

Climate Change: Pakistan's Soaring Vulnerability

Author

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Abstract

Climate change is considered to be the new horror for the human race. After years, decades, and centuries of never-ending wars globally, the world was finally set to achieve peace and stability, but a non-conventional threat to the human race has been threatening the human population for the past few decades. However, the magnitude of this threat is not equal in every part of the world, some are facing mild consequences, but some communities face severe implications of climate change, and Pakistan is one of those countries in the world. In this research, the author aims to research the intensity of the effects of climate change in Pakistan, Who are the core perpetrators of climate change? How Pakistan is facing severe consequences on psychological, economic, and social grounds? Recommendation to be adapted in order to save Pakistan from severe future effects of climate change? Only the primary effects of climate change are evident to the people, but the underlying secondary effects of this dilemma are not highlighted, primarily in the context of Pakistan, how it leads to the social dismantling and psychological pressure on the people suffering through this. For this study, the data has been collected from sources such as articles, journals, books, speeches, conferences, reports, and surveys. To tackle the primary and secondary effects of the issues, it is obligatory to understand the issue by taking a holistic approach.

Keywords: Climate Change, Disasters, Social Economic Instability, Population, Carbon emission, Greenhouse gases

Background

The human population inherited Earth a long time ago, and the interaction between humans and nature has always existed. Humans were said to inhabit Earth 1.5 to 2 million years ago (Stoneking, 2008). Our ancestors have survived using the resources that Earth has to offer. May it be food, water, and shelter, these are the necessities needed to live on earth. However, over the period, the unplanned multiplication of human beings and their mismanagement of resources have led to devastating results for the entire population.

In the post-industrialized world, the use of natural resources has been tremendous. Due to immense human greed, the idea of resource scarcity was developed during the period of industrialization (Randall, 2021). It's evident that to extensive demand for finished goods throughout the world and increased globalization had its side effects. However, after the idea of nation-states, separate ideologies, frameworks, and systems of governments decided the fate of their people. At the time of partition, Pakistan only had 34 industrial units out of 921 industrial units throughout the sub-continent (Ahmad, 2016). However, at that time East Pakistan was also under the same flag, which is today an independent state, Bangladesh. With

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only a handful of industries in hand, Pakistan was highly dependable on agriculture. On the other hand, the Western world was flourishing in terms of industrialization.

Unfortunately, the implications of resource exploitation, unstable business practices, and rapid growth of pollution resulted in issues such as global warming, degradation of ozone layer, contamination of soil and water, and destruction of forests and biodiversity throughout the world, leading to uneven implications in different parts of the world, making Pakistan, one of the top 10 countries affected by Climate Change from 1999 to 2018 (David Eckstein, Vera Künzel, Laura Schäfer, Maik Winges , 2020). This clearly indicates that Pakistan is facing the consequences of the unsustainable actions happening throughout the world. Moreover, these effects are in the shape of floods, unusual temperatures, changing rain patterns, melting of glaciers, dropped air quality index, and declining biodiversity in Pakistan. These issues are not only a threat to the lives of the people in Pakistan, but they are also a threat to their human dignity and social relations.

To understand the intensity of these issues, the Climate Risk Index (CRI) was used by the German think tank, Germanwatch to analyse the extent of countries and regions that have been affected by climate change. The escalating signs of climate change are no longer to be ignored, and such tools are being developed to take timely action for the people of the affected regions. The Millennium Development Goals (MDGs) were easier to understand, implement, and monitor, but that is not the case with Sustainable Development Goals (SDGs) (Kumar, 2016). Everyone wants to see the change caused by SDGs but very few are readily available to go against their personal and business interests to save the planet. The rapid population growth in Pakistan demands redoubling of the efforts to meet the expectations of SDGs (Brollo, 2021). Even though it has made progress in some areas there is a lot to do in order to make people aware of the causes and effects of climate change and how it can completely change the lives of the coming generations.

History of Climate Change

The discovery of climate change was made back at the start of the 19th century when global temperatures started to rise a bit, but there was no solid evidence that could've clearly indicated this dilemma. During the Napoleonic era, Joseph Fourier, the mathematician working for Napoleon described the phenomena of the greenhouse, and explained how Earth's atmosphere traps warmth due to which the planet has become survivable, otherwise, it would have been very cold (Fleming, 1999). However, his work didn't receive the attention it deserved leading to further ignorance regarding the issue of climate change.

The measurement of atmospheric CO₂ with high accuracy was conducted in 1958 by Charles David Keeling (Cubasch, 2007), the true measure of the global carbon cycle was determined from his research, giving an understanding of the implications of excessive CO₂ in the atmosphere of the earth. However, during the era of roaring industrialization such studies were not given great attention, as communities were more fantasized by the idea of modernization.

