

Pakistan's Climate Crisis: Challenges and Sustainable Solutions

1. Introduction

Thesis Statement