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Topic: Climate Change bringing Climate Disaster to Pakistan

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Essay

Despite contributing less than 1% to global greenhouse gas emissions, Pakistan is ranked the 5th most vulnerable country to climate change by Germanwatch's Global Climate Risk Index. At the same time, a United Nations Common Country Analysis 2024 report calls it the 27th least prepared country to cope with climate impacts. Climate change refers to long-term shifts in earth's average weather patterns, including temperature, rainfall, wind patterns, and the frequency of extreme weather events, over decades or longer. It is primarily driven today by human activities. These human activities include burning of fossil fuels, like coal, oil, gas, which releases greenhouse gases in the atmosphere. It also includes deforestation, which reduces the planet's ability to absorb carbon dioxide (CO_2). Moreover, industrial and agricultural processes are also such human activities that emit methane and nitrous oxide and drives climate change. As a result, the planet is experiencing rising temperatures, melting glaciers, sea-level

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rise, and an increase in extreme weather events. Overall, climate change is no longer a future concern; it is a present day global crisis threatening ecosystems, economies and human survival. This essay will explore how climate change, driven largely by human activities, is intensifying environmental degradation and triggering frequent climate disasters in Pakistan, while highlighting the country's growing vulnerabilities and urgent need for effective climate adaptation and mitigation strategies.

Pakistan, due to its unique geography, diverse climate zones and reliance on agriculture, is particularly highly exposed to the effects of climate change. The country faces increasing incidents of floods, heatwaves, drought, and glacial melting. These incidents have caused widespread damage to communities, infrastructure, and the economy. Not only these incidents threaten human lives but also they exacerbate challenges like water scarcity, food insecurity and displacement. As climate related risks grow, Pakistan faces mounting

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pressure to implement effective climate adaptation and mitigation strategies to safeguard both its people and its long-term development.

Starting from the factors that make Pakistan vulnerable to climate change. The first and most significant factor is its geographic and topographic characteristics. The country's diverse landscape includes low low lying plains, arid deserts, coastal areas, and mountainous regions in the north. This diversity makes Pakistan prone to variety of climate disasters. For example, because of climate change, monsoon crossed Himalayan region and reached Tibetan Plateau experiencing 100 Km westward shift in monsoon pattern in the past 3 (three) decades. This shift in monsoon significantly affected the water cycle. that disrupted Pakistan's water availability, leading to increased floods and prolonged droughts. Moreover, the low lying Indus River plains are highly susceptible to the flooding during heavy rainfall, while northern mountainous regions face risks from glacial melting and

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landslides. These geographic and climatic features combine to create a high level of natural vulnerability, making Pakistan especially sensitive to the impacts of climate change.

The second most significant reason behind making Pakistan exposed to climate change is its hydrological factor. Pakistan rely on transboundary water resources, particularly rivers originating from its neighboring countries. The Indus River system, which origibegins in India, and Kabul River starts in the Hindu Kush mountains of Afghanistan. Both the Indus river and Kabul river are crucial for Pakistan's agriculture, drinking water and hydropower. Change in the percipitation and glacial melting directly affect the quantity and water availability in Pakistan. This dependence makes the country highly sensitive to both climate induced changes and geopolitical tensions over water-sharing agreements. As a result, any disruption in the flow of these transboundary rivers can intensify water scarcity, reduce crop yields, and strain energy and flood security

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Another major factor contributing to Pakistan's vulnerability is its economic structure, particularly the heavy reliance on agriculture. Agriculture contributes a significant portion of around 23% to the country's GDP. Moreover, around 40% of its population depends directly on farming for their livelihoods. Climate induced events such as floods, droughts and heatwaves directly threaten cultivating seasons. Because much of the farming is rain-fed rather than irrigated, irregular rainfall and shifts in monsoon patterns have an especially severe impact on agriculture. This economic dependence on climate-sensitive sector amplifies the overall vulnerability of Pakistan, as damage to agriculture affects both livelihoods and the broader economy of the country.

After outlining the factors that make Pakistan vulnerable to climate change, it is important to examine the climate disasters drawn by climate change that have already impacted the country. Firstly, it is devastating flood crisis caused by climate change.

