

**Forum:** Second General Assembly

**Issue:** Bolstering disaster preparedness in the face of the increasing risk of environmental disasters

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## Introduction

Environmental disasters can fall into two different categories, one of which being natural disasters. Due to the natural variability inherent in climate systems, natural disasters are inevitable. However, the risk of such disasters has increased considerably for the past few decades. According to WMO Atlas of Mortality and Economic Losses from Weather, Climate and Water Extremes, the number of environmental disasters across the globe has quintupled between 1970 and 2019. Not only were natural disasters responsible for 50% of all types of disasters during the 50 years, but they also accounted for 45% of all reported deaths as well as 74% of all reported economic losses. The surge in this number is mostly driven by anthropogenic factors, namely climate change. Through ways such as raising the sea levels and influencing atmospheric circular patterns, the intensity and the frequency of extreme climate events, including tropical cyclones, flooding, and extreme rainfall events, have augmented. The second type of environmental disaster includes catastrophes that are directly induced by humans, such as oil spills and nuclear incidents. These events severely harm the environment as well as human lives; the effects are graver than natural disasters in many cases. These environmental disasters have also shown an increasing trend due to continual industrial and agricultural development and increased human activities with greater environmental threats, impeding the pursuit of sustainable development goals.

Despite the aggravation, death tolls from environmental disasters over the last 50 years fell almost threefold. The decrease can be attributed to the improvement in disaster preparedness across different countries. However, greater attention and effort are needed to bolster the systems, considering how the disaster risk is on a constant rise due to continuous development in all countries and the ever-worsening global warming. Moreover, population growth in areas subject to greater peril – mostly located in developing countries – is of serious concern. Even though the developing countries suffer from the greatest fatalities from environmental disasters, the warning and disaster management systems are highly lacking in the areas. Hence, international cooperation is critical at this time.

## Definition of Key Terms

### Environmental Disasters

One type of environmental disaster includes disasters caused by natural climate and encouraged by human activities. Common examples of such environmental disasters include flooding, storms, landslide, drought, and earthquakes. Another type of environmental disaster includes human-induced events that result in damage to the environment and the lives of living beings. Nuclear disasters, oil spills, chemical spills, forest fires, and collapse of buildings are a few examples of this type of environmental disasters.

### Disaster Preparedness

Disaster preparedness refers to forecasting imminent danger and undertaking a set of precautionary measures and actions to minimize the damage to lives, livelihoods, and the environment. The concept applies to any events that may bring harm. Methods of preparation may include conducting research, planning, resourcing, educating, practicing, and rehearsing.

### Climate Change

Climate change is the long-term alteration in usual weather patterns and conditions. While it may be driven by natural factors, human activities have emerged as the primary cause since the 1800s. Due to humans' exploitation of oil, gas, and coal, the global temperature has and is constantly rising – a phenomenon known as “global warming” – and extreme weather events are occurring more frequently.

## Background

Whether nature-induced or human-induced, the risk of environmental disasters will only continue to rise. Given that these calamities are held accountable for the greatest number of casualties as well as environmental and economic loss compared to any other causes of such harms, preventing them before any damage is done is the most effective measure that can and should be taken. In order to expedite and facilitate such a process, it is imperative to understand the causes, repercussions, and ways to prepare for the different environmental disasters.

### Nature-induced Environmental Disasters

Environmental disasters, which are mainly driven by climate variability, are more difficult for humans to manage and control. Hence, it is more crucial to take precautionary measures against such disasters and also minimize activities that can encourage the occurrence of this type of disaster.

