

Analysis on Disasters Caused by Climatic Changes in Nature



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Abstract: *On Earth, humans are not the only living beings, and there is a lot of wrongdoing by humans. As our body works, the earth also works. In our body, if we have some disease or something else our immune system starts working, in the same way, the world has some effects of our human actions like pollution deforestation, and all other harms which we do to nature which affect the flow of nature in corresponding ways like climate change which causes natural disaster to form on our earth which cannot be controlled by humans. Due to heavy rain, the ocean's water level increases, which can lead to tsunamis. High winds also create cyclones that tear apart anything in their way. These are all caused by different climate conditions. These climate conditions can be determined by their parameters, such as humidity, wind, and temperature. These have a drastic impact on the climate, leading to the formation of natural disasters. This is for our daily life as it is, and destroys anything in its way. Let's examine some of those parameters in detail and consider some disasters that have occurred due to these climate changes.*

Keywords: Disaster, Temperature, Forecast, Wind, Humidity, Dew, Drought, Storms, Wildfire.

I. INTRODUCTION

Weather changes are a major global problem right now, and the World is becoming more susceptible to it. Climate change refers to changes in Earth's climate. It discusses how the climate has evolved over many years, rather than just a few decades. The Earth's climate has undergone continuous evolution and change. Natural disasters, such as floods, forest fires, and volcanic eruptions, have contributed to some of these changes. However, many of them are the result of

human activity. Deforestation, the burning of fossil fuels, livestock farming, and other human activities [1].

All forms of life on Earth will be affected if the current climate change trend continues unabated. The monsoon patterns will change, the Earth's temperature will rise, sea levels will increase, and storms, volcanic eruptions, and other natural disasters will occur more frequently. People will be unable to drink clean water or breathe clean air because the environment will become increasingly polluted. Earthly existence will come to an end [4].

II. WEATHER PARAMETERS

A. Maximum Temperature Forecast

The day's sunshine is used to calculate the maximum temperature that will be predicted. The temperature conditions are significantly affected by cold and warm advection. The temperature of the air is very important for agriculture. Crop plants thrive in temperatures that are conducive to their development. The ideal temperature should be maintained for normal growth [2].

B. Minimum Temperature Forecast

The night's cloudy conditions are the basis for the forecast of the minimum temperature. The temperature at night is significantly influenced by cold and warm advection. The minimum temperature stays close to the freezing point throughout the winter. The forecast of the minimum temperature is crucial for protecting crops from damage caused by low temperatures. The temperature rises throughout the summer, reaching its highest point in May and June [8]. Warm advection causes an abrupt temperature rise. The result is an intensified heat wave that is harmful to crop plants. Similarly, cold advection causes a temperature drop during winter. It results in frosty nights and cold waves.

C. Wind Forecast

The horizontal pressure gradient established between the two stations causes the mass of air to move, resulting in wind. The isobar spacing is used to determine the wind forecast. The winds are stronger and closer to the isobars and vice versa. Strong surface winds are typically linked to cyclonic circulation or low-pressure regions [3]. The surface chart's pressure distribution is crucial to the wind forecast. The wind speed would be greater the closer the isobars. The highest wind speed, which is 850 Mb, cannot be exceeded at the surface. When applying fertilizer and chemicals by spray, the wind forecast is crucial.

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D. Cloud Forecast/Precipitation

The synoptic conditions determine the forecast for cloud cover. Assume that the region is influenced by the upper air cyclonic circulation or upper air through low pressure. Depending on the number of water vapours present, cloudiness or precipitation may be anticipated in that case.

Farmers can use the data on these weather parameters to make decisions about spraying, irrigating, and harvesting their crops. Additionally, agricultural processes such as threshing and drying require sunlight [5].

E. Dew Forecast

When the air temperature reaches the dew point, dew forms on vegetation near the earth's surface in the morning. "Dew" refers to the condensation of airborne water vapours cooled by radiation losses on the surface of vegetation. Compared to the amount of precipitation, the amount of dew is minimal [9].

F. Evaporation

The prevailing and anticipated weather conditions both influence the rate of evaporation. To apply irrigation to the crops, forecasting evaporation is necessary. The type of soil and the crop grown determine the application of irrigation. The amount of accumulated evaporation is solely determined by the irrigation applied. The weather affects the amount of water lost. To use water wisely, anticipating evaporation is helpful when planning irrigation [6].

G. Humidity

The amount of water vapour in our atmosphere is measured by humidity. Because water vapour holds heat in the air, the air feels extremely muggy and uncomfortable for our skin when the humidity and temperature are high. More moisture can be retained by warm air. On our skin, the air feels much drier when the humidity is low. This can happen, for instance, in the desert or on a crisp, cold winter day [12]. The climate and location determine the air's humidity. The ideal humidity levels are between 30% and 60%, and the ideal relative humidity indoors is between 30% and 50%. If the humidity level is too low, more water evaporates than falls, which can lead to drought in the area [8].