Excessive sulfate aerosol emission was measured in the atmosphere in the 1950s as well (Hegerl, 2019). Through modeling and attributions, it was confirmed that the forcing of aerosol was responsible for altering regional temperatures, it also caused long-term changes in the pattern of monsoons. Much of the research on such issues was conducted in the latter half of the 20th century, but that was too done keeping in sight the parameters and atmospheric conditions of the West.

However, by the time of the 21st century, it was clear that environmental issues such as climate change were as important as poverty, hunger, diseases, gender inequality, and lack of education. As Millennium Development Goals (MDGs) were laid out by the United Nations in the year 2000. They were established in response to many significant challenges faced by the world (McArthur, 2014). All members of the United Nations agreed to this agenda.

When it comes to Pakistan and MDG No. 7, Ensuring Environmental Stability, the country was able to only achieve the target of improving water resources and land protection, but all the other targets were not met (Habib, 2019). Pakistan was only able to produce regular data on 33 of the 60 MDG indicators (Khan, 2019). However, to build a link to the 17 SDGs that were crafted in 2015, and are set to achieve in 2030, Pakistan is under hot waters to achieve the targets.

Roots of Climate Change

Climate change is still a vague idea to many communities around the world, especially the ones least affected by it. Not only this, but literacy rates have also played a pivotal role in determining the awareness ratio of climate change among communities. Many people still believe it's a myth or propaganda of a certain group of people, which is truly unacceptable at a time when the haunting of this phenomenon is taking the lives of thousands of people around the world through unpredictable means. The average surface temperature of the earth has increased by 1 degree Celsius since 1900 but the surprising part here is that half of the increase has been from the mid-1970s (Sciences, 2020). May it be the lower atmosphere or the upper layers of oceans, they have warmed, resulting in the melting of snow and ice in the northern hemisphere.

Climate change is the prime perpetrator behind the melting of ice which was frozen even before the existence of humans. The permafrost has seen the age of dinosaurs, the drifting of continents, and many other changes on the planet Earth. As the layers of thick ice are melting, ancient giant deadly viruses are coming into action. There are reasons why these viruses are special and of great concern, the viruses waking up from the ice have hundreds of genes and are comparatively larger in size than bacteria also, the Arctic permafrost regions have been experiencing an increase in air temperatures two times faster than the rest of the world (Langer, 2023), and this is the reason the sea levels are also escalating, which also pose a great threat to the region of Pakistan.

Unfortunately, Pakistan has also played a pivotal role in bringing severe consequences to itself. It is among the top 5 countries with the highest CO₂ emission in the world (Tawiah, 2023), making it an alarming situation for Pakistan. The country is responsible for emitting 0.85 metric tons of CO₂ per capita in the year 2019, but the number is set to increase to 1.048 tons per capita in the year 2028 (Tawiah, 2023). The story doesn't end here, Pakistan also contributes to 1.02% of global greenhouse gas emissions. Solely in 2018, it emitted 504.59 million tons of GH. However, still Pakistan is only contributes only 1% to the global greenhouse gas emissions, and is clearly not the only culprit that would cause climate change. Being in the top 10 countries affected by climate change the statistics clearly show that a lot of work needs to be done to curb the factors causing global warming and climate change, especially in Pakistan

Climate reality in Pakistan

Pakistan is the 8th most vulnerable country to climate change in the world. Out of 193 member states of the United Nations, Pakistan lies in the top 10 most affected countries by

climate change, putting risk on the lives of more than 231.4 million people in the 5th most populated country in the world. The history of Pakistan is filled with climate induced disasters that have taken the lives of many people in the region.

The deadly flooding in 2022, affected about 15% of the total population in Pakistan (Somani, 2023). In the summer of 2022, the country experienced unusual heat waves, which were later followed by unimaginable rain that caused extreme floods in the country. The temperature exceeded 50 degrees Celsius in many regions of Pakistan, leaving people praying for rain. However, the Global Change Impact Studies Centre in Islamabad indicated that the extreme temperature will be inviting heavy rain from July to September.

The rains from July to September caused the death of more than 1,300 people according to Consumer News Business Channel (Somani, 2023). The floods of 2022 washed away 1.2 million houses and displaced more than 33 million people in Pakistan. The Northern Part of Khyber Pakhtunkhwa, Upper and Lower Chitral, and southern districts of Balochistan were highly affected by the flash flooding (OCHA, 2023). Only between the dates of 27 to 30 July 2023, about 27,000 km² of land was affected by floods, as shown by the United Nations Satellite Centre (OCHA, 2023).