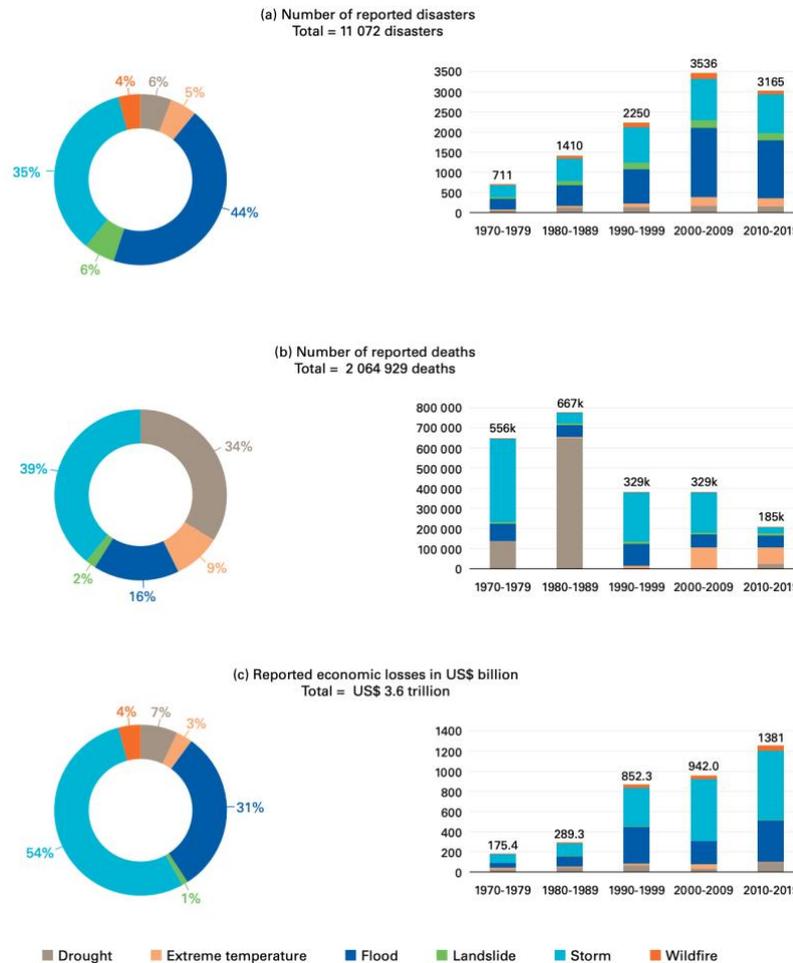
#### **Causes**

Although these environmental disasters are brought about by natural weather cycles, studies in the annual supplement to the Bulletin of the American Meteorological Society suggest that almost 80% of all natural disasters have been influenced by anthropogenic factors. However, the extent of the impact is contingent

on the types of disasters. Events such as tropical cyclones and flooding are heavily impacted by climate change since they are directly related to increasing sea levels. Moreover, almost every study on heatwaves shows that the probability of a disaster has spiked due to climate change. Landslide is another hazard that can be directly caused by human activities, such as deforestation and construction. However, drought events are hardly linked to man-made factors in many cases, as they are affected by large oceanic and atmosphere oscillations, characterized by great variability. Still, the warm sea-surface temperature has shown a correlation with the frequency of droughts in certain areas like East Africa.

