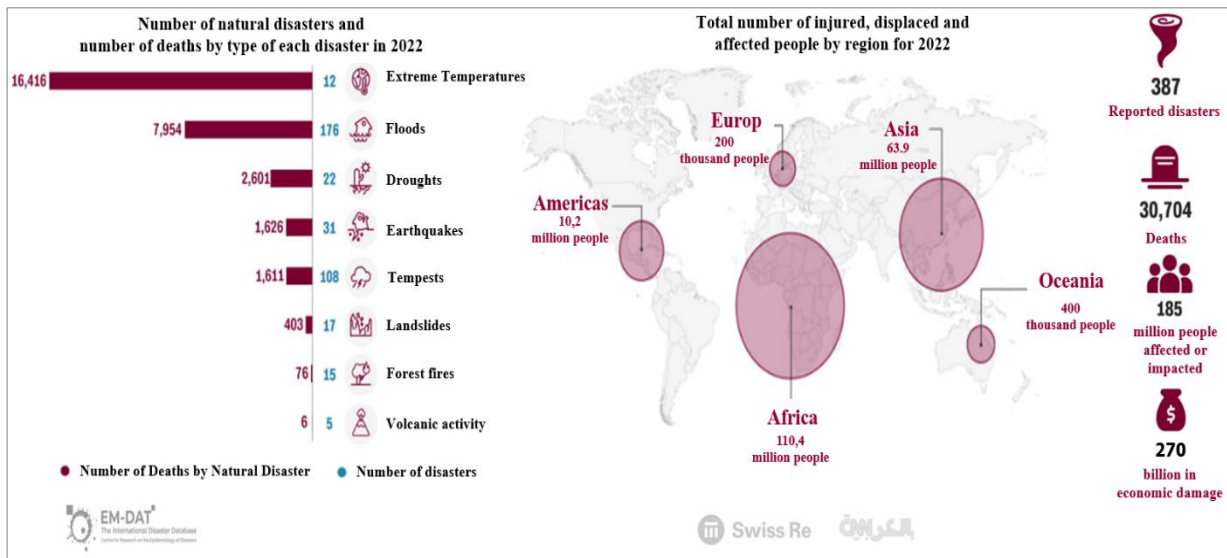
2.1- The reality of major disasters globally for the year 2022:

With the end of 2022, and the beginning of the end of the health crisis of the Covid-19 pandemic, which left a deep and profound impact and a harsh experience on the lives of people in their health and social well-being; the repercussions of which included the entire world without exception, as more than 6.5 million people died in less than three years, a number of deaths greater than any earthquake, drought, flood or hurricane, in addition to the negative and direct impact on the global economy and slowing its growth.

The year 2022 was characterised by the occurrence of major disasters, the majority of which were natural disasters of severe and varying severity, most of which were unprecedented, leaving huge losses and impacts around the world, primarily floods, droughts, hurricanes, earthquakes and others. Through the interactive chart and illustrative map ⁽⁰⁴⁾, according to the statistics of the International Disaster Database Centre EM-DAT, and according to the estimates of the reinsurance company Swiss Re Worldwide, we extract the following facts:

□ During the first three months of 2022, a staggering 187 high-impact disasters were recorded in 79 countries, resulting in more than 50 million people being directly affected, with losses exceeding \$40 billion, which is more than the usual levels. The total number of global and most severe disasters reached about 387 disasters monitored and reported for 2022, affecting approximately 185 million people; Africa, followed by Asia, was the continent most significantly affected by these repercussions, as well as resulting in more than 30,000 deaths; human losses caused by climate change were at the forefront due to record heat waves, droughts, floods and violent cyclones, while economic losses totalled \$270 billion ⁹.

Interactive chart and illustrative map (04): Global Major Disaster Chronology for the year 2022.



❖ A current view of the most impactful milestones and events of 2022 ¹⁰:

➤ **events caused by the consequences of climate change and its extremes due to the repercussions of global warming:**

(floods, storms, hurricanes, record heat, droughts, fires).

⇒ **Fallout from the floods :**

- 17 February 2022, massive floods sweep southeastern Brazil, the most affected area is Rio de Janeiro, causing severe damage and landslides that killed 272 people.

- During the period 'February-April 2022', Australia witnessed the worst disasters and an unprecedented situation due to a wave of floods that swept large areas of the east of the country, resulting in the death of 22 people, and extensive material damage to property and infrastructure, the size of losses and the cost of reconstruction and recovery exceeds the \$6.6 billion barrier.

- In April 2022, massive floods swept through South Africa in the southeastern regions, unprecedented for more than 60 years, killing 501 people, leaving about 40,000 people affected and causing an estimated 1.6 \$ billion in material losses.

- 22 May 2022, severe floods accompanied by thunderstorms caused landslides that killed more than 69 people in the northern regions of India.

- 29 May 2022, massive floods in the state of Pernambuco, on the east coast of Brazil, resulting in 116 fatalities and massive material losses.

- 11 June 2022, China declared a state of emergency in the southern and eastern provinces after torrential rains caused the level of rivers to rise, leading to the flooding of cities and neighbourhoods; serious landslides occurred; the situation required large-scale evacuation and relief operations, and the same scenario was repeated during August 2022, including massive

floods in the northwestern provinces of the country, where the rainy summer season in China witnesses floods every year, but climate change exacerbates the situation in terms of this natural phenomenon. Floods occur every year, but climate change is exacerbating the situation in terms of this natural phenomenon. The annual toll of the repercussions of the floods was heavy, resulting in the death of more than 50 victims, affecting more than 40 million people directly, in addition to significant material losses in property and facilities; significant damage to infrastructure and transport networks, as well as industrial and economic activity witnessed costly direct losses amounting to 88.81 billion yuan (approximately \$13.13 billion).

- June 2022, massive floods again hit northern India, causing landslides and widespread destruction, killing 137 people; the final toll after the May-August 2022 rainy season was a heavy toll of 1954 victims.

- During the period 'July-September 2022', Pakistan was swept by an unusually large seasonal flood wave, which flooded a third of the country's regions and caused major landslides, causing hundreds of deaths at the last count at the end of the rainy season in October, the losses exceeded 1697 victims and 12 thousand injuries, which directly affected more than 7.5 million affected people, resulting in a huge humanitarian crisis, this disaster came after a record heat wave and drought that covered the country for several weeks previously. Economic losses and damage to property and infrastructure were initially estimated at more than \$10 billion. For more information, [see the interactive chart and illustrative map \(05\)](#).

- August-September 2022, parts of Sudan experienced massive floods along the course of the Blue Nile and White Nile rivers, resulting in about 112 deaths, 136,000 people affected, and 20,000 homes damaged in 12 states, the disaster caused a humanitarian crisis, epidemics, and mass migration.