Apart from the devastating floods, there has been a rise in the mean temperature of 0.6 – 1.0 °C since the 20th century in the arid coastal areas (Farooqi, 2005). Not only this but there's an 18%-32% increase in rain in the monsoon regions, making it an alarming situation for these zones. Cloud coverage has decreased by 5% in central Pakistan and in the past 100 years, it has experienced 10 moderate, 7 weak, and 7 strong El-Nino events (Farooqi, 2005), indicating an alarming situation in the region due to climate-induced events.

Economic Impact

The climate-induced reduction in the productivity of wheat and rice would cost Pakistan \$19.5 billion in real GDP by 2050 (Khurshid, 2022). It sounds horrific when a country on the brink of a crumbling economy undergoes a heavy blow due to climate change. The changing weather patterns are the real culprit behind the declining condition of crops in Pakistan, these changes would result in a 20-30% reduction in livestock as well (Ishaque, 2022), agriculture and livestock sectors are two of the most significant sectors of Pakistan's economy, direct effect on these sectors is threatening for the weak economy of the country.

Both these sectors are responsible for 23% of GDP and 60% of the exports of the country. It would directly affect the employment of thousands of people in Pakistan and also would impact the food security situation in Pakistan as well as globally, land in Pakistan is becoming vulnerable to unannounced floods. Pakistan is already categorized as a low-income country with devastating human development indicators (Akram, 2014), the earthquake of 2005 was a turning point for Pakistan, which led to the birth of the National Disaster Management Authority (NDMA) but only a few years later, the devastating floods of 2010-11 showed that a lot has to be done when it comes to crisis management.

The temperature rise is adversely affecting the agricultural conditions in Pakistan, the Baluchistan plateau, central and south Punjab are highly vulnerable to extremely hot temperate, and it has been predicted that the annual temperature in Pakistan will soar by 4.3 – 4.9 degrees Celsius by 2085, leading to water scarcity and many other implications for farmers.

According to the Pakistan economic survey of 2016-17, canal water is utilized to cultivate 30% of the wheat crop area, 55% is cultivated through tube wells, and the rest 15% has no

active source of water for cultivation of the crops. 60% of the rain is received in the monsoon period, but due to climate change, the monsoon rain is declining over time (Khan M. A., 2020), and is also following unusual patterns, hampering the agricultural industry's progress in building the economy of Pakistan. The recent floods of 2022 have also played a disastrous role in crushing the country's economy and affecting the lives of millions of people in the country.

The flooding of 2022 caused \$14.9 billion in damages and \$15.2 billion in economic loss, leaving 9 million people at the stake of poverty, 15% of rice crops and 40% of cotton crops were affected due to the floods (CDP, 2022).

