

Forum: Environmental Commission
Issue: Addressing human subsistence in extreme climates
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Introduction

Globally, more than 11,000 environmental disasters have been reported over the past 50 years, with each one having varying degrees of severe effects on human subsistence. The *WMO Atlas of Mortality and Economic Losses from Weather, Climate, and Water Extremes* estimates that these disasters resulted in around two million death tolls and \$3.84 trillion in losses over the last two years, with the majority of the deaths occurring in developing nations. Unfortunately, the occurrences of extreme climate events are steadily increasing as global warming and climate change are aggravated, and the severity of the disasters is getting more intense as well. Now, these extreme climate events became an immense threat to human subsistence.

Natural disasters like flooding, hurricane, and storm cause a large number of deaths, injuries, and huge economic losses. Moreover, extreme climate events such as rising sea levels and heat waves are forcing people to migrate to safer places. One of the most recent natural disasters, the bushfires in Australia during 2019 – 2020 hugely impacted the whole continent, burning 18 million hectares and 9,000 buildings and houses. Estimated 65,000 people are unintentionally displaced, 400 people died, and millions of animals are murdered due to the fire. According to the United Nations High Commissioner of Refugees (UNHCR), an average of 21.5 million people are unwillingly displaced by extreme weather events every year. If people are displaced at the same rate, the total number of climate refugees is estimated to reach 1.2 billion at the end of 2050. As shown in these numerical data, extreme climate events are causing non-negligible damage to humans. Hence, immediate international cooperation is needed to create appropriate precautionary measures and restrictions to minimize natural disaster occurrences.

Definition of Key Terms

Extreme climate

Extreme climates refer to unexpected, unusual, and severe environmental events that cause a devastating impact on both ecosystems and humans. Environmental disasters such as floods, drought, and hurricanes are the most common examples of extreme climate events, while rising sea levels, wildfires, and heat waves are also included in those events.

Climate change

Climate change refers to a long-term alteration in usual weather patterns and conditions. As the global temperature is constantly rising, the speed of climate change is accelerated, and it results in more frequent extreme climate events.

Natural disasters

Natural disasters, also referred to as natural hazards, are the type of harmful events that are naturally caused by weather and climate inconsistency. The typical natural disasters are floods, earthquakes, hurricanes, or typhoons, and they may cause significant damage such as life loss and economic damage when they occurred in populated areas.

Human subsistence

Human subsistence is defined as minimum requirements to support and maintain the safety of human life. This includes the basic necessities of human life: food, water, shelter, and clothing. In the case of this issue of extreme climate, human subsistence is considerably harmed as extreme climate events and natural disasters are making the supply of basic necessities more challenging.

Background Information

Extreme climate events can fall into two different categories by their features, one of which is natural disasters and another being extreme climate events led by global warming. Two different types of extreme climate events have different causes and consequences; thus, they should be dealt with by independent policies and plans.

Natural disasters

Since natural disasters are mainly caused by weather and climate variability, it is difficult for humans to predict and manage. Therefore, it is critical to create prevention measures to minimize the damage of them. At the same time, more research and development (R&D) on disaster control and management is needed.

Causes

Most natural disasters are caused by environmental factors such as geological, hydrological, and meteorological variables. Disasters such as tsunamis, earthquakes, and volcanic eruptions happen on the border of the tectonic plates due to their movements, while some natural disasters are largely influenced by human activities. Flooding and drought are mainly caused by the water cycle, but they are heavily impacted by climate changes and rising sea levels. Storms and hurricanes are also deeply correlated with climate change. Furthermore, human's deforestation and construction also can be minor causes of landslides.

Consequences

Natural disasters both cause short-term and long-term damages. The primary short-term effects are fatalities, injuries, collapsed buildings, and economic damages. According to the report regarding economic loss from natural disaster events globally from 2007 to 2021, the total economic loss due to natural disasters in 2021 amounted to about 343 billion U.S. dollars, with flooding generating the highest amount of economic loss. Since floodings are directly related to sea levels, the short-term effects of natural disasters in the future are most likely to be more intense.

Long-term damages of natural disasters are agricultural impacts, loss of habitat of creatures, and loss of infrastructures. Natural disasters may interrupt the whole food chain and habitat of animals and plants within the damaged regions. Also, if a natural disaster damages an agricultural area, it might result in economic losses and poverty for farmers in some cases. The cruellest long-term damage is infrastructure losses because water and electricity supply is directly linked to people's lives. In the worst cases, natural disasters might cause a nuclear power accident, as happened in Fukushima, Japan, which resulted in one million buildings being damaged and four million people losing their electricity.

They also create huge consequences on individual levels. Natural disasters such as earthquakes and floods often damage buildings and houses and leave numerous people homeless. Furthermore, economic damages to individual properties like vehicles and buildings are critical to most citizens. For example, due to the most recent flood in Seoul, South Korea caused by hard rainfall, at least 9 people were killed and thousands were injured. Also damaging 2800 buildings and tens of thousands of vehicles, it created huge economic pressure on the victims of the disaster. No matter how severe the natural disasters are, there is no doubt that they are making a lot of people suffer and undergo difficulties to handle the damages.

