

Natural Disasters: The Cataclysm Effects on Humanity

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Abstract

The article discusses the catastrophic damages natural disasters can bring to society and the financial burden. Considering the statistics of how each country is affected differently, the numerous protocols that may be used to help combat nature's wrath. The article illuminates how one's mental health may be affected and affect a country's GDP, where a fair percentage of funding go towards natural disaster restoration. It also discussed how some disasters may be avoided in order to prevent lost of lives and finance in the coming future and highlights how the environment itself plays a major role between the natural disasters and humanity. Each individual disaster may be the prequel or sequel of the other, with hurricanes being the prequel to flooding. In this paper, a fond understanding will be adapted on the topic of natural disasters and how they are also connected with each other.

Introduction

Natural disasters are extreme sudden events attributable to environmental factors such as hurricanes, droughts, and floods. These disasters occur seasonally, increasing in severity and impact, often without warning. Therefore, they pose a significant threat to the overall well-being of communities and critical infrastructures of a functioning society. Governments must ensure that the necessary precautions are taken to minimize the acceleration and duration of these periods of insecurity. Exploring these overlooked aspects helps us better understand the multifaceted consequences of natural disasters and underscores the importance of actively implementing robust disaster preparedness and response procedures. By maintaining this proactive approach, society can ensure that the long-term safety of vulnerable populations is secured. The following literature review will analyze current research to raise awareness of the

catastrophic effects of natural disasters on humanity, focusing on the growing damages caused by hurricanes in the United States, the impact of droughts on vulnerable communities, and the role of floods in widening economic disparities globally.

Hurricanes

Hurricanes can be looked at as a natural disaster that affects everyone similarly regardless of the location of where it hit. The Caribbean and Western Hemisphere get the brunt of it's rampage while the East would experience primarily Cyclones and Typhoons. Hurricanes form over the ocean, mainly close to the Equator, evaporating warm seawater into the low atmosphere; when the air rises, it cools and releases heat. They normally start as thunderstorms, but with more warm ocean water, these thunderstorms will grow stronger until they reach a fully realized violent hurricane. Hurricanes can cause damage worth millions to repair, and the loss of lives can be unimaginable, whether from sheer wind speed and destruction or its connection to a daunting disease category known as pathogenic diseases (Pathogens are organisms that can cause disease).

Hurricane Damage and Related Federal Spending

Hurricanes are known to cause damage to urban structures which can result in major economic damage to the region affected. The aftermath of a hurricane is one in which the governments of any country do not look forward to. It means that a miraculous amount of their budget and GDP has to go towards it. According to Terry Dinan (2016) study, found that:

over time, the costs associated with hurricane damage will increase more rapidly than the economy will grow. Consequently, hurricane damage will rise as a share of gross domestic product (GDP), which

provides a measure of the nation's ability to pay for that damage. According to the agency's estimates, expected annual damage currently amounts to 0.16 percent of GDP (or about \$28 billion). (p. 002)

The data may read a low percentage, but when converted to the actual dollar being 28 billion, it puts into question if a hurricane didn't cause this much damage to the country, the finances can go towards something else. It is unfortunate those who are affected, with the government making tough calls put into the question of priority as well and how well it is handled.

Of course, spending varies between different hurricanes and storms hence the categorical system helps. A category 1 Hurricane is light, almost as if it was a generic tropical storm: while a category 5 Hurricane is a full violent storm that brings heavy wind speeds, high volumes of rainfall which can cause flooding, and can also light the skies with lightning. For instance, according to this statistical chart from Terry Dinan (2016) study:

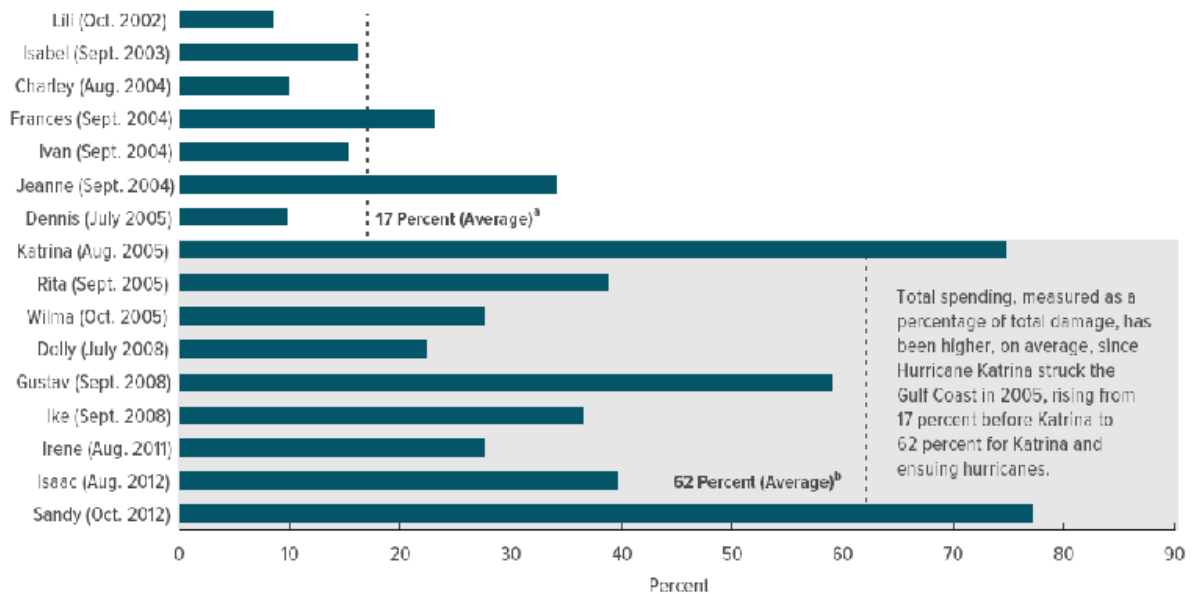


Table 1 (p.35)

Hurricane Lili from 2002 was not as destructive, thus it only amounted to costing 9% of federal spending; up to Hurricane Sandy of 2012 being so catastrophic, hitting the United States and

causing the government to put nearly 80% into repairs and the aftermath. What can be observed is that the relationship between the government and hurricanes is solely dependent on how destructive and strong the hurricane is. The United States is the x-variable (independent) while the Hurricanes is the y-variable (dependent).

The Effects of Hurricanes on Mental Health

As human beings, mental health is a main priority, as it is needed for our survival and sanity. Humanity is driven by logic and ethics- and a key component to allow those drivers to operate is to have good mental health. Natural disasters, i.e. hurricanes, depending on how serious it is can in fact pose great risks to human health, i.e. their mental health. Yasin Civelek (2023) study noted the following:

Goldmann and Galea (2014) point out that a large proportion of individuals living in disaster-affected counties are likely to suffer from various mental disorders, including post-traumatic stress disorder (PTSD), due to the loss of a loved one or economic resources following the disaster. Unlike acute physical health problems, poor mental health conditions associated with disasters may be persistent over time (Norris et al., 2002). (para 3)

Hurricanes are notorious for its reputation of mass destruction and ability to take people's lives. The majority of the reasons why people has mental health problems which indubitably last a very long time, is due to the hurricane taking a loved one away from them and being sunken into a financial hardship. These storms have the power to dismantle and rip away someone's house, thus leaving the homeowner homeless. The government will now have to use its funding and part of its GDP to help repair all the damages and house those who lost their home.

Effects of Hurricanes on Pathogens

To put simply, pathogens are organisms that can produce disease(s); they may also be called infectious agents, with some common causes being viruses, bacteria, fungi, and parasites. It lets one ask the question, how does a hurricane correlate to pathogens and these infectious diseases? Hurricanes are violent storms that bring destruction not just to humans' homes/health and a country's economy, but also to the environment. Nature is home to many elements, some in which lives in animals, the ground/soil and other areas, thus when a hurricane comes, these elements can cause a reaction and thus have pathogens being formed. Lisa R. Maness (2019) study recorded the following:

After Hurricane Sandy, farmlands became flooded and municipal waste treatment plants were under water, which affected the coastal regions of North Carolina in 1999. A variety of animal farms flooded, resulting in hogs, turkeys, and chickens drowning and having to be burned in order to prevent the spread of disease. Millions of gallons of manure were released into rivers, thereby contaminating water supplies. Over 300 private wells tested positive for coliform bacteria. One study indicated increases in illnesses from *Toxoplasma gondii* and adenovirus following Hurricane Sandy in severely affected areas of North Carolina (Setzer & Domino, 2004). Although *T. gondii* is carried primarily by cats, intermediate hosts include livestock, suggesting that this organism was spread to humans due to flooding of livestock farms. Studies that determine the presence of pathogens in environmental waters after hurricanes can indicate what potential risks there are to people cleaning up or working in the aftermath of hurricanes. (paras 2-4)