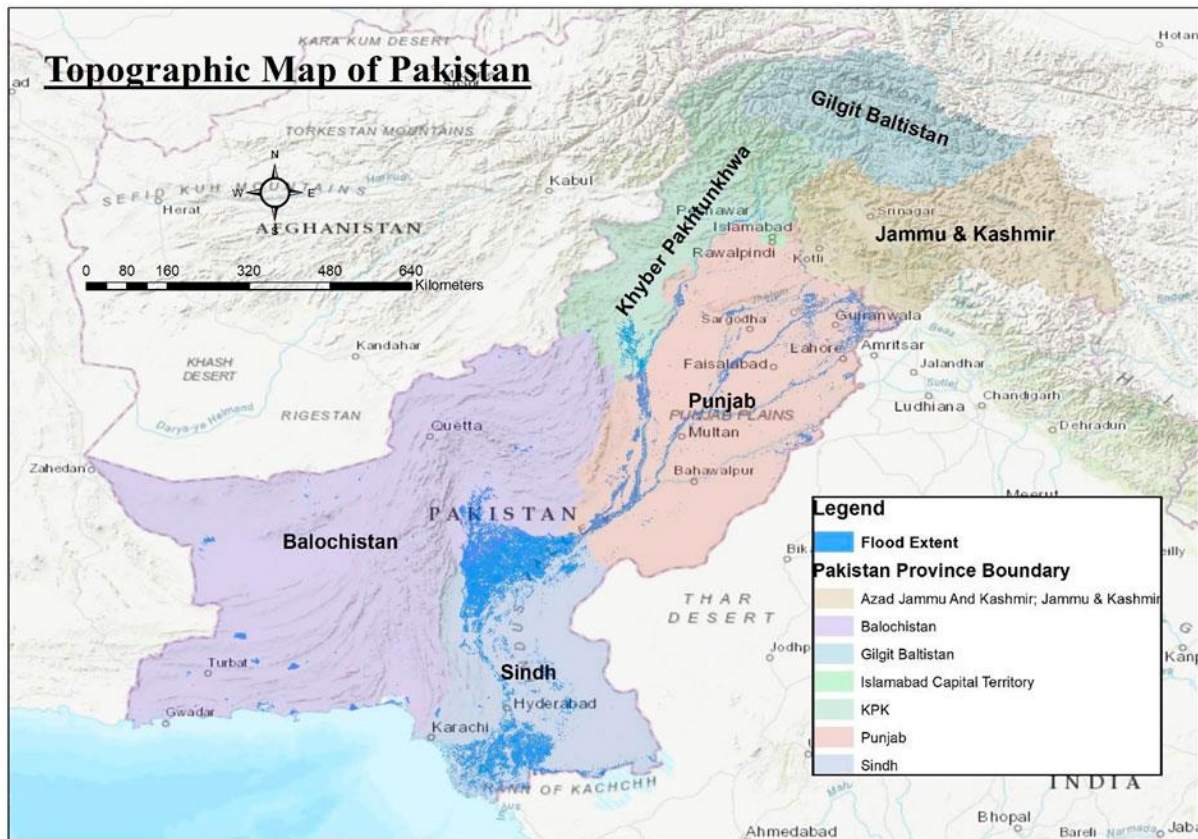


Fig 1 Sources: (ESRI topographic layer used)

About 40% of the overall impact was sustained by Sindh province, affecting the lives of children and women primarily. Central and South Punjab were also heavily impacted due to the floods. The effect of these floods disturbed the economy of Pakistan unevenly, primarily targeting the area of Sindh and Central & South Punjab.

Social Impact

1700 people lost their lives in Pakistan due to floods in 2022, about 13,000 people were injured and 33 million were impacted (NDMA, 2022). As disasters are known for creating horrific environments for children and women historically, the same is the case with the floods of 2022. Due to this climate-induced disaster, about 3.5 million children were unable to have access to education. Even after 6 months of floods, children were unable to go back to their schools, as either their institutions were destroyed, or their houses suffered the wrath of floods.

Families who lost their loved ones or their homes faced unimaginable social and economic stress, the floods have had a long-term impact on human development in Pakistan. In the areas that were completely washed out, only a quarter of households have returned home, as they lived in temporary shelters for months (Lauren Dahlin, 2023). Yet, many of them are still living in temporary shelters to survive. Some of the most significant areas of concern are food insecurity, travel disruptions, and the effect on children's mental health.

Even in February 2023, about 1.8 million people lived near flood waters according to the satellite imagery from the United Nations Office for the Coordination of Humanitarian Affairs. Still, the number has improved tremendously from the actual time of the flood, when 33 million people were affected. However, only the direct impacts of the flood were discussed such as the destruction of crops, homes, and livestock, but the underlying impacts such as lack of access to health, transportation, and education were widely ignored.

These floods were only a tiny portion of how climate change is impacting the country on economic and social grounds. Pakistan is one of those places where people have little to no idea of how to adapt to the changes proposed by climate change, floods, melting of glaciers, unusual weather patterns, and droughts are some prominent effects of this dilemma (Hussain, 2022).

The country has diverse weathers in different regions, starting from Gwadar to Gilgit, you'll have a variety of weathers to enjoy but that blessing is now turning into a curse. As climate change is hampering the weather patterns of these regions, extreme winters, and summers are becoming the fate of Pakistan. People in coastal areas are concerned with the increase in sea levels, the population residing in Hunza is facing floods due to the excessive melting of glaciers. There are tons of problems caused by one single dilemma. Back in 2015, about 700 people died due to heat strokes in Karachi alone (Hussain, 2022), and 136 extreme hot spells were experienced in the country only between 1997 to 2021, if we talk about the Thar and Cholistan deserts, people are suffering due to droughts, causing famine and food insecurity, people have to travel miles to get access to clean water.

Cities such as Rawalpindi, Gujranwala, Multan, Lahore, and Karachi have to deal with extreme smog in winter due to a lack of rain, which is another problem that Pakistan has been exposed to in recent years. Floods, droughts, heat waves, smog, rising sea levels, and melting of glaciers are causing unrest to millions of people in Pakistan who are already suffering from economic setbacks.