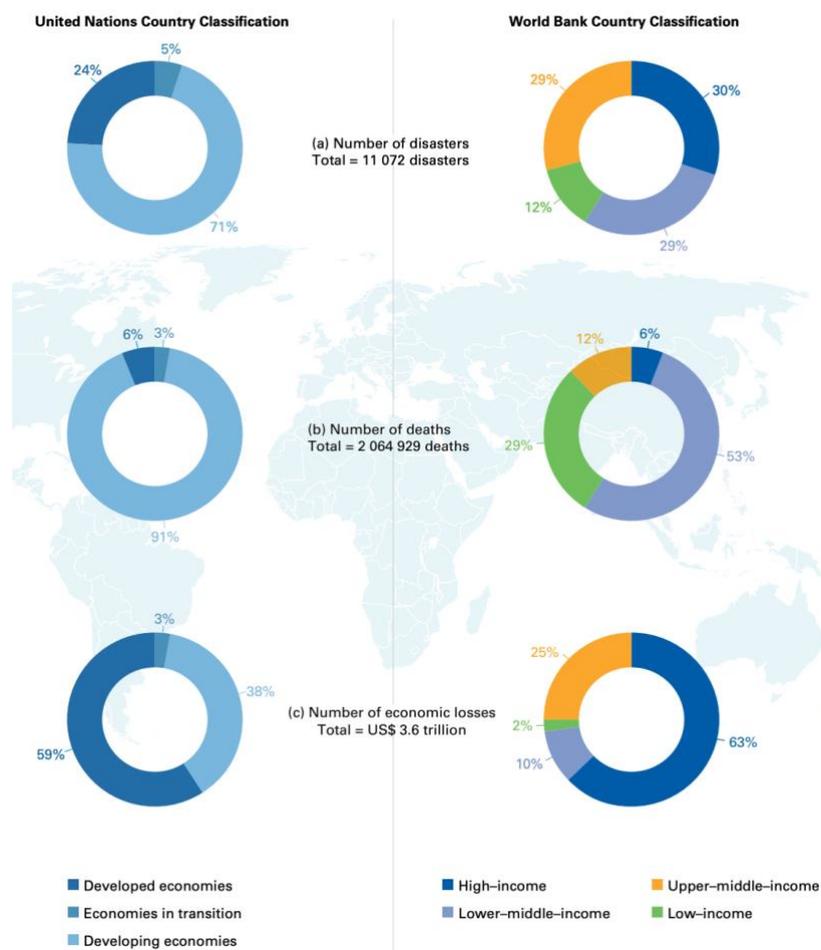
**Consequences**

Natural disasters result in both short-term and long-term damages. The primary short-term effects are undoubtedly mortalities, collapsed buildings, and economic losses. Data reveals that storms, namely tropical cyclones have induced the greatest damage, as shown in the diagram below. Given that the storms are closely linked with climate change, it is predicted that the world will suffer from greater loss as climate change aggravates.



*Distribution of (a) number of disasters, (b) number of deaths and (c) economic losses by hazard type by decade globally*

Another important point to be noted is that the majority of natural disasters between 1970 and 2019 occurred in developing countries. However, due to the lack of disaster preparedness in these areas, they are suffering from severe damage. In fact, 91% of all casualties over the 50 years from natural disasters were from developing countries. On the other hand, despite the low rate of occurrence, developed countries faced the greatest economic loss.



*Distribution of (a) number of disasters, (b) number of deaths and (c) economic losses by country classification globally (1970–2019)*

The long-term effects of natural disasters include changes in natural features, loss of habitat and infrastructures, and crop failure due to interference. Natural disasters often alter landscapes, disturbing the habitat and, therefore, the food chain of natural species that inhabit the area. Furthermore, destroyed infrastructures not only hinder economic activities but also increase the risk of communicable diseases spreading. The absence of shelter, electricity, and health care for individuals displaced by the disasters further escalates the risk of disease. For instance, Haiti suffered from a cholera outbreak right after an earthquake. Additionally, mental health problems also exacerbate due to the lasting psychological impact of disasters, resulting in higher morbidity rates of depression, post-traumatic stress disorder (PTSD), anxiety, and suicide. Longer-run effects include an increase in the poverty rate not only because of the loss

of assets and income but also because the disasters put countries' ability to eradicate poverty at risk by imposing heavy financial burden and preventing the government from investing time and funds in the issue.

### *Precautionary Measures*

There are diverse ways countries prepare and prevent nature-induced environmental disasters. Many countries and organizations, such as World Meteorological Organization (WMO), run varying early warning systems, yet they all consist of similar components that are crucial to the process of disaster preparedness. First, hazard assessment and risk assessment are conducted. During the process, scientists examine the timing, location, severity, and frequency of past hazards, characteristics and magnitudes of different hazards, possible socio-economic effects, and areas with high vulnerability. This information is then organized into a form that could be used by policymakers and officials. The science division also has to continually detect and forecast hazards. Then, it has to give accurate warnings to officials and citizens when necessary, and clear communication and dissemination are highly critical during the process. Preparation of a national disaster response plan is also a vital part. Agenda for how different parties and entities will respond to different disasters, such as evacuation routes, need to be prepared in an explicit and detailed matter. Sectoral agenda can also be developed, which proposes key actions for adequate disaster management of different sectors of vital infrastructure and basic services.