H. Frost Forecast

Frost refers to the layer of ice crystals. A type of precipitation is frost. Frost also plays a significant role in agriculture, just like dew. The dew point determines how frost forms. The water vapours directly transform into ice crystals when the dew point drops below freezing. Sublimation is the name of this method. Crop plants are damaged by the low temperature caused by frost [8].

Conditions favourable to the development of frost include:

- The sky should be clear.
- Calm conditions.
- Excessive radiational cooling.
- Low water content in the air.
- Anticyclone wind
- There must be a high-pressure region.[20]

III. DISASTERS CAUSED BY CLIMATE CHANGE

A. Hindenburg - The Disaster

In 1937, an airship was involved in an accident. The airship was the longest in its class, had the largest envelope volume, and was the lead ship of the Hindenburg class. It carried commercial passengers. The German Zeppelin Airline Company was responsible for operating it, while the Zeppelin Company (Luftschiffbau Zeppelin GmbH) was in charge of designing and building it. [13] It got its name from Field Marshal From 1925 to 1934, Germany's president was Paul von Hindenburg. It caught fire and collapsed while attempting to dock with its mooring mast at Naval Air Station Lakehurst. Officially, the fire was caused by an electrical discharge in the atmosphere near an airship leak of hydrogen gas; On the other hand, it was rumoured that the dirigible had been sabotaged by anti-Nazis [15]. The company considers the Hindenburg to be a tragic event that could have been avoided if it hadn't been overconfident and ignored previous failures. They aim to identify similar market disasters caused by humans and warn people about them before they occur [10].

B. Chernobyl

The nuclear accident known as the Chernobyl disaster occurred on the 26th of April, 1986, at the No. The Chernobyl nuclear power plant has four reactors. In the Chornobyl Exclusion Zone, forest fires are not a new occurrence; However, climate change has increased both their frequency and intensity. Additionally, they are taking place in locations where higher levels of radioactive fallout have been deposited. Approximately one-fifth of Belarus's land remains contaminated following the explosion, and the wind carried an estimated 70% of the debris. Research into the disaster's effects on wildlife and the surrounding forest is also ongoing. Because so many trees succumbed to high radiation levels and turned reddish-brown, the four-square-mile area immediately surrounding the accident was dubbed the "Red Forest"[19]. Even though many trees have regrown, scientists have recently observed that some of the area's wildlife species are experiencing increased cataracts and albinism, as well as a decline in beneficial bacteria.

C. Australia wildfires

The worst bushfire season in Australia's history began at the beginning of 2020, following Australia's hottest year ever, and has resulted in the deaths of at least 28 people. More than a billion people have killed native animals, and some species and ecosystems may never recover. Australia is prone to drought, has hot, dry weather, and frequently experiences bushfires [4]. These bushfires will cause Environmental effects. They will affect the growth of plants and plant vegetation on a large scale. Global warming is another major factor in this situation [19]. These fires are becoming more frequent and intense due to a significant increase in carbon emissions.

As a result, it becomes difficult to gauge the extent of its damage, and the season of the bushfire can extend its usual duration. Although some of these bushfires are caused by natural occurrences, such as lightning strikes and climate change, human activities, including grinding and welding, careless disposal of cigarettes and matches, machine sparks, and arcing lines, also contribute to others [4].



Figure 1: Bushfires [7]

D. African Drought

The crop grown during the first rains of the year is typically planted in March or April. The rainfall in 2011 was insufficient and late, falling in late April and May. Due to their late planting, the crops are only now being harvested. In July, a poor harvest and lack of pasture exacerbated the issues with food security. Drought primarily affects crops, which in turn impact human life. If food is not available, people cannot survive [11]. Additionally, the earlier crop was poor, which was harvested early in the year. At least 20% of a region's households face severe food shortages and are unable to cope; Rates of acute malnutrition exceed 30%; Additionally, the mortality rate is greater than two per 10,000 people per day. This Drought is affecting the people of Africa significantly [17].

E. Superstorm Sandy

The massive storm known as Superstorm Sandy, also known as Hurricane Sandy or Post-Tropical Cyclone Sandy, caused significant flooding and wind damage. Sandy's severity was exacerbated by the interaction of three elements: a powerful hurricane fueled by the moisture and energy of the Atlantic Ocean's higher-than-average sea surface temperatures, and a peculiarly shaped dip in the jet stream [12]. The Sandy Storm primarily affects people in coastal areas. People are more resilient in the face of loss, which enables them to overcome it more effectively. This may have been caused by Arctic warming, moving the storm from the east to the west, and lunar high tides that raised the sea level on the East Coast by a few feet [14]. "Retreat from the shoreline and take remedial action now to floodproof ourselves." These are some of his suggestions:

- Equipment in the flooded power grid should be raised to levels that are higher than storm surges [19].