This indicates that after a hurricane, flooding began, and due to this, a large amount of manure (which is toxic and contains diseases and bacteria) was released into the river, contaminating the

water supply. So, many humans primarily contracted pathogenic diseases due to the flooding of farms and the pathogens in the water.

Hurricanes are a dangerous disaster that can result in many others, i.e, landslides or, more notoriously, flooding. Flooding can also cause many damages to infrastructure, and can bring forth the loss of lives: While Hurricanes will bring the sheer wind speed and violent rainfall and lightning, its aftermath flooding can pose more threats, one that is just as severe if not worse, than a hurricane.

The Pervasiveness of Flooding

These disasters can be caused by natural, man-made, and technological hazards, in addition to various factors influencing the exposure and vulnerability of a community (IFRC,2024). It's important to remember that natural disasters such as hurricanes are not just coastal hazards and the risk of inland flooding may be more significant than expected (Garthwaite, 2024). Flooding is an overflowing of water onto land that is typically dry. Floods are the most common and widespread of all weather-related natural disasters. They can occur within minutes and can last for several days or weeks typically occurring during heavy rainfalls or when ocean waves come on shore (NOAA, 2024). Therefore, it's crucial to take proper precautions considering most home and renters insurance policies don't cover flood damage. To put this into perspective just an inch of water can cause approximately 25 thousand dollars' worth in damage to properties (FEMA, 2024). Considering these disasters are recurring the cost in damages, decrease in income and assets jeopardize one's financial stability. Generally, individuals of lower socio-economic status are more susceptible to these damages caused by floods and the rate in which they recover is significantly slower. As a direct result the acceleration of economic disparity is significantly widening.

A recent study by The University of Tokyo (Kawasaki & Shimomura, 2024) highlighted an extreme case present within small and medium sized cities in Myanmar. A nation in which both the economy and financial system lack development, limiting job opportunities. This is especially the case during the rainy season in which floods occur more frequently, limiting the citizens' access and ability to work in these flood prone areas. Additionally local financial resources are scarce restricting urban development, infrastructure, administrative services, and education. Due to these extreme circumstances Myanmar citizens of poorer socioeconomic status will have to take on more financial debt. To be more precise the study mentioned that approximately 50 percent of these impoverished citizens possessed some form of financial debt (Kawasaki & Shimomura, 2024).

Furthermore, several surveys recorded in the city of Bago noted the devastating effects inflation holds on the cost of living for its impoverished citizens. This added pressure prohibits these citizens from accumulating and maintaining valuable assets that could potentially provide relief (Kawasaki & Shimomura, 2024). Implying that the next generation of individuals within this demographic will likely inherit this debt and continue this vicious cycle.

Earth's Rising Air Temperature & Hydrological Cycle Correlation with Flooding

The planet's rising surface air temperature yields an intensification of its hydrological cycle. This cycle relates to the continuous circulation of water present in the earth atmosphere system involving evaporation, transpiration, condensation, precipitation, and runoff (NOAA, 2024). This is directly associated with the risk of river floods, which are projected to increase regionally over the next twenty years due to atmospheric warming (Willner et al, 2018). The economic losses due to these floods will affect regionally heterogeneous losses and gains through propagation within the global trade and supply network. If safety measures aren't implemented,

the overall economic losses due to fluvial floods will go up globally by 17 percent within the global trade network (Willner et al, 2018). China will experience greater losses with a total increase of 82 percent, while the United States is primarily affected indirectly through trade relations. A model featured in a study by Willner et al implied that the losses due to fluvial floods will jump to a total of \$597 billion U.S. dollars from 2016 to 2035 (Willner et al, 2018).