Aside from early warning systems, disaster risk is also often reduced through physical approaches to different types of disasters. For instance, countries take structural flood mitigation measures such as the implementation of dams, levees, and improved channels. Furthermore, constructions and buildings may be designed to withstand earthquakes or tropical storms. The development of disaster risk mechanisms is also a crucial precautionary measure. Some countries adopt specific financing strategies in order to ensure that sufficient funds are available when disasters occur. Such strategies may include the creation of catastrophe bonds (CAT) or the accumulation of funds specifically for future disasters.

## **Human-induced Environmental Disasters**

There are countless different types of environmental disasters directly caused by human activities, as they include any man-made events that harm the natural environment. These disasters do not merely damage the environment but also threaten humans' health and lives. As the causes, effects, and methods of preparation vary depending on the type of the disaster, the most common and deadly environmental disasters will be elaborated upon separately.

### *Oil Spill*

Oil spill is a type of pollution that refers to the spillage of petroleum substances, including gasoline, crude oil, and petroleum fuels, in lands and, mainly, oceans. There are various ways oil spills can occur. These

accidents often occur during oil drilling underseas when oil rigs malfunction or workers make mistakes. Collisions among oil tankers or other obstacles during transportation and explosions of oil storages are also key sources of oil spills. In fact, the most infamous oil spill – the Exxon Valdez catastrophe that took place in 1989 – was caused by the collision with Bligh Reef. Other causes include wars and off-shore drilling. When the Trump administration has approved the expansion of off-shore drilling, the frequency of major oil spills jumped by ten times. Oil spills lead to a decimation of marine species through inducing hypothermia, damaging internal organs, and increasing the possibility of being preyed upon. Studies have shown that it takes more than decades for many species to fully recover after an oil spill. For the Exxon Valdez catastrophe, an estimated 250,000 sea birds, 3,000 otters, 300 seals, 250 bald eagles, and 22 killer whales were killed. Oil spills also result in economic losses. Not only do oil industries face a heavy loss in commodities and funds due to the burden of cleaning up, but the fishing industry and tourism industry also suffer due to oil spills. To prevent such disasters, many oil companies install safeguards, such as alarms, on oil storages that indicate overfilling oil or gas accumulations and prepare secondary containments for leaking oil. Inspections and testing on the conditions of containers are also conducted on a periodical basis in some areas. Moreover, many oil companies follow certain industry standards for oil storage that has been set to minimize the possibility of oil spills. Lastly, like any other environmental disaster, risk assessments are also crucial to prevent oil spills.

### **Chemical Pollution**

The presence of chemical pollutants in the environment is increasing as manufacturing industries are rapidly growing. Every year, industries release around 10 million tons of toxic chemicals into the environment. The main source of chemical pollution is the waste streams from chemical industries, namely oil refineries, coal power plants, construction, and mining and smelting. Agricultural use of pesticides, insecticides, chemical fertilizers, and household chemicals also contribute to chemical pollution. Phosphates and nitrates inside chemical fertilizers enter into bodies of water through runoffs. The polluted water damages the marine environment as well as the health of humans and animals when consumed. One of the most common diseases induced by the consumption of agricultural pollutants is methemoglobinemia, which has a mortality rate of 80%. Chemical substances also pollute the soil. Chemical pollutants in soil encourage soil erosion and harm soil micro-organisms, soil fertility, as well as humans and animals through the consumption of contaminated crops. The effect of chemical pollutants on humans, in particular, is becoming graver every year: mortality from exposure to hazardous chemicals rose from 1.56 million in 2016 to 2 million in 2019. The most important preventive measure for chemical pollution is establishing strict requirements on discharge to sewer and water for chemical industries. Granting licenses to industries that satisfy a certain environmental standard, such as the Integrated Pollution Control (IPC) license, is also a means for countries to prevent chemical pollution.