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Floods are the most destructive and frequent climate induced disaster in Pakistan. Change in the rainfall patterns, melting glaciers in the north, and monsoon system have caused river to overflow, especially the Indus River, resulting in the large tract of farmland, homes, and infrastructure. According to the National Disaster Management Authority (NDMA) report of 2025 floods in Pakistan, the floods in Punjab caused over 1000 deaths and nearly 1100 casualties. Hence, devastating flood crisis marks itself as the dealiest disaster caused by climate change in Pakistan.

Secondly, Pakistan has been experiencing severe heatwaves, with temperatures soaring for above the historical averages. These severe heatwaves are particularly intense in southern regions such as Sindh and Southern Punjab. Heat-wave causes direct threat to human health such as dehydration, heatstroke, and even death. Not only do severe heatwave pose threats to human healt but also negatively impact agriculture by reducing crop yields and stressing livestock.

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For example, severe heatwaves caused temperature soaring in April through June 2025. According to Pakistan Metereological Department (PMD), temperature soaring of about 6°C to 8°C above seasonal normal temperature was experience in Pakistan — between April and June of 2025.

Thirdly, severe climate driven drought condition is another disaster Pakistan has been experiencing, particularly in arid and semi-arid regions such as: Balochistan, Sindh, and Southern Punjab. Droughts, similar to heatwaves, not only do affect water availability for drinking and irrigation, but also severly affect agriculture leading to crop failures, livestock losses and foodinsecurity. Prolonged dry spells, rising temperatures and reduced rainfall have made water scarcity a persistent challenge. For example, Pakistan experienced an overall decline of 42% below normal rainfall from September 2024 to January 2025. Sindh recorded 63% decline, Balochistan recorded 53% of decline, and Punjab recorded 41% decline in the annual rainfall during the same time period. The rainfall decline caused jeopardizing water supply, agriculture,

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and livelihoods in large parts of Pakistan, and therefore, severe droughts making its place in climate driven disasters in Pakistan.

Fourthly, Glacial lake outburst floods caused by climate change is another climate disaster frequently experience in Pakistan. Pakistan holds World's 3rd largest concentration of glacier ice outside polar regions. There are around 7000 glaciers in Hindu Kush, Karakoram, and Himalayan ranges of Pakistan. Apart from that, there are around 3000 glacial lakes in Pakistan out of which 36 are in highly vulnerable condition, according to NDMA. Glacial lake outburst flood not only affect infrastructure by causing floods, but also very harmful for human life. A stark example is the recent glacial lake outburst flood in district Ghizer back in 2022. The GLOF in Ghizer damaged 211 houses and killed 9 people. Therefore, glacial lake outburst flood is another disaster in Pakistan caused by climate change.

Adding to this, 2025 brought Pakistan a horrifying cloudburst, unrelenting, destructive and unforgettable. Cloudburst

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is an extreme weather event where a large amount of rainfall occurs in a very short period of time, usually over a small area. The rainfall intensity of cloudburst is very high, often about 100mm (4 inches) per hour. Cloudbursts can lead to flash floods, landslides, and sudden distruction of infrastructure. For example, severe cloudbursts were experienced recently in several cities of Khyber Pakhtunkhwa, among which the most destructive cloudburst one was that of Buner. It affected in many ways, such as, it caused death of around 230 people in Buner alone. Moreover, around 30000 acres of farmland in KP, and more than 700 houses were damaged and destroyed. A record 150mm (6inches) of rain was experienced in Buner. So, deadly and destructive cloudbursts are another disasters caused by climate change in Pakistan.

Moving down the ladder, Pakistan has been experiencing forest fires intensified by high temperature and heatwaves. A forest fire is an uncontrolled fire that spreads rapidly through forest areas, burning trees, dry leaves,

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grass, and vegetation. Forest fires not only destroy forests, but also affect wildlife and nearby human settlements. According to a climate expert cited in The Nation, Pakistan has seen a 12.7% rise in wildfires between 2001 and 2020. Moreover, in a forest fire in Chakdara in May 2025, NDMA noted dry deciduous trees and accumulated dry leaves. The NDMA further issued an advisory warning of increased fire risk for February – April 2025. Hence, such risks result in the form of climate driven disasters in Pakistan.

Climate change also badly impact agriculture sector devastation, causing food security crisis in Pakistan. Repeated floods, prolonged droughts, intense heatwaves and shifting rainfall patterns have severely damaged crop production, reduced soil fertility and disrupted planting cycles. As a result of which crops such as wheat, rice, and maize face declining yields. For example, Pakistan, because of climate change experienced a record decline of crop yields in the recent years. Wheat yields faced a decline of about 14% and rice yields declined upto 20.5%.