Possible Solutions to Flooding

The change in land use has a significant effect on floods considering humans have heavily modified natural landscapes across the world. For instance, landscapes such as hillslopes have been modified for agricultural production. As a direct result there is a noticeable difference in flow paths and velocities, water storage, consequently, flow connectivity, and concentration times (Rogger et al, 2017). The study also emphasizes the importance of extensively studying the effects of agricultural practices such as drainage, terracing, and forest management relating to floods. In addition to acknowledging how prior experiences or approaches in hydrology, soil and agricultural science, forestry, and geomorphology maximize findings while seeking to expand on current research (Rogger et al, 2017).

Drought

The total amount of Earth's water does not change and continually circulates from place to place inside. Therefore, if one area receives more than average rain and has flooded due to abnormal weather, the other area receives less than average rain and water shortages or a drought. Human history has been with drought. Most of the events that killed hundreds of thousands of people were war and famine. A drought is one of the most notorious natural disasters caused by long-term water shortages. As history and technology have progressed, the development of irrigation systems could prevent drought damage, and food shortages caused by

drought damage could be resolved under the logistic economy system. Drought can also occur when the amount of water required by an area is higher than the average amount of precipitation. This means that even in the desert, it may not be a drought or a drought, even if it rains frequently. High atmospheric pressure always exists due to the influence of convection and ocean currents, but prolonged high-temperature and high-pressure weather due to global warming causes more and more droughts and affects crop yield production, spreading plague, and the physical and mental health of humans.

The Role of Temperature in Drought

Regular and severe droughts generated by global warming have been unpredictable because of their frequent and wide occurrence around the world. Prolonged droughts are affected much more than those associated with droughts of shorter timescale due to extended high-pressure weather and heat waves, especially in the low-latitude regions. Jeong, D. and his research team (2014) predict patterns of future droughts by using Regional Climate Model (RCM) simulations from the North American Regional Climate Change Assessment Program. They suggest that long-term and extreme drought events are affected more by future increases in temperature and potential evaporation and transpiration than short-term and moderate drought events, particularly over the high drought-risk regions of North America (Jeong et al., 2014, p. 289). Continuous droughts cause many other catastrophes as byproducts.

Drought and Plague

Water scarcity is linked to a lack of industrial water, which not only lowers production but also depletes crop damage, accompanied by plant viruses which are responsible for tremendous agronomic and socio-economic damages (Munster et al., 2017). In a study “Water Deficit Enhances the Transmission of Plant Viruses by Insect Vectors”, a severe water deficit

increases the efficiency of aphid transmission of the Cauliflower mosaic virus (CaMV) or the Turnip mosaic virus (TuMV). The rate of vector transmission is significantly increased from water-deprived source plants: CaMV transmission reproducibly increased by 34% and that of TuMV by 100% (Munster et al., 2017). Generally, people think water shortage may prevent the expansion of plagues. Crops do not grow in a water-deprived environment, however, this condition makes it appropriate to carry viruses that are fatal to agriculture, because some viruses need water, not others while crops always need water.

Impacts on Our World

Drought brings economic losses, infrastructure changes, diminished access to services, environmental degradation, and social network disruptions, impacting California's regional economy directly. Severe droughts are slow-onset and long-duration disasters with far-reaching impacts on the community's economy and environment (Barreau et al., 2017).

Drought-impacted households might perceive physical and mental health effects and might experience financial, or property impacts related to the drought. Barreau and his research team (2017) found how drought affects human civilization:

households reported not having running water (3%– 12%); impacts on finances (25%–39%), property (39%–54%), health (10%–20%), and peace of mind (33%–61%); worsening of chronic disease (16%–46%); acute stress (8%– 26%); and considering moving (14%–34%). Impacts on finances or property were each associated with impacts on health, peace of mind, and acute stress during the most severe drought in California in 2015 (p.786).

The damage will be more severe in the area or countries affected by climate factors and global warming than in California, especially in areas with poor water resources.

Conclusion

The warning signs about global warming were raised a long time ago, and the accumulated consequences are becoming unpredictably frequent and inevitable. This paper highlighted the environmental, economic, and (mental) health trends in the most destructive natural disasters. As shown above, those three disasters provoke dreadful feelings towards an individual's home and future. With more of their taxes and salaries being spent to survive and restore those destroyed by calamities. The accompanied byproducts like landslides, the spread of plague, and mental disorders such as depression and post-traumatic stress disorder will continue to fill every sector of our lives. Impacts and irregular patterns make an individual think about how we should change our lifestyles and current perspectives on natural disasters.

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