Psychological Drawbacks for Children and Women

Disasters leave direct and indirect impacts on the lives of people. However, due to the lack of data available on the underlying effects of Climate Change, the picture is unclear for the children of Pakistan. While the authorities are focused on reviving the economies after a disaster has hit, it's important to consider the psychological implications of any unpleasant event. The type and extent of loss play a pivotal role in determining the sense of grief, panic, loss, and sadness felt by the victims (Vujanovic, 2017). Moreover, the psychological effects of the disasters are more prominent among children, women, and elderly population (Makwana, 2019). The same is the case in Pakistan, the floods of 2010, 2015, 2020, and 2022 have impacted the lives of millions of children in the region.

Of the total families, 50% in flooded areas are worried that they will run out of food again, and only 40% of children made it back to school after the floods of 2022 (Lauren Dahlin, 2023). Majority of the children are unlikely to return to school and there are numerous

reasons to it. Some schools are not fully functional back again due to lack of funds to restore them and the travel time has also increased due to areas flooding. The well-being of children is heavily impacted, about 31% of people have lost their primary source of income (Lauren Dahlin, 2023), putting children under extreme stress.

Parents believe their children will need to work due to the economic setbacks caused by floods, and they won't be able to resume their education like before. According to the 2nd round of surveys conducted by the World Bank, parents reported that their children felt sad and became more quiet six months after the flood than one month after.

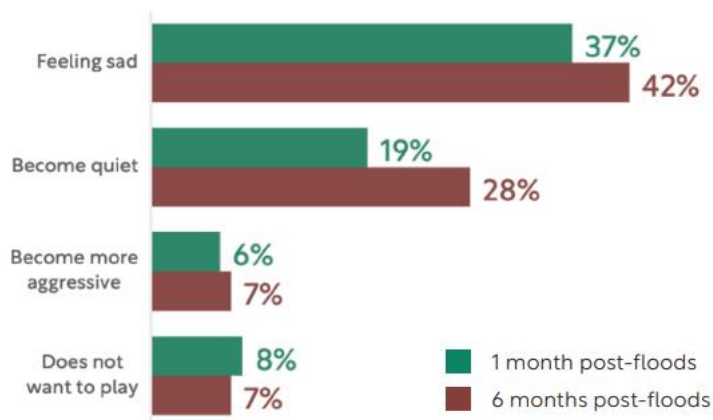


Fig 2 Source: (World Bank - *Children and Their Families Six Months After Pakistan's Floods*)

Higher rates of anxiety and sadness were reported in children, creating an alarming situation in children's mental health. Not only the floods, but extreme weather are also a reason for the closure of educational institutes in different parts of the country. In summer, extreme hot waves are the reason for extra holidays for children, and in winter excessive smog in major cities is hampering the education of children.

Women are also subjected to increased domestic violence and poor economic conditions due to the behavioral impact of climate change. When the economic conditions are affected by climate-induced events, financial uncertainty, and stress are culprits behind the sharp increase in domestic violence against women. Psychological factors do play a part in domestic violence but social factors also have prime importance in this issue (Azhar, 2012). Pakistan's vulnerability is soaring in contrast to climate change, and social, economic, and psychological factors have a significant role in allowing us to understand the situation holistically in order to get to the roots of the problem.

Recommendations

It's a lethal combination when a country suffering from extreme poverty is one of the most vulnerable communities to climate change. Pakistan needs to take timely action to acknowledge this issue and look for sustainable solutions. However, here are some of the recommendations for Pakistan to sustain the impacts of this global issue;

- Pakistan needs to assess and address the need for additional water storage and distribution infrastructure to save flood-vulnerable regions from another disaster. It also needs to upgrade existing agricultural infrastructure and enforce timely measures

to increase the life of existing storage facilities. The country needs to focus on water conservation on all levels to avoid water scarcity in the time of unexpected droughts.

- Develop models to understand the impact of climate change on the chemical, biological, physical, and financial aspects of the agricultural industry and make reliable predictions when it comes to climate change by gathering enough data.
- Pakistan needs to work on risk management systems by improving extension and surveillance systems at all levels.
- When it comes to health, reporting and data recording needs to improve in terms of climate-sensitive diseases.
- Pakistan needs to shift to renewable energy at least by 60% by 2030.
- Due to extreme smog and pollution in Pakistan, 30% of electric vehicles need to be incorporated into the vehicle industry by 2030 as per the climate promise of Pakistan.
- Disaster management teams should specifically collect data on the mental well-being of children and psychological first aid for children needs to be prioritized at all costs.
- The communication gap between sustainable development goals and the general public of Pakistan needs to shrink, allowing the majority population to be aware of their responsibilities toward a sustainable world.

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