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from the annual average yields. These declines cause food scarcity and food security crisis across the country and endangers national stability deepening poverty and malnutrition, particularly in rural and climate-sensitive regions. Consequently, this has become another serious crisis for the country.

Furthermore, public health emergencies exacerbated by climate change has emerged as another grave disaster faced by Pakistan. Climate change has a huge impact on health sector, turning it into another are of concern. Air pollution intensified by prolonged dry spells have been filling the atmosphere with particulate matter that penetrates deep into lungs. This has led to a sharp rise in respiratory diseases such as asthama, chronic bronchitis, and chronic obstructive pulmonary diseases. Moreover, vector-borne and infectious disease are expanded due to frequent floods and stagnant water. For example, Malaria cases have rocketed from around 400000 in 2021 to 2.7 Million in 2023, a record increase of about 576% due to the after affects of 2022 deadliest floods in

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Pakistan. In this way, Pakistan continues to suffer from another major disaster.

Last but not the least, disruption of transportation system adds to the list of critical hardship for the nation. Destructive events caused by climate change result in the damage of infrastructures such as bridges, roads and highways, causing loss in the connectivity infrastructure and making lifes more difficult for the people and transportation system. For example, in the post 2025 floods in KP, several organizations, non-governmental organization (NGO), and social workers wanted to visit the flood affected areas for bring providing food, clothes and other necessary stuff for the affected people. However, because of the loss in critical infrastructure connectivity, it was very difficult for helping and connecting with the affected people. Therefore, this remains one more severe calamity for Pakistan.

Having highlighted the severity of climate induced disasters, attentions must now be directed towards effective strategies to mitigate and

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manage their impacts. At first place, the government needs to engage with international community. It also need to participate in the Conference of the Parties (COP), the way it strongly advocated in COP-27 and COP-28 the establishment of loss and damage funds. By participating in climate related conferences and platforms, the government should also promote climate injustic narrative. It also should highlight the role of global north in climate change and its footprint of carbon emission. Pakistan government should also give leverage to carbon trading and adopt California's Cap and Trade program, designed for decline in green-house gases emission. This will help Pakistan to trade carbon emission and earn dollars in return, that would also be helpful in growing GDP or tackling the economic vulnerabilies of the country.

In addition to this, water resource management can also be remarkable step in terms of tackling climate driven disasters. The country faces increasing water stress due to erratic rainfall, melting glaciers, rapid

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population growth, and ineffective irrigation practices. Therefore, modernizing irrigation systems, such as promoting drip and sprinkler irrigation, constructing small and medium sized dams, and improving rainwater harvesting can help conserve water and ensure sustainable supply. Moreover, the government needs to develop GIS database. GIS database can be helpful to monitor the quality and quantity of water. It also assess the usage and resources for resource and management. Hence, by adopting integrated water resource management, Pakistan can significantly minimize climate-induced water crisis and secure its agriculture and domestic water needs.

Lastly, strengthening disaster preparedness and response play a pivotal role in minimizing the destructive impacts of climate change in Pakistan. With the growing occurrence of flood, drought, heatwaves and sudden cloudbursts, it is essential to strengthen early warning systems, improve weather forecasting, and enhance realtime communication networks to alter vulnerable populations in advance. Moreover, district administrations and NDMA with collaborating together

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should identify safe evacuation zones, and develop and implement efficient rescue mechanisms. Doing, such collaborations, so can significantly reduce human and economic losses by the time climate driven disasters are at the door step. Therefore, a well-coordinated and response mechanism is vital for safeguarding lives and building national resilience against climate-driven disasters.

In conclusion, climate change has emerged as a profound threat to Pakistan, intensifying natural disasters, undermining food security, straining the health sector, and deepening socio-economic vulnerabilities. The country's geographic location, hydrological challenges, and its heavy reliance on agriculture further amplify its exposure to climate-induced risks such as floods, droughts, heatwaves, and forest fires. While Pakistan contributes minimally to global emissions, it bears a disproportionate burden of climate devastation. Therefore, urgent and coordinated action is imperative through effective water resource management, robust disaster

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management and response system, and active participation in global climate forums like COP. Only through collective national commitment and international cooperation can Pakistan mitigate the impacts of climate change and secure a resilient future for generations to come.

The End.