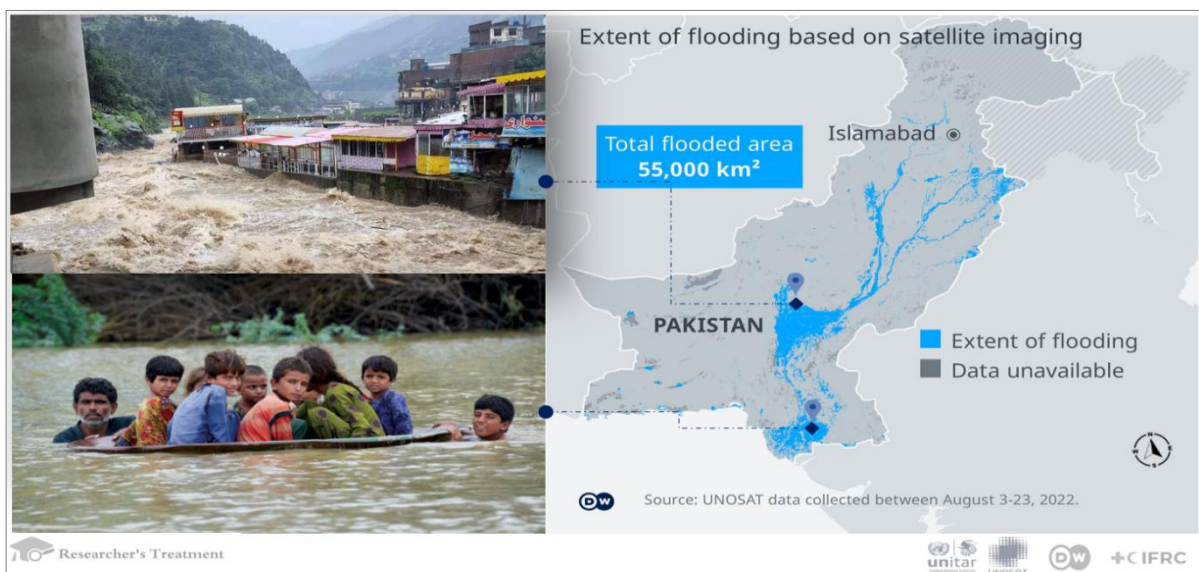
- 02 August 2022: Floods causing 37 deaths in eastern Kentucky and massive material losses.

- 16 August 2022, floods in Nigeria kill more than 500 people and cause widespread destruction in Jigawa North.

- 19 September 2022, Niger floods kill 159 people due to unusually heavy rains in the Sahel region.

[Interactive chart and illustrative map \(05\):](#)

Consequences of exceptional monsoon floods in Pakistan for the year 2022.



• The final toll of human losses due to floods caused by unusual and exceptional seasonal rainfall, avalanches, landslides and heat-induced snowmelt in Asian countries has reached 4,463 victims. The countries involved are Afghanistan, Pakistan, India, Nepal, Bangladesh and Sri Lanka.

⇒ **Consequences of severe storms and tornadoes:**

• 11 February 2022, Tropical Cyclone ‘Patsirai’ hit the countries of far south-eastern Africa, with the majority of the impact affecting Madagascar, resulting in a heavy death toll of 121 deaths and widespread destruction.

• 14 April 2022, Tropical Storm ‘Megi’ hit Southeast Asia, the most affected country being the Philippines, with 289 fatalities and significant material damage.

• 10 May 2022, Typhoon Nol, which hit Southeast Asia, most affected by the Philippines, killing 160 people and causing \$4.5 billion in damage.

• 21 May 2022, a tornado hits the US state of Michigan, killing 44 people and causing extensive material damage.

• 01 October 2022, a powerful Category 4 hurricane ‘Ian’ hit parts of Central America and the southeastern United States, the deadliest hurricane recorded in modern American history, accompanied by wind gusts of more than 220 km/h, massive flooding due to massive rainfall; the water level reached 4 metres in some areas, leaving 150 people missing. It left a terrifying picture of widespread destruction of property, vital facilities and infrastructure and significant damage to various networks, the majority of the impact and its consequences included the governorates of ‘Florida, Georgia, North and South Carolina’, while the economic cost of recovery and reconstruction exceeds \$95 billion and direct compensation reaches \$55 billion.

For more information, see the interactive chart and illustrative map (06).

• 31 October 2022, a violent tropical storm ‘Nalgene’ hits parts of Southeast Asia, with the Philippines most affected, killing 98 people and completely destroying villages on the southern island of Mindanao.

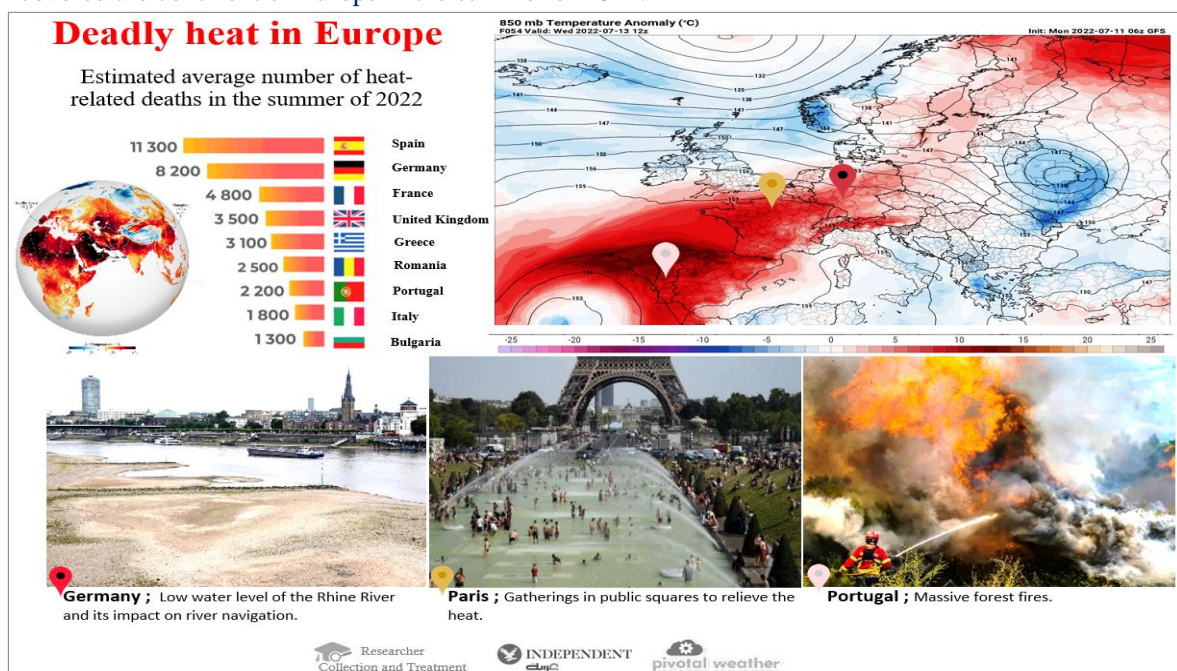
Interactive chart and illustrative moon map (06): Consequences of the devastating Hurricane Ian in 2022.



⇒ **The repercussions of heat waves and droughts:**

- May-August 2022; Among the worst droughts and record heat waves sweeping the countries of the Mediterranean basin, especially the continent of Europe witnessed a drought not seen for 500 years, unprecedented low water levels in rivers and lakes, and unusual temperatures that led to mass deaths. [See the interactive chart and illustrative map \(07\).](#)
- 12 August 2022, Britain declares a state of drought in large areas of England due to the lack of rainfall and the record high heat wave.
- The repercussions of consecutive years of droughts since 2014 have caused a humanitarian crisis, food insecurity and mass migration in the Horn of Africa, Sahel, Chad and Kenya.

Interactive chart and illustrative map (07): The repercussions of the record and historic heat wave that covered the continent of Europe in the summer of 2022.



⇒ **Fallout from the wildfires:**

- In 2022, the world witnessed a wave of massive fires in many countries of the world, as an inevitable result of the repercussions of global warming and climate change, which led to a succession of dire consequences, as Mediterranean countries witnessed record temperatures that led to the outbreak of huge fires that consumed thousands of hectares of Hectares of forests, significant material damage to property, huge operations to evacuate civilians, and heavy loss of life, such as what happened in Algeria as the heaviest toll, estimated at 43 victims, and other countries in the region such as Spain, Portugal, Morocco, Hungary, Czech Republic, France, Greece, Portugal, and Turkey. Catastrophic fires also broke out in America, Canada, Argentina and South Korea.