Extreme climate events led by global warming

Global warming

Global warming is a rise in the temperature of the atmosphere and oceans, mainly caused by heat trapped due to the greenhouse effect. According to United Nations (UN) Sustainable Development Goals (SDGs), the average global temperature increased by 0.85°C from 1880 to 2012, and it is estimated to increase by 1.5°C at the end of the century if the same amount of greenhouse gases is released. As represented in the diagram, global warming has accelerated in recent years, showing a 0.15 to 0.20°C increase every decade since the 1980s. This recent shift is mostly due to the huge increase in carbon dioxide emissions. As shown in diagram 2, the amount of CO₂ emitted worldwide has been rapidly increasing since the 1960s, vastly provoking the greenhouse effect.

The consequences of global warming are extremely hazardous. Mainly driven and enhanced by global warming, rising sea levels, heatwaves, and wildfires are three of the most severe extreme climate events. Unlike natural disasters that occur in and affect relatively small regions, these extreme climate events may impact innumerable people and even a whole nation sometimes. Hence, powerful and straight measurements are required to curtail activities that induce global warming.

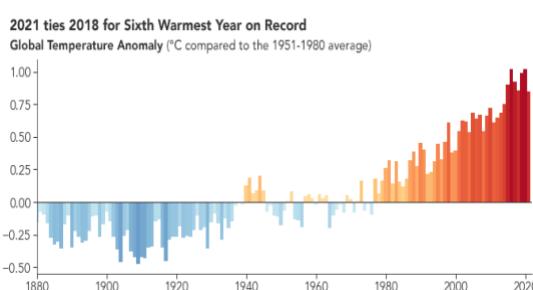


Diagram #1: Average global temperature increase (earthobservatory.nasa.gov)

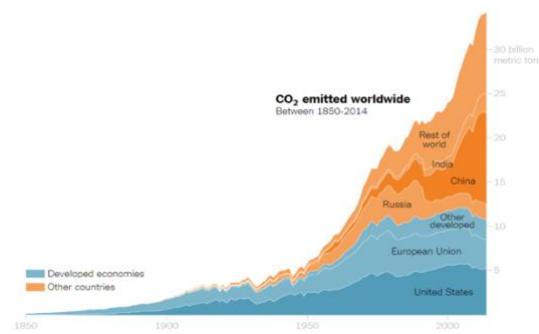


Diagram #2: Average global CO₂ emission (NewYork Times)

Rising Sea levels

The sea level has increased 21–24 centimeters since 1880 as a result of ocean warming, and it has reached the highest point ever in 2021. According to NOAA, the pace of sea level rise has more than doubled from 1.4 millimeters per year in the 20th century to 3.6 millimeters per year in

the 21st. Global warming is the dominant driver for sea levels to rise. The ocean is gaining more water from melting glaciers and ice sheets, and as the temperature rises, the volume of the ocean gets larger and larger. More than 400 billion tons of water are released into the global ocean from the melting ice sheets of Greenland and Antarctica, and it does not appear that this situation will end anytime soon. If this world trend continues, the sea level is estimated to rise by 30cm by the end of this century.

The consequences of rising sea levels are even more catastrophic than the effects of typhoons and hurricanes. Flooding and salt pollution of the land are not the only effects of rising sea levels. Even a slight increase can have detrimental effects on coastal environments, leading to the loss of fish, bird, and plant habitats. People in low coastal areas have already been forced to relocate to higher territories because of the risk of flooding. Bangladesh is one of the countries under the direct threat of rising sea levels. The official research by the Bangladesh government predicts that only a 1m rise in sea level in 2100 will submerge 18% of the total Bangladesh territory, which will deadly impact 3 crore people in total. Major countries such as China, Vietnam, and Japan are also under the threat of rising sea levels. Given that 40 percent of the world's population currently resides within 100 kilometers of the coastline, the continued rise in sea levels would cause billions of people to migrate globally, leading to more serious problems affecting all global citizens. This worst-case scenario is unavoidable if the sea level actually rises by 30cm by the end of the century. Thus, measures to solve this issue are absolutely necessary at this point.

Many coastal cities have already started to implement a few long-term strategies to combat rising sea levels. The proposed solutions include building sea walls and planting water-absorbing plants such as mangroves. For instance, Jakarta and Rotterdam are designing seawalls, while the Dutch city has already created sea barriers and drainage systems. However, such measurements require high costs and investment from the government, making these solutions inaccessible to many nations. Although when developed nations do have enough finance to enact, it would be impracticable to implement these precautions across all the shores. Furthermore, these measures are only short-term solutions, which are not able to stop global warming, the primary driver of rising sea levels. Delaying the rate of sea level rise should be the long-term objective for all nations, and additional development on adaptation strategies will be required in the near future.

Heatwaves and wildfire

A heat wave is a period of unusually hot weather caused by heat trapped in the Earth's air circulation. During the summer of 2022, European countries, including France and Spain, experienced one of the worst heatwaves in history in which the temperature exceeded 40-43°C.