- Reclassify floodplains and mandate their evacuation in the event of an emergency.
- bolstered entrances to the lower floors of skyscrapers [18].



Figure 2: Superstorm Sandy

F. Dry Corridor in Central America

Climate shocks, such as El Niño, have an impact on crop planting and harvesting in the Dry Corridor, and they will exacerbate the already fragile food security in the region. COVID-19 is currently driving an even larger number of people in the area into poverty and hunger [20]. Due to the intensified "heat wave" in July, which affects the flowering and grain-filling phases of crops, the production of basic grain crops in Central America faces a significant risk of contraction. The self-consumption of maize and bean crops is expected to be most affected, particularly in the "Dry Corridor" areas. The timing of sowing and the geographic distribution of rain determine how much the crops are affected [16].



Figure 3: Dry Corridor



Table 1: Deadliest Disasters Due to Climate Change. [15]

(a)	Disaster type	Year	Country	Deaths
1	Drought	1983	Ethiopia	300 000
2	Storm (<i>Bhola</i>)	1970	Bangladesh	300 000
3	Drought	1983	Sudan	150 000
4	Storm (<i>Gorky</i>)	1991	Bangladesh	138 866
5	Storm (<i>Nargis</i>)	2008	Myanmar	138 366
6	Drought	1973	Ethiopia	100 000
7	Drought	1981	Mozambique	100 000
8	Extreme temperature	2010	Russian Federation	55 736
9	Flood	1999	Bolivarian Republic of Venezuela	30 000
10	Flood	1974	Bangladesh	28 700

Table 2: Economic Loss Due to Disaster [15]

(b)	Disaster type	Year	Country	Economic losses (in US\$ billion)
1	Storm (<i>Katrina</i>)	2005	United States	163.61
2	Storm (<i>Harvey</i>)	2017	United States	96.94
3	Storm (<i>Maria</i>)	2017	United States	69.39
4	Storm (<i>Irma</i>)	2017	United States	58.16
5	Storm (<i>Sandy</i>)	2012	United States	54.47
6	Storm (<i>Andrew</i>)	1992	United States	48.27
7	Flood	1998	China	47.02
8	Flood	2011	Thailand	45.46
9	Storm (<i>Ike</i>)	2008	United States	35.63
10	Flood	1995	Democratic People’s Republic of Korea	25.17

DECLARATION

IV. CONCLUSION

These are just a few of the significant events that climate change and natural disasters bring about. Ultimately, all other aspects of history reveal one crucial fact. We are responsible for our demise and destiny. We are the ones who have a significant impact on our environment and climate change. As a result, we must be prepared to address problems in our domain. We must be ready for all future disasters by understanding various climate parameters, as we have lost nearly 300,000 people in a single location due to some disasters. Climate change isn't some supernatural force that science can't explain. We simply fail to take into account every parameter; The extent of climate change is determined by everything in those parameters. Therefore, to be prepared to reduce casualty numbers and losses, we need to know how to identify various climate changes—every life, whether human or planetary, is significant.

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Akhil Kumar Reddy A from Andhra Pradesh, India, I am pursuing my career in Jain Global Campus, Bangalore, Karnataka, India. I am in the final year of my completion period. I enjoy researching topics that are often overlooked, and I have great admiration for the researchers and development teams in various sectors who continually innovate and explore new, interesting topics, helping the world progress faster and more safely.



Swaroop S from Bangalore, India, I am pursuing my graduation in Jain Global Campus, Bangalore, Karnataka, India—Department of Computer Science and Engineering. I would describe myself as a kind-hearted and honest person who wants my surroundings to be happy and maintain a peaceful environment. I am confident in my abilities to produce, and while I prepare for the worst, I do the work necessary to tilt the odds in favour of the best happening.



Achammagari Nitika from Kurnool, Andhra Pradesh, India. I am currently pursuing my final year at Jain Global Campus, Bangalore, Karnataka, India. I am passionate about my work. I am as curious as an individual who is passionate about exploring new ideas and pushing the boundaries of knowledge in my field. I am a team player and value collaboration and feedback from my peers. I have a deep interest in learning and continually strive to expand my knowledge and skill set.



Sai Pranav Kumar. Pursuing my B.Sc. from Andhra Pradesh, India. Tech final year in computer science engineering from Jain University, Bengaluru, Karnataka, and got a place in L&T Mindtree. As an aspiring researcher, I am a curious and diligent individual who is passionate about. I possess strong analytical skills and attention to detail, which allows me to analyse and interpret complex data effectively.

My enthusiasm and dedication to research make me a promising candidate who is committed to making meaningful contributions to the field.



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