➤ **Events caused by the consequences of earthquakes:**

• 22 June 2022, a violent earthquake struck Afghanistan 'Paktika province' and parts of the eastern border with Pakistan with an intensity on the Richter scale of 6.2, depth 10 km and an extension of 500 km; it is considered the most severe earthquake in two decades in the region, leaving 1211 dead and heavy material damage, aftershocks caused huge rock collapses; which obliterated the features of remote mountain villages, as well as the consequences of the disaster were a real humanitarian crisis at all levels and the suffering of the affected population. A factor that contributed to the high human losses, due to the weakness and limited rescue and relief operations and the lack of means to deliver aid due to the collapse of the infrastructure; and the complexities of the location of the earthquake in rugged areas in terms of terrain, the economic cost of recovery and reconstruction requires harnessing extensive efforts and international solidarity by providing about 7.9 billion dollars. 9 billion dollars. [See interactive chart and illustrative map \(08\).](#)

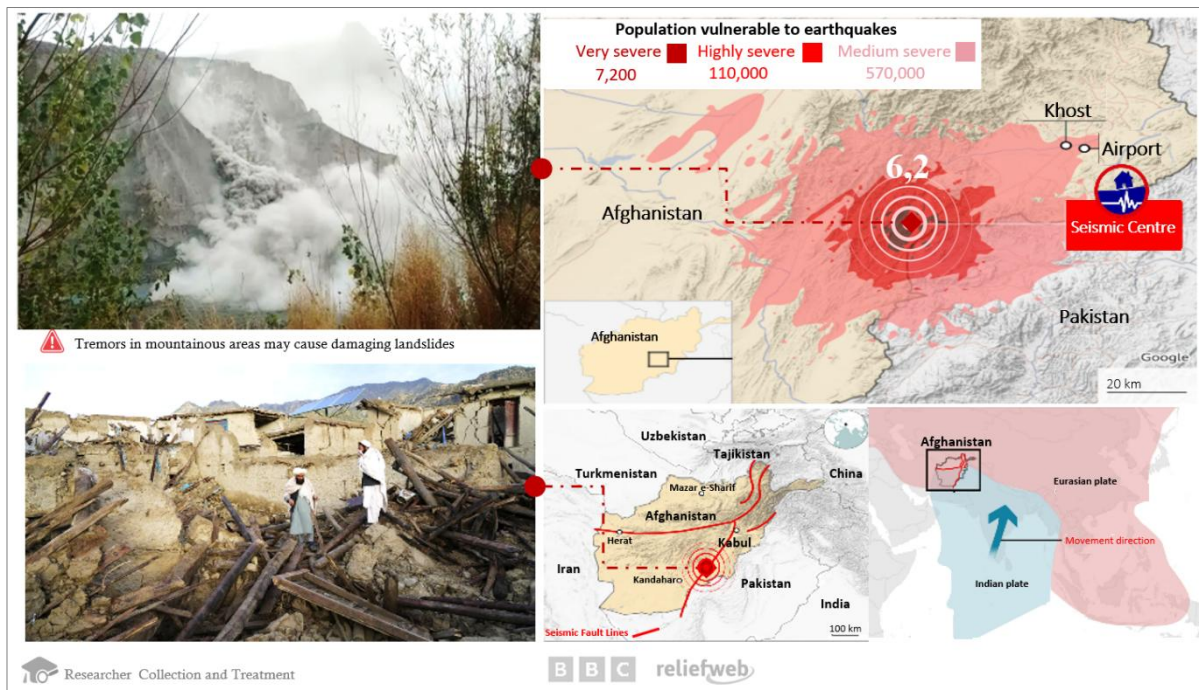
• July 2022, a seismic wave of several earthquakes hits southern Iran, the strongest of which reached 6.3 on the Richter scale, in Hormozgan province, leaving 5 dead and significant damage to mountain villages.

• 05 September 2022, an earthquake measuring 6.8 on the Richter scale hits Luding, Sichuan Province, southwest China, killing 65 people and causing significant material damage.

• 31 November 2022, a strong earthquake measuring 5.6 on the Richter scale strikes West Java, Indonesia, leaving a heavy toll of 268 people dead, thousands injured, and extensive damage to various networks, infrastructure, and property.

[Interactive chart and illustrative map \(08\):](#)

Consequences of the devastating earthquake that struck eastern Afghanistan in 2022.





➤ **The repercussions of deadly epidemics:**

- During the year 2022, many critical cases, deaths and infections were recorded with many dangerous and deadly epidemics such as cholera, Ebola and measles, with the most affected countries in Africa in particular, the Democratic Republic of Congo ‘1294 deaths from measles and 9137 cases of cholera’, Zimbabwe ‘698 deaths, 6444 cases of measles and cholera’, Uganda ‘164 deaths from Ebola and measles’, Malawi ‘67 deaths and 1736 cases of cholera and measles’, Uganda ‘164 deaths from Ebola and measles’. Cholera cases and deaths have also been reported in Cameroon, South Africa, Ethiopia, Syria, Lebanon and Haiti.

2-2- Chronology of the reality of major disasters globally for the year 2023:

During the period of preparing this research paper and collecting the scientific material that enriches its content, we came across the occurrence of remarkable and unusual natural incidents and disasters during the course of the year 2023 AD, according to the global early warning and coordination system for disasters and monitoring sudden changes, the most important four incidents that resulted in heavy human losses and material, social, and economic damage were recorded, the first of which is the Eastern Mediterranean earthquake in Turkey and Syria in February 2023. The first is the Eastern Mediterranean earthquake in Turkey and Syria in February 2023, the second is the record heat wave that affected many parts of the world in the summer of 2023, the third is the earthquake in the Hawz region of Morocco in September 2023, and finally the Mediterranean storm that hit the Libyan coast in September 2023. As a reminder, there are other disasters that affected parts of the world; violent cyclones that caused destruction in Madagascar, New Zealand, floods and slides in Brazil, and huge fires in the Mediterranean countries; Chile... etc.



❖ **A current view of the most impactful milestones and events of 2023 :**

⇒ **Earthquake in southeastern Turkey and northwestern Syria; on 06 February 2023 ¹¹:**

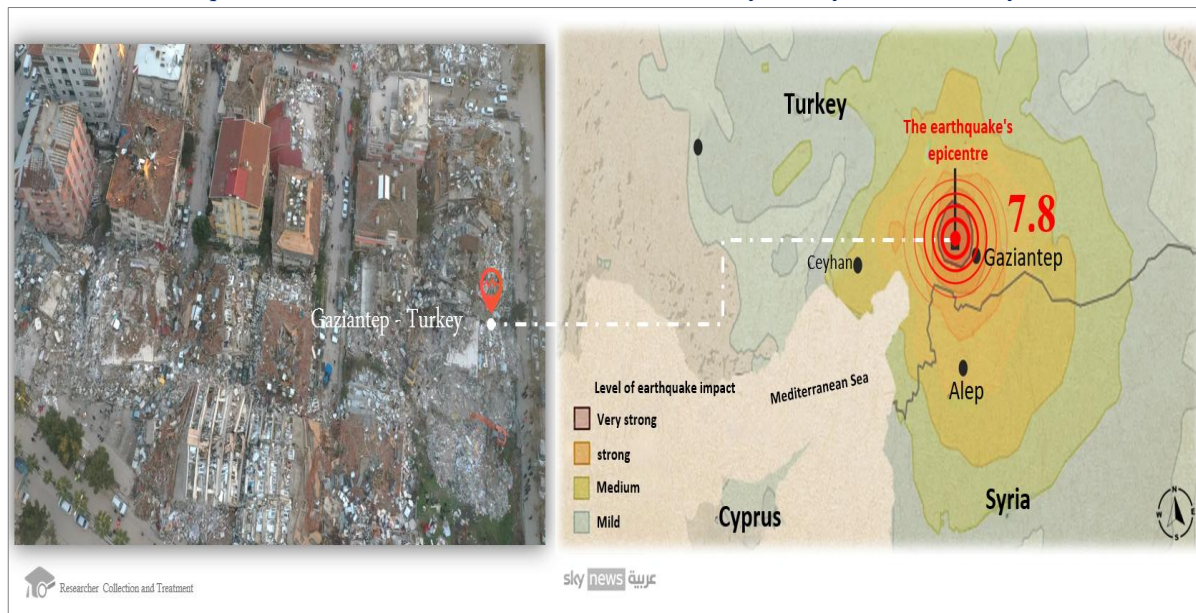
According to the United States Geological Survey (USGS), at 04:17 am local time, a violent earthquake was recorded with a magnitude of 7.80 on the Richter scale with a duration of 75 seconds, and its epicentre was located in the city of ‘Gaziantep’, the extent of the earthquake reached ten Turkish provinces and most of the border provinces in northern Syria, in addition to strong and successive aftershocks during the same period with a maximum of 7.50 on the Richter scale, centred on the city of ‘Kahraman Maraş’. [See interactive diagram and illustrative map \(09\)](#).