Heatwave has devastating impacts on the ecosystem since heat increase can cause water shortage and a reduction in plant growth. Heatwaves also result in illnesses in the human body due to the sudden heat rise. According to World Health Organization (WHO), heat cramps, heat exhaustion, heat stroke, and hyperthermia can be caused by heatwaves and may even cause death for patients with severe symptoms.

Furthermore, increased global temperature results in more frequent wildfires. As climate change causes a drier atmosphere and higher temperature, it is more vulnerable to get wildfires in particularly dry regions. Wildfires are also a huge extreme climate event that causes damage to the ecosystem and human subsistence. It may burn a million hectares of agricultural and residential lands and forcefully people. In the worst scenario where people are involved in the fire, serious injuries or death are unavoidable. Furthermore, the fact that wildfires mostly last for a longer time, from a week to a few years, makes the impacts of wildfire even more disastrous.

Major Countries and Organizations Involved

United Nations Office for Disaster Risk Reduction (UNDRR)

UNDRR, created in December 1999, is an office under the UN that coordinates international efforts in disaster risk reduction. It supports the implementation and review of the Sendai Framework for Disaster Risk Reduction and ensures all nations take international strategies to reduce disaster risk.

World Meteorological Organization (WMO)

WMO is a specialized agency under the UN promoting international cooperation on environmental issues over the world, established in 1950. The organization provides weather and climate-related data on atmospheric science, climatology, hydrology, and geophysics.

Japan

Also known as holding Sendai Framework for Disaster Risk Reduction, Japan is one of the global leaders in disaster preparedness. Japan is a country that experienced the largest number of disasters while each of them being the most severe. Thus, Japan has created effective measures and strategies to deal with natural disasters and invested heavily in disaster precautionary measures. Japan has been actively sharing its knowledge and experiences through international conferences such as Sendai Framework and supported a number of nations.

Timeline of Events

Date	Description of event
May 23 – 27 th , 1994	The first UN world conference on natural disasters was held in Yokohama, Japan. Adopted Yokohama Strategies for Safer World.
January 18 – 22 nd , 2005	The second world conference on disaster risk reduction was held in Kobe Japan.
March 14 - 18 th , 2015	Sendai Framework for Disaster Risk Reduction was endorsed by the UN general assembly.

Relevant UN Treaties and Events

United Nations 2030 agenda includes specific goals of sustainable development, and SDG 13 includes goals related to extreme climate events.

- SDG 13: take urgent action to combat climate change and its impact.
- United Nations environment programme (UNEP) is a UN programme that aims to deal with environmental problems world widely. Through UNEP, the climate crisis has been promoted and multiple nations have been supported.

Previous Attempts to solve the Issue

Sendai Framework for Disaster Risk Reduction

International organizations and countries have cooperated to create precautionary measures to minimize the impact of extreme climate events. The first major agreement of the 2015-2030 developing agenda was Sendai Framework for Disaster Risk Reduction, with Japan as a host country. Sendai Framework includes seven main goals to reduce the damage of disasters and create and spread disaster risk reduction strategies. The main 6 goals of this framework are minimizing the damage and creating and spreading international strategies, each of them being: reducing global disaster mortality, reducing the number of affected people, reducing economic loss and damages to infrastructures, enhancing strategies, strengthening international cooperation, and creating an early warning system. Based on the Sendai Framework, appropriate financial and technological support is provided to regions with disaster damage, and risk reduction strategies are applied.

Switzerland

Switzerland is a country experiencing floods, landslides and debris flows often, and is known as one of the countries with the best disaster management. The Switzerland government has invested a large amount of money in disaster protection and adaptation measures, with a detailed order of disaster reduction mechanisms. Based on their experiences and data from past natural disasters, they have created numerous adaptation measures that can protect human lives, nature and ecosystems, and industries. Their response to natural disasters during the past decade was fairly successful.

Possible Solutions

- The most fundamental causes of extreme climate and environmental disasters are climate change and global warming. If human activities continuously accelerate climate change, environmental disasters and their huge impacts will grow beyond human control. Hence, restricting human activities inducing global warming and climate should be the foremost but long-term goal for all nations facing extreme climates.
- Greater research and development on disaster and extreme climate assessment is key to reducing the damage in nations. Every nation should have a solid understanding of the causes, impacts, and characteristics of natural disasters to create preventive measures. International cooperation is needed to collect data from all over the world, and insightful scientific analysis of each disaster should be done.
- Support for developing nations is especially important because they experience the greatest number of environmental disasters but do not have the necessary procedures and funds in place to prepare for them. One of the methods to accomplish this is to strengthen national or international disaster risk management policies in developing nations. These policies would be based on the assessments and strategies from the solution above, which can suggest the most effective solution for that region. At the same time, financial supports from developed nations are essential to enact the solutions in the regions. Funds from the UN, NGOs, governments, and donations from individuals can be gathered to fulfill the required funds.
- A specialized aiding system for climate refugees and people damaged by extreme climate events is needed to be created. This can be done through cooperation between international organizations such as UNHCR and the assistance of NGOs.

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Appendix or Appendices

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