## ***Nuclear and Radiation Accidents***

Nuclear and radiation accidents refer to events that lead to large radioactivity releases, such as the Chernobyl or Fukushima disasters in 1986 and 2011 respectively. A nuclear meltdown is a prime example of a nuclear accident, which occurs when the core of a nuclear reactor melts from overheating due to loss of coolant pressure or coolant flow rate or from external factors like fire or tsunami. Although the explosions and exposures to radioactive materials lead to both immediate deaths and long-term health effects, such as cancer, researchers claim that the impact of radioactivity is less severe than widely feared. Instead, the socio-economic effects due to misconceptions of the health effects and the sufferings of evacuated populations were found to be graver. For instance, the Chernobyl disasters displaced more than 330,000 people and increased the morbidity rate of psychiatric disorders by 20%. Multiple safety measures are taken to prevent and prepare for future accidents. For instance, constant radiation monitoring of nuclear power plants' surroundings is conducted to ensure there is no leakage. Installation and stabilization of major facilities in the power plants, such as the electricity system that is required for the cooling system, also prevent nuclear accidents, as the failure of the electricity system is considered to be the cause of the Fukushima disaster.

## **Major Parties Involved**

### **World Meteorological Organization (WMO)**

WMO is an intergovernmental agency under the United Nations (UN) aiming to promote international cooperation on issues relating to Earth's atmosphere, climate, and weather. Among the goals of WMO, disaster risk reduction is listed as one of the primary aims. The organization achieves this through the provision and management of weather and climate-related data, creating standards of observation and monitoring, and other climate-related services.

### **Japan**

Japan is known as a world leader in disaster preparedness. Japan has been subject to countless environmental disasters, ranging from tsunamis to nuclear accidents. Hence, the country has invested heavily in its disaster preparedness, rising as a country with one of the most effective and contextualized disaster management systems. Japan has shared its knowledge in organized planning and community training in multiple international conferences, benefitting numerous countries.

### **Indonesia**

Indonesia has been ranked as the country with the highest number of natural disasters in the year 2020. Because the archipelago is perched on the Pacific Ring of Fire, where tectonic plates collision occurs, the country is highly prone to volcanic eruptions as well as earthquakes. Other disasters, including tsunamis, landslides, and

flooding, are also extremely frequent in the area. Thus, 1.4% to 1.9% of the total annual government spending is related to natural disasters, imposing a significant financial burden on the government.

## Russia

Russia is known for its frequency and severity of man-made natural disasters, especially oil spills; it has been recorded that an oil spill occurs every half hour in the country. The major reason for such prevalence is the lack of enforcement of environmental laws on oil companies. As an oil-rich state, the country is highly dependent on the oil industry. Hence, the government is endeavoring to avoid imposing legal barriers on the companies, resulting in graver environmental consequences.

## Timeline of Events

Date	Description of event
<b>1912-1965</b>	Mishandling of industrial waste in Japan led to a series of disease outbreaks, including Itai-Itai disease and Minamata disease. The event influenced many nations to regulate industrial pollutants.
<b>1986</b>	An explosion at the Chernobyl Nuclear Power Plant in Soviet Ukraine, with the estimate of immediate and long-term death toll ranging from 500 to 90,000. The event slowed nuclear development in many countries.
<b>March 24, 1989</b>	The oil tanker Exxon Valdez spilled 11 million gallons of oil into Prince William Sound, Alaska. Although this was not the most serious oil spill in history, this catastrophe greatly heightened public awareness of the environmental damages induced by oil spills. Accordingly, the Oil Pollution Act was passed in the American Congress in the following year.
<b>December 1999</b>	The United Nations Office for Disaster Risk Reduction (UNDRR) was founded as part of the United Nations Secretariat in order to ensure the implementation and monitoring of the International Strategy for Disaster Reduction, proposed in General Assembly (GA) resolution 54/21.
<b>2008</b>	A 7.9-magnitude earthquake hit regions in south-central China, inducing landslides and building collapses. The landslides created makeshift dams, which further led to widespread flooding. The catastrophe resulted in 70,000 casualties.
<b>2019-2020</b>	Australia experienced one of the deadliest wildfires in modern history, killing 478 people and injuring 4,00 people. Research shows that the risk of wildfire in Australia increased by 30% since 1990 due to climate change.

## Previous Attempts to Resolve the Issue

Countries and organizations have adopted various measures to bolster the disaster preparedness for natural disasters in the past. One way was to strengthen international and inter-organizational cooperation. For instance, UNDRR, WMO, and other national and international organizations such as The United Nations Office for Outer Space Affairs (UNOOSA) hold United Nations World Conference on Disaster Risk Reduction (WCDRR) periodically to devise solutions to natural disasters collaboratively. One of the most important outcomes of the conferences is the Sendai Framework for Disaster Risk Reduction 2015-2030, which is an agreement that provides global targets as well as concrete actions to reduce disaster risk for member states. The International Network for Multi-Hazard Early Warning Systems (IN-MHEWS) in 2015, a system that “facilitates the sharing of expertise and good practice on strengthening multi-hazard early warning systems,” has also been established in 2015 to support the Sendai Framework. Although these attempts were effective in reducing the damage of natural disasters, only one-half of the 193 member states of WMO have multi-hazard early warning systems. Moreover, the weather and hydrological observing networks that are needed to collect data for scientists to forecast disasters and send warnings are lacking in Africa, some parts of South America, and in Pacific Caribbean Island states.

In order to prepare and prevent human-induced environmental disasters, different entities have attempted to solve the issue by putting emphasis on risk assessments. For example, WHO prepared methodology documents, training materials, and scientific reviews on different environmental disasters in order to assess the risk of individual hazards and their respective consequences. The organization achieved this by setting up different research centers to collect and process data. Such an approach was beneficial in assisting countries that lack the ability to conduct thorough investigation and research with advanced technology.

The UN has drafted numerous resolutions on the prevention and preparedness of disasters. The General Assembly (GA) has constantly endeavored to enhance member states’ abilities to construct disaster prevention and preparation plans and assist them in enacting them. The following are a few of the resolutions that aim to achieve this:

- International Strategy for Disaster Reduction, 2 March 2006 (A/RES/60/195)
- Natural Disasters and Vulnerability, 19 December 2008 (A/RES/63/217)
- Disaster risk reduction, 19 December 2019 (A/RES/74/218)

## Possible Solutions

- The key step in bolstering disaster preparedness is reinforcing hazard and risk assessment. It is critical for countries to understand the characteristics, causes, and impacts of different hazards in order to devise suitable and effective risk reduction and preparation strategies. Although the accuracy and consistency in reporting and collecting statistics are important, countries should be encouraged to focus on adaptability. For natural disasters, reviewing hazard exposure and vulnerability with newly collected data is needed, as climates and weather are altering rapidly. Disaster risk reduction strategies derived from these data should

also reflect and adapt to the perpetual changes. For human-induced disasters, constant effort to search for unknown effects of disasters should be made, as human-induced disasters are more likely to have consequences that are unnoticeable in the short run. Additionally, nations should constantly investigate new types of disasters since human activities are increasing as technology is advancing, possibly having effects on the environment that are currently unknown.

- Special effort is needed to support developing countries, as they have the highest number of environmental disasters yet lack appropriate systems to prepare for them. One of the many ways this can be achieved is through strengthening disaster risk mechanisms at international levels or national levels in the developing areas. Furthermore, the promotion of private insurance and reinsurance markets in these countries can help reduce their financial burden at times of disasters, as individuals and businesses will be able to purchase an increased amount of affordable and cost-effective insurance coverage, which can protect them during environmental disasters.
- Spatial planning and land management can also be used as tools to prevent environmental disasters, namely nature-induced ones. Studies have shown that utilizing land resources and planning out regional spaces in an environmentally favorable way can greatly assist in reducing the possibility and effects of natural disasters. For instance, buildings with optimized density, private and public spaces with high ecological quality, and transport systems that are reconcilable with the environment can be beneficial in preventing environmental disasters.

## Bibliography

"A Closer Look at the Long-Term Health Consequences of Natural Disasters." *Tulane University: School of Social Work*, 15 Mar. 2018, [socialwork.tulane.edu/blog/health-consequences-natural-disasters](https://socialwork.tulane.edu/blog/health-consequences-natural-disasters).

Deryugina, Tatyana. "Short and Long-run Effects of Natural Disasters." *National Economic Education Delegation*, 9 Sept. 2020, [needelegation.org/blog/short-and-long-run-effects-of-natural-disasters/](https://needelegation.org/blog/short-and-long-run-effects-of-natural-disasters/).

"Environmental Disasters." *Encyclopedia.com*, AN ELITE CAFEMEDIA PUBLISHER, [www.encyclopedia.com/environment/energy-government-and-defense-magazines/environmental-disasters](https://www.encyclopedia.com/environment/energy-government-and-defense-magazines/environmental-disasters).

Future Humanitarian Financing. "FHF Risk Financing and Risk Transfer."

K, Supriya. "Chemical Pollution: Effects, Types and Life Cycle." *Environmental Pollution*, [www.environmentalpollution.in/chemical-pollution/chemical-pollution-effects-types-and-life-cycle/1468](https://www.environmentalpollution.in/chemical-pollution/chemical-pollution-effects-types-and-life-cycle/1468).

Miller, Peter. "What's Causing Extreme Weather?" *National Geographic News*, 21 Aug. 2012. *National Geographic*, [www.nationalgeographic.com/science/article/120820-extreme-weather-heat-waves-science-environment-global-warming](https://www.nationalgeographic.com/science/article/120820-extreme-weather-heat-waves-science-environment-global-warming).

"Natural disasters and hazards." *SEG Wiki*, 17 June 2016, [wiki.seg.org/wiki/Natural\\_disasters\\_and\\_hazards](https://wiki.seg.org/wiki/Natural_disasters_and_hazards). Accessed 3 Jan. 2022.

"Nuclear and radiation accidents and incidents." *Wikipedia*, [en.wikipedia.org/wiki/Nuclear\\_and\\_radiation\\_accidents\\_and\\_incidents](https://en.wikipedia.org/wiki/Nuclear_and_radiation_accidents_and_incidents).

Rubiano, Diana. "How to prepare a country to respond to a disaster." *World Bank Blog*, 19 Feb. 2018, [blogs.worldbank.org/latinamerica/how-prepare-country-respond-disaster](https://blogs.worldbank.org/latinamerica/how-prepare-country-respond-disaster).

Soomro, Ahsen. "Oil Spills; Causes, Effects and Solutions." *Environment Buddy*, 26 Nov. 2020, [www.environmentbuddy.com/environment/oil-spills-causes-effects-solutions/](https://www.environmentbuddy.com/environment/oil-spills-causes-effects-solutions/).

"Weather-related disasters increase over past 50 years, causing more damage but fewer deaths." *World Meteorological Organization*, 31 Aug. 2021, [public.wmo.int/en/media/press-release/weather-related-disasters-increase-over-past-50-years-causing-more-damage-fewer](https://public.wmo.int/en/media/press-release/weather-related-disasters-increase-over-past-50-years-causing-more-damage-fewer).

"What are the effects of nuclear accidents?" *World Nuclear Association*, [world-nuclear.org/nuclear-essentials/what-are-the-effects-of-nuclear-accidents.aspx](https://world-nuclear.org/nuclear-essentials/what-are-the-effects-of-nuclear-accidents.aspx).

WHO Working Group. "ASSESSMENT AND MANAGEMENT OF ENVIRONMENTAL HEALTH HAZARDS." [apps.who.int/iris/bitstream/handle/10665/58908/WHO-PEP-89.6-eng.pdf?sequence=1&isAllowed=y](https://apps.who.int/iris/bitstream/handle/10665/58908/WHO-PEP-89.6-eng.pdf?sequence=1&isAllowed=y).

World Meteorological Organization (WMO). *WMO ATLAS OF MORTALITY AND ECONOMIC LOSSES FROM WEATHER, CLIMATE AND WATER EXTREMES (1970–2019)*. WMO, 2021. *World Meteorological Organization*, [library.wmo.int/doc\\_num.php?explnum\\_id=10902](https://library.wmo.int/doc_num.php?explnum_id=10902).

## Appendix or Appendices

- I. <https://public.wmo.int/en/media/press-release/weather-related-disasters-increase-over-past-50-years-causing-more-damage-fewer> (WMO News)

*This article gives a comprehensive overview of the current status of natural disasters as well as possible solutions to preventing them.*

- II. <https://apps.who.int/iris/bitstream/handle/10665/58908/WHO-PEP-89.6-eng.pdf?sequence=1&isAllowed=y> (WMO Report)

*This report elaborates on why and how risk assessment should be improved and developed in order to bolster disaster preparedness.*