As a result of this violent earthquake, 50,132 people were killed (Turkey 44,218 killed, Syria 5914 killed), the number of injuries exceeded 120,000, and about 20 million people were directly affected, and widespread damage was recorded, including the almost total destruction of many Turkish and Syrian cities, and the severe impact on vital infrastructure. In addition to the difficult terrain of the disaster area and the concurrent winter climatic factors that hindered the progress of the response efforts and operations of the relief and rescue teams and the delivery of aid, which required greater solidarity and solidarity through international

cooperation to overcome the crisis in both Turkey and Syria. The economic and financial consequences of the disaster and recovery are estimated by the World Bank at \$84 billion.

Interactive chart and explanatory map (09):

The violent earthquake that hit the Eastern Mediterranean - Turkey and Syria - 6 February 2023.



⇒ Extreme heat wave or the so-called heat dome fallout July 2023:

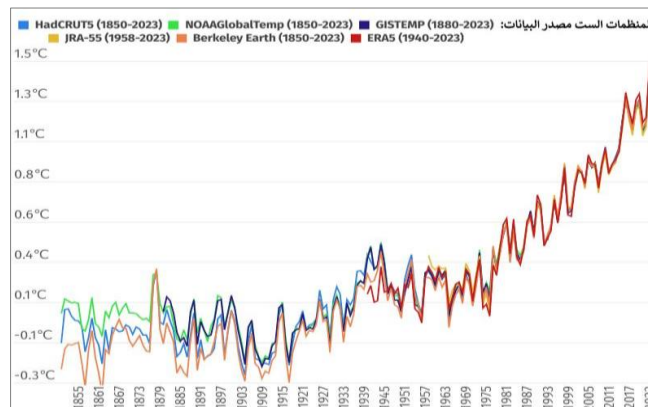
The summer of 2023 witnessed an unprecedented heat wave, record and historical temperature records were set in many regions across the world, ‘the Mediterranean Basin, Southern Europe, North America, the Atlantic Ocean, and especially the Middle East and North Africa, which witnessed the highest temperatures in the world’, as climate experts revealed that the main reason behind these climatic phenomena is what is known as heat domes that know an increase in the intensity of their activity, frequency and duration.

Exceptional records have been set for the summer of 2023, which are as follows ¹² :

- June and July 2023 were the hottest on record, with an average temperature of 1.47°C, the highest since 1800. July was also the hottest month on record, having surpassed the temperature recorded in the same month in 2019. Recording the hottest day in history, 6 July 2023 broke the record for the highest temperature, surpassing what was recorded in the summer of 2016. According to figures from monitoring stations, there are areas around the world that are recording temperatures at this level for the first time ever and simultaneously for clarity, see interactive chart (10).

Illustrative interactive chart (10):

Global average temperature rise °C - 1850-2023.



Source: World Meteorological Organisation. Periodic Report on the Status of Climate Change 2023. <https://wmo.int/ar/news/media-centre/2023>

- Examples of average temperatures reached in regions across the world's continents:
 - Europe: Southern countries '45° C' such as Greece, Italy, Spain, Portugal. Centre countries '42° C' such as France, Germany, Switzerland, Austria. Nordic countries '°C38' such as the United Kingdom, the Netherlands, Belgium and Denmark.
 - North America: USA '54.5° C', Canada '46° C'.
 - Middle East: Levant countries '51.4°C' such as Iraq, Syria, Lebanon, Jordan, Palestine and Egypt. Arabian Peninsula countries '50.8° C' such as Saudi Arabia, Qatar, Kuwait, Bahrain, and the UAE.
 - North Africa: Maghreb countries with a record temperature of '50° C'.
- The highest temperature of the oceans and seas ever recorded, during the summer of 2023, the average daily marine temperature reached 20.96°C, surpassing the record of 2016. This has repercussions and fears that warn during the course of the year; the occurrence of violent extreme waves of storms and hurricanes, especially in the Mediterranean Basin and the Atlantic Ocean.
- The unusual heat wave has caused unprecedented drought, record erosion of the ice layer in the Arctic and Antarctic, a wave of massive fires has swept through many countries concerned with the phenomenon; a direct impact on the yield of agricultural crops and a terrible decline in productivity.
 - **What is a thermal dome:** This term refers to an atmospheric climatic phenomenon that arises as a result of the concentration and entrapment of a mass of dry and hot air, and its stability in the atmosphere of some regions for a relatively long period of time; it may reach days and even weeks, with exposure to high atmospheric pressure factors; forming a dome-like barrier or cover, which retains heat on the surface of the earth and prevents it from escaping towards the upper atmosphere, in other words, 'a dynamic process called heating under pressure'; this cover makes the hot and cold air currents In other words, 'a dynamic process called heating under pressure'; this cover makes the hot and cold air currents under its grip and prevents them from moving up and down, while at the same time the sun's rays work to further heat that area. ... ¹³. For further explanation see interactive diagram (11)
 - **Causes and consequences of the heat dome** ¹⁴:

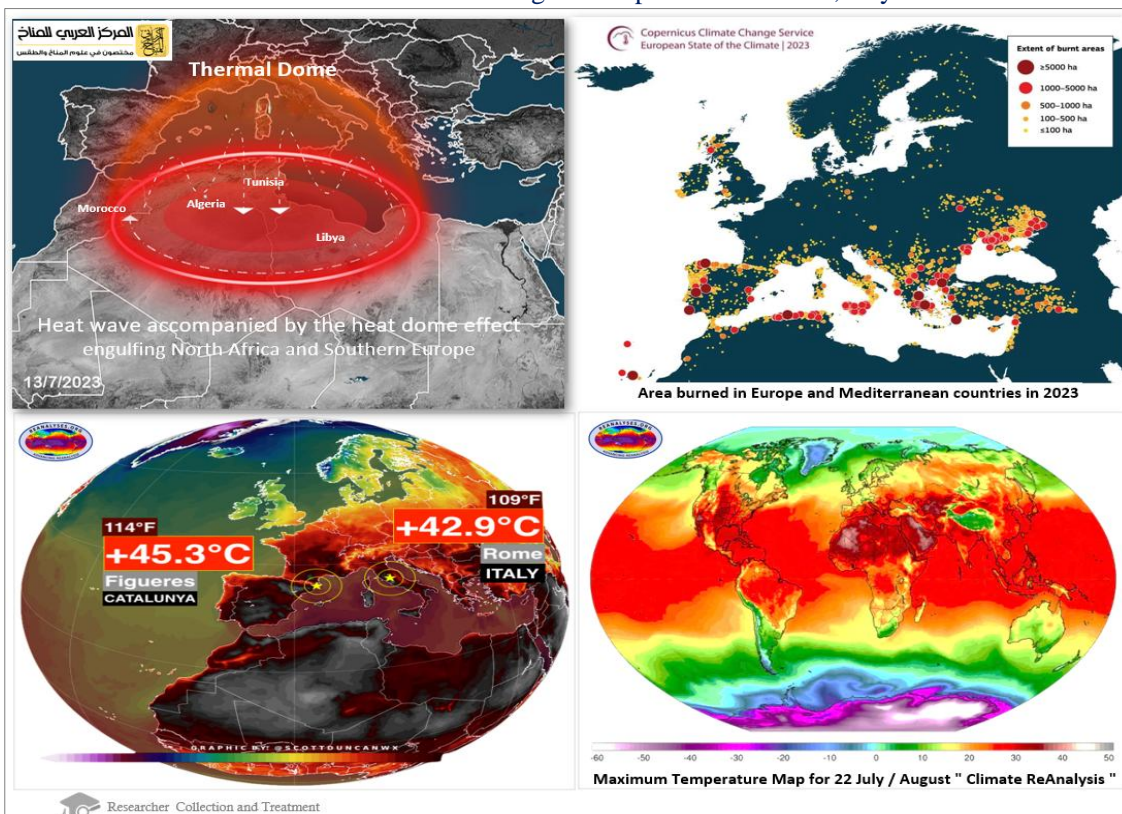
The heat dome is originally a natural phenomenon, but in recent years it has become more frequent, of unusual intensity, of wider scope, of longer duration, and of more serious repercussions. The objective and fundamental reason is due to the exacerbation of the global warming phenomenon and its severe repercussions, which practically directly affects the balance of the earth's climate by negatively interfering with the factors of origin or the shape of the formations of climate phenomena and their various patterns, which leads to mutations, imbalances and a significant increase in the intensity or prolongation of their activity, especially when they coincide with each other, such as what happened when the thermal dome intersects and interacts with the activity of phenomena such as El Niño and El Foehn wind.
 - **The phenomenon of foehn:** Originally a natural cyclical climatic feature that arises in high altitude areas and mountain belts when strong winds and air currents lead to a sudden change in temperatures; it decreases when ascending, depending on the state of the upper atmosphere and the season; and rises when descending to be called the Fohne winds, during the same period this phenomenon coincided with the emergence of the thermal dome factors, as it dominated the Mediterranean regions, especially North Africa and its mountain peaks. In the Mediterranean regions, especially North Africa and its mountain peaks, the spread of air

currents and the blowing of strong hot and dry winds coming from the southern Sahara, which contributed significantly to the rise in temperatures and atmospheric pressure after their descent as a result of friction and interaction with the causes of the thermal dome and their entrapment, the temperature related to this characteristic can rise by 10°C - 20°C within hours. The same thing happened in the Alpine peaks of southern Europe and North America.

- **The phenomenon El Niño:** A cyclical natural climatic feature, which during the last decade has gained unusual intensity and frequency to become the highest recorded waves, it has a very important impact on weather characteristics, wind season systems, temperatures and precipitation rates in different parts of the world; to include parts of the Pacific Ocean, the Americas, South Asia and Africa, El Niño has two successive phases, the cold one is called 'La Niña' less frequently, and the warm one is called 'El Niño'. Frequently occurring, which is the name commonly used to denote it, it works to fluctuate the surface water temperatures of the Pacific Ocean on a large scale, this leads to an increase in water surface temperatures across the oceans, which then leads to a rise in the temperature of the atmosphere above it, the average difference is between 3 to 5 degrees Celsius, the period of its activity lasts from nine months to two years, and these changes occur at regular intervals once between 3 to 7 years, usually. However, due to recent and ongoing climate change, the El Niño phenomenon has become characterised by a greater frequency and a wider range at its peak, a longer period of activity and a stronger action during its cycle. The warming of ocean waters has resulted in very serious repercussions, manifested in changes in the rates and nature of the seasons and the occurrence of violent extreme events (droughts, record heat waves, flash floods, hurricanes and violent tropical storms, disturbances to marine life).

Interactive chart and illustrative maps (11):

Thermal dome effects on the Mediterranean region and parts of the world, July 2023



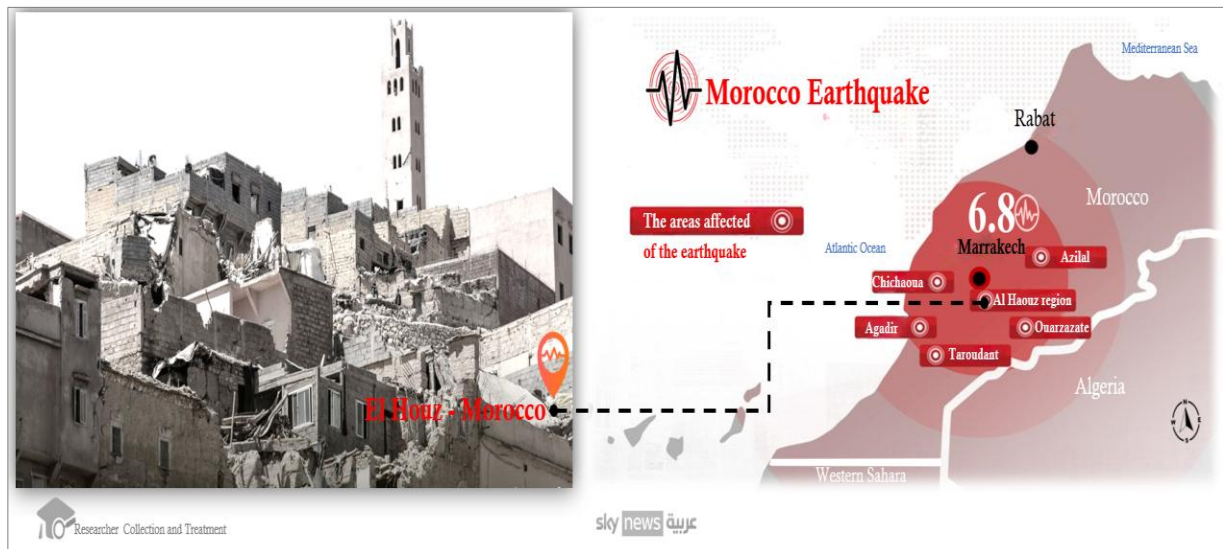
⇒ **Earthquake in the Hawz region, Marrakech-Asfi region, in the far south of Morocco, on 8 September 2023:**

According to the Euro-Mediterranean Seismological Observatory, a violent earthquake with a magnitude of 6.80 on the Richter scale struck the Al-Houz region in the Marrakech-Asfi region in the far south of Morocco on 08 September 2023 AD, at 11:23 local time; its duration was 25 seconds, and its epicentre was located in the 'Egil' community, at a depth of 18.5 km, due to the movement of an inclined fault and its slip under the High Atlas mountain range; due to the pressure and tectonic movement of the continental plates, and violent aftershocks were recorded, the strongest of which reached 4.8 on the Richter scale. immediately after 20 minutes, the main tremor reached the four corners; it was felt by residents of the country's northern cities, border areas adjacent to neighbouring countries in Spain and Portugal, south to Western Sahara, far east with Algeria, west to the Canary Islands in the Atlantic Ocean ¹⁵.

According to the axioms of geology, the border between the African and Eurasian plates is the most seismic activity and intensity, but the Al Hawz earthquake is a real surprise and a rare case, which inevitably requires a careful review of all calculations and research, and everything related to expectations and theories in this regard, as this disaster created an exception. The phenomenon was characterised by the breaking of the general rule in terms of the location and intensity of the tremor far from the border between the two plates by about 500 km; within the depth of the African continental plate, in living memory according to seismologists, Morocco has never witnessed such a violent earthquake, the intensity of which was estimated to be equivalent to 25 nuclear bombs ¹⁶. See interactive chart and illustrative map (12).

Interactive chart and explanatory map (12):

The violent earthquake that struck the Al-Houz region in the far south of Morocco on 08 September 2023.



According to the statistics of the Moroccan Civil Defence Authority and local official channels, about 2,960 deaths and 5674 injured were recorded, and the number of those directly affected reached about 300,000 people, and indirectly affected about 2.5 million people. As for the intervention, relief and aid delivery efforts, they were complicated and very difficult due to the rugged terrain of the area covered by the earthquakes; leaving widespread destruction of mountain towns and rockfalls that obliterated the features of villages (2939 villages affected by destruction, collapse and damage to about 60,000 dwellings), damage to infrastructure and

closure of roads and paths. Dealing with the conditions resulting from the disaster required finding quick alternatives for transporting rescue teams, delivering aid, and transporting the wounded using helicopters, especially in the affected and isolated areas. The quality of the buildings also added to the complexity of the crisis; they are built of red clay, especially in historical and tourist areas. The economic cost of the Al Haouz earthquake, according to World Bank figures, may exceed \$12 billion for reconstruction, recovery and return to normal life, which is equivalent to about eight per cent of Morocco's GDP¹⁷.

In the face of this new situation of the inevitability of major disasters with a more severe characteristic, it requires from now on the urgency of adopting specific precautionary and preventive measures and special methods of confrontation and intervention, given the difficulty of building probabilities or predictions regarding this type of earthquakes, especially within the depth of the continental plates in the first place.

⇒ **Mediterranean Storm Daniel and its catastrophic repercussions on the Libyan coasts, on: 9 September 2023.**

The persistence of climate change has resulted in a bleak global landscape with severe repercussions. The year 2023 was marked by the occurrence of extreme and unprecedented climatic phenomena, including major floods, violent tropical cyclones, severe droughts, severe heat waves and associated wildfires. In the first six months of 2023, rare climatic events were recorded, such as Tropical Cyclone Freddy, which formed between February and March; it was considered one of the longest-lived tropical cyclones in the world, and caused strong storms and floods, resulting in major impacts on the countries located in the extreme southeast of the African continent, as well as Tropical Cyclone Moka, which formed in May 2023, which was the most intense cyclone ever observed in the Bay of Bengal. It was followed by a record heat wave; historical during the summer period of the same year 'and was called the term "heat dome" that included many parts of the world, these special new climatic events, warned by climate experts; as they are considered indicators that predict the future and warn of the occurrence of a series of disturbances and other events whose source of origin is as a supplement associated with previous phenomena, as a result of their interaction or intersection with each other, or an inevitable extension of the symptoms of climate change within the course of the year and the coming years, evidenced by the disaster of the Libyan east coast "Derna city tragedy"¹⁸.

Happened on: 12 September 2023, a complex and severe disaster caused by the Mediterranean storm 'Daniel', which hit the northeastern Libyan coast, the features of its formation began on 4 September, peaking from 9 to 12 September 2023, which ended with the incident in and around the city of Derna. Storm Daniel originated in the central Mediterranean; then it developed into the size of a Mediterranean hurricane 'sub-tropical category I' on 10 September, affecting the coastal areas overlooking the Ionian and Aegean seas of Italy, Greece and Turkey, then penetrated towards the Libyan and Egyptian coasts, the speed of the hurricane exceeded 120 km / s. The total amount of precipitation is a rare case; 700 mm within hours, which is equivalent to what falls within 18 months in the central Mediterranean countries¹⁹.

Characterising the situation of the Libyan city of Derna requires familiarity with it before and after the disaster materialised; where geography overcame all possibilities contributing to the enormity of the tragedy. the Derna Valley passes through its centre and divides it into two parts, east and west, with a length of more than 60 km and a catchment area of about 570 km². There are two dams on the course of the valley, the main dam, Al Mansour Dam, with a storage

capacity of 22.5 million cubic metres, 13 km from the residential communities of Derna, and the secondary dam, Al Bilad Dam, with a storage capacity of 1.5 million cubic metres, 1.2 km from the residential communities. the purpose of these two dams is to protect the city from the flooding of the valley stream and to meet the needs of drinking water and agriculture. it was previously warned that the two dams pose a risk to the city of Derna due to the nature of the valley course and its surrounding terrain, meaning the majority of the valley course is located on a relatively high plateau, which is a contributing factor in increasing the severity of the impact of the risk in the event of damage to the two dams ²⁰.

After the cyclone reached the eastern Libyan coasts, it was accompanied by heavy rainfall of up to 200 mm on the night of 12 September in just a few hours. this massive rainfall accumulation led to the accumulation of 115 million cubic metres of water in the Derna basin, which put terrible pressure on the main dam and the secondary water barrier and exceeded their carrying capacity, which led to their collapse. this was a decisive factor in maximising the force of the flood across the valley and increasing the destructive capacity; the height of the water reached 7 metres. this sudden collapse resulted in a high flow force of the torrent, which dragged with it huge quantities of silt and stones that obliterated the features of the city centre, washed away buildings, facilities and entire residential complexes of several floors; dragging them towards the sea, causing a tragedy and a severe human, environmental and health disaster, human losses exceeding 6000 deaths, hundreds of missing persons, 40 thousand displaced from Derna, and serious damage to vital infrastructure, various networks, facilities and properties, more than 10 km² affected area ²¹. For a more detailed explanation, see the interactive chart and illustrative map (13).

The face of the city was changed by the effects of the storm, according to experts The damage was more severe due to key factors related to the region's worst flooding in a century; ²²:

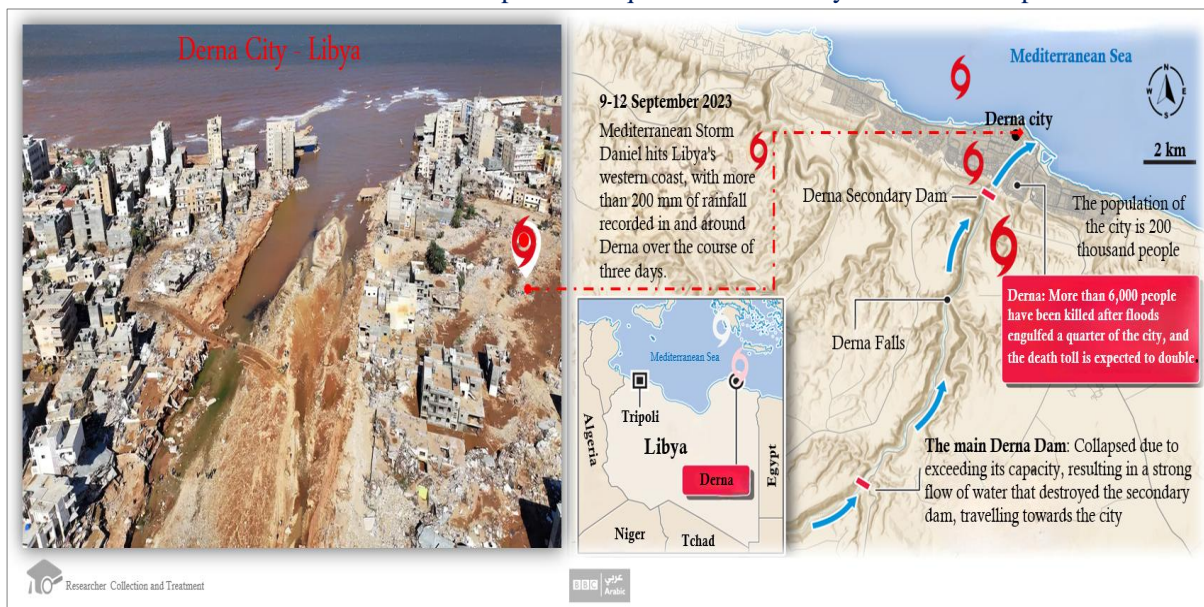
- Extreme weather combined with a fragile infrastructure and geographical location.
- The record amount of rainfall in less than twenty-four hours.
- The affected neighbourhoods in the city centre contributed to its low-lying geographical nature adjacent to the valley over a wide area.
- Lack of maintenance, follow-up and intervention to support and structure the two dams.
- The delay recorded by the local authorities to respond and intervene before the disaster occurred; especially what was predicted by the warning bulletins, which warned of the magnitude of the storm Daniel and its development into a devastating hurricane, and its catastrophic consequences and massive floods in Greece before reaching the Libyan coasts.

The disaster on Libya's eastern coast has developed into a humanitarian crisis, requiring the declaration of a state of emergency and widespread international solidarity to overcome its effects. The following areas were declared disaster areas: Al Abyar, Barsis, Tawkara, Al Marj, Taknis, Shehat, Al Baida, Sousse, and the most affected and difficult situation was in Derna. according to a report by the United Nations and the International Relief Organisation, the number of people directly affected by the storm exceeded 880,000 people, and indirectly about 1.5 million people, and the number of displaced people exceeded 50,000 people. almost total damage to the infrastructure and road network, collapse of the health and social welfare system, weakness and difficulty in organising rescue and relief operations and recovering bodies under the rubble, most of which were pulled by the torrent towards the sea, threatening an epidemic situation and the spread of infectious diseases in the affected areas due to the decomposition of bodies, contamination of drinking water sources, destruction of the sewage network and waste carried by torrents, the cost of reconstruction and recovery from the consequences of the disaster is estimated to exceed \$2 billion ²³.

Experts have agreed that the Mediterranean storm 'Daniel' is a rare phenomenon and a symptom of global climate change, due to the warming of the Mediterranean due to the effects of global warming and the unprecedented rise in the concentrations of the gases that cause it. 'Daniel' is a climate mutation that deserves to be studied to build similar scenarios in order to optimally prepare by simulating its conditions and repercussions, and projections for future periods in a new era under the weight of climate change. The current situation imposes itself to adapt to these developments and take them into account by adopting and improving early warning systems as a proactive and preventive measure to mitigate undesirable effects.

Interactive chart and illustrative map (13):

Mediterranean Storm Daniel and its catastrophic consequences on the Libyan coasts - 9 September 2023



❖ The last two years, 2022/2023, have witnessed unfortunate events at the global level due to the consequences of major disasters, especially natural ones. Despite the progress made in the field of predictions and collective and local response attempts, they were indeed very painful in their course and harsh in their outcome, but they surprised humanity and shook its ability to absorb them within a relatively short time frame. Disasters caused by earthquakes have been more deadly, causing massive damage to facilities, property and infrastructure, while crises caused by climate change have been more extreme, frequent, severe and devastating, breaking unprecedented records such as severe droughts, record high temperatures in areas never seen before, causing huge fires, as well as violent hurricanes and flooding. As well as the occurrence of violent hurricanes and massive floods in season or even out of season. These are all experiences that will remain in memory, requiring urgent and effective solutions, exemplary cooperation, and more serious mechanisms for adaptation and response, at least to de-escalate and minimise impacts and losses.

3-The effects of major disasters on the economy:

Disasters - whether caused by natural or man-made hazards - cause loss of life and livelihoods. Urgent spending needs for disaster response and reconstruction efforts are

exacerbated by weak economic conditions, damaged infrastructure, destroyed businesses, diminished tax revenues, and high levels of poverty ²⁴.

It is inevitable that the economic sector is affected by the aftermath of major disasters, as the greater the fragility factors, the higher the price and the greater the impact - a reciprocal relationship - in which the economy incurs severe damage to the country's capabilities and depletes its reserves, in parallel the development movement is disrupted "slowing local growth" and the decline of various activities in terms of attracting investments and lack of productive capacity "profitability and competitiveness", starting from huge costs and deductions from public budgets; which are allocated to mobilise all necessary resources, material, financial, structural, strategic and logistical reserves, and the preparation of multifaceted prevention plans; all of which are devoted to the mobilisation of all necessary resources, material, financial, structural, strategic and logistic reserves. the preparation of multifaceted prevention plans; and everything related to the control of preparedness, confrontation and intervention programmes; whose main objective is to provide all the necessary conditions to ensure a more effective response and minimize the negative effects if the risk materializes, as well as to contribute to correcting the weaknesses recorded to avoid the worst ²⁵.

The economy also bears the burden of recovering from the consequences of the disasters and their heavy losses, making it in a state of confusion or shock in the face of this sudden situation, by increasing government spending directly, unexpectedly, in an urgent mechanism that cannot be delayed, by supporting sensitive social sectors, health and supply lines, compensation and relief costs, shelter, housing, subsistence, transport and communications, recovery and reconstruction, and rehabilitation of damaged infrastructures and facilities ²⁶.

According to the latest data from global reinsurers Munich Re and Swiss Re, losses from natural disasters in 2022 were estimated at \$270 USD billion globally, with Hurricane Ian causing the majority of these losses and affecting large parts of Central and North America. Losses in the first half of 2023 averaged approximately \$194bn. In estimates by the World Bank, the financial costs allocated both before and after major disasters are very high and rising in relation to the gross domestic product of countries, the financial losses over the past 30 years have reached nearly 3.5 trillion dollars, and are increasing annually; pushing about 26 million people into poverty every year, where most of the costs of these damages by 75% are due to the repercussions of climate change and the resulting extremist and violent phenomena ²⁷. [See the interactive chart below \(14\)](#).

It is notable that developing countries are the most exposed to major disasters and the most affected in terms of human and economic losses compared to developed countries. The depth of the implications of these results is due to the geographical characteristics of developing countries and their location in areas most exposed to various major hazards. the data also indicate that the tension and concentration of these events is constantly increasing, with an average rate of a major disaster every two years, coupled with a set of conditions and a fragile climate for these countries, the weakness and lack of seriousness or effectiveness of response and mitigation mechanisms, as well as situations that increased the complexity of the situation due to geopolitical, economic and social crises ... ²⁸.

In the context of the economic impact of major disasters, we ask two fundamental questions, the first of which is: "Can major risk reduction and disaster management be cost-effective?" This question can be answered by the international bodies concerned with the issue:

- According to the International Bank for Reconstruction and Development (IBRD), it is difficult to estimate the cost of managing risks and preventing disasters due to variables and developments that lead to the instability of prevention and response measures, and there is no internationally agreed method to determine a cost or assign a value to human life.

- The United States Geological Survey (USGS) believes that effective management of major risks can deliver enormous benefits and could have reduced global economic losses from disasters in 2016, resulting in recovery costs of more than \$290bn. this could have been reduced by spending about \$40 billion by taking concrete and serious measures for prevention and response and strengthening warning and forecasting mechanisms, all of which have the benefit of dimension and continuity.

- According to the World Meteorological Organisation (WMO), every \$1 invested in prevention saves \$4 to \$7 in post-disaster recovery.

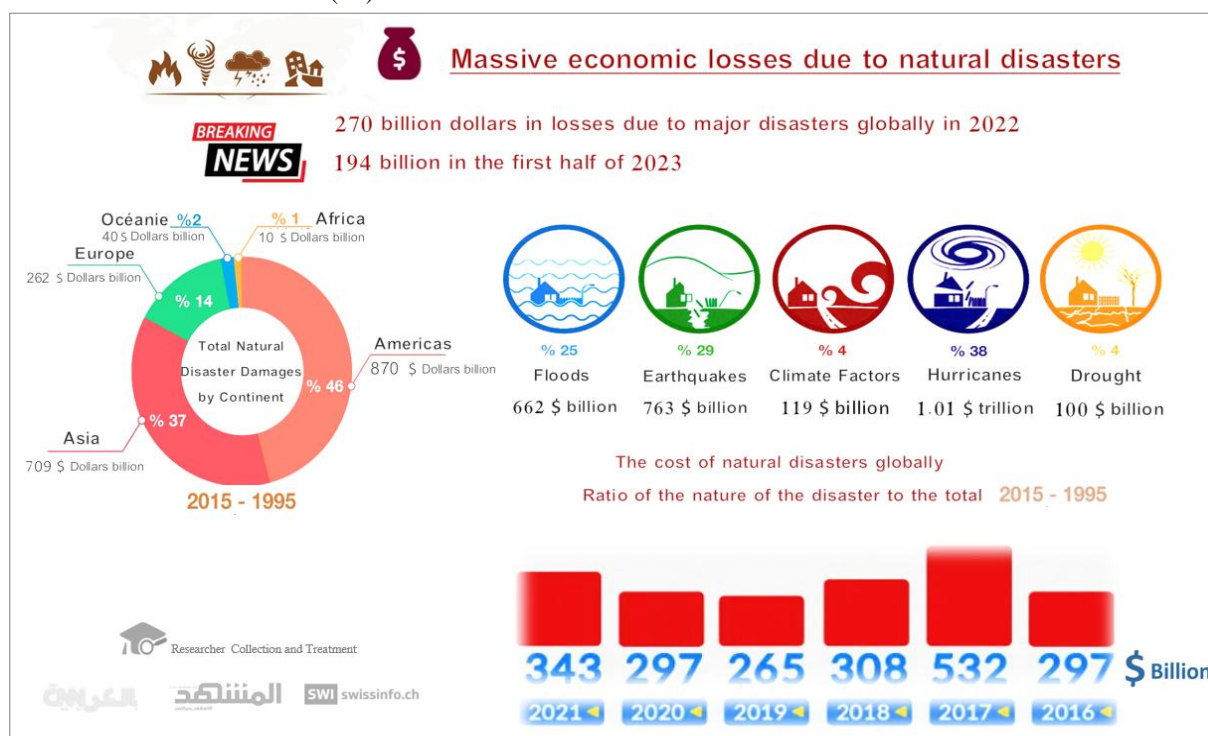
The second query posed: "Do you have to be a rich country to implement DRR policies?", it is inevitable to take concrete actions to turn the situation around, overcome difficulties and minimise shortcomings.

- The adoption of a policy to reduce and manage major risks can be considered more of an investment than a cost. This particular investment is a feasible and urgent priority that creates a kind of assurance and security, which reflects a positive climate on the economic, social and developmental structure of the country.

- There are simple and inexpensive measures that have an effective and very important role. participatory, awareness-raising and entrepreneurial culture, which is integrated into educational programmes, media guidance and sensitisation, instills positive behaviour in society. this contributes to mitigating and cooperating in confronting various major risks and their repercussions.

- Control, strict application of preventive measures, respect for construction conditions and tools, and quality in construction contribute to reducing the cost by a very large percentage ²⁹.

Illustrative interactive chart (14):



❖ **Results:**

The impact of recorded disasters is increasing across the world, both in terms of the number of events occurring annually and in terms of losses, including deaths, injuries and damage, due to the following reasons:

□ There are many variables related to disaster mitigation policies, especially in developing countries, and their relationship to their potential and stability.

□ The low economic capacity and technology available to implement prediction, prevention, response and mitigation policies.

□ The difficulty of making general provisions to address the effects of major disasters due to the different criteria related to the severity, severity and scope of the disaster, and the developments that occur; and their transformation into complex and complex disasters.

□ Demographic growth, population migration towards urban areas, which puts pressure on the city system and challenges local officials to organise and manage the space and control the population distribution, creating disparities and spatial complexities, factors that make the city more fragile and vulnerable, thus increasing the number of individuals exposed to risks.

□ The changes in the natural components and the relationship between them, due to the high rates of consumption of natural resources, due to their excessive exploitation to meet the needs of human activity, have very serious consequences leading to a decline in the environmental level and the balance of its patterns, which will increase the occurrence of extreme, complex and more severe phenomena and disasters on a larger scale.

□ The effects of global warming on the global climate system and through it the ecosystems and their balances are affected, which have serious repercussions on social, urban, economic and agricultural aspects.

□ The misuse and occupation of land and the inadequate application of standard criteria for the planning and qualitative design of facilities.

↳ **Disclaimer:** With regard to the language of numbers, data, images and statistics cited in this study, which have a deep meaning, highlighting the enormity of the consequences and effects of major disasters. we have carefully collected them from various reliable sources: reports and studies of international media outlets, international institutions, scientific laboratories, and research centres specialised in the field of monitoring and following up on major risks and their consequences. these data may differ in their relative values from one party to another, but they are characterised by their diversity and quality in presenting them in a form that serves the purpose for which they were formulated, and the extent of the idea to be achieved, which allows users and those interested in the topic to access the information in the best form and in an interactive manner that is easy to understand.

Conclusion

The challenges of the current situation of major disasters impose themselves in all their manifestations, in a state of continuous and unprecedented escalation; in terms of the number of their frequency, the changes that occur in each incident, the suddenness and the severity of the grave damage of their repercussions, the 2022-2023 harvest had a special impact, in which the events left a very heavy and tragic outcome in the global scene; leaving deep scars in the memory of humanity, so everyone is concerned with the issue without exception; it requires sounding the alarm of the imperative urgency to correct the situation, by: "radical assessment

and overcoming negative accumulations in various sensitive sectors, putting aside differences, uniting ranks, intensifying efforts, cooperation and solidarity", by voluntarily engaging in the agendas of the UN endeavour and its noble objectives; under the name: " Resilient Recovery, Disaster Diplomacy and Reprioritisation", to create a more solid structural front to confront major risks and disasters.

It is necessary to deal seriously, scientifically and wisely with the causes of disasters and at various stages, improving knowledge and a good understanding of the risk and its sensitivity; adopting accurate information, collecting sufficient data and updating it periodically, allowing to build a preparedness and response capacity characterised by effective performance, including taking appropriate rational decisions, providing and mobilising all material resources, human competencies and financial and logistical allocations for implementation, as well as administrative attention; structural organisation and institutional specialisation, relying on coordination and strategic planning, locally and internationally in the short and medium term, adjusting preventive and proactive measures, adopting monitoring and early warning systems, strengthening the resistant infrastructure, respecting safety and security standards, integrating and embodying the objectives of gender development Proactive and preventive measures, adapting to new developments by adopting monitoring and early warning systems, strengthening resistant infrastructure, respecting safety and security standards, integrating and embodying qualitative and sustainable development goals, as well as community participation and awareness, are all requirements and foundations that support the idea in all its dimensions; making it more appropriate and with an effective and concrete response, which would gain an opportunity to contain the disaster or even prevent it or mitigate its consequences, and avoid scenarios with dire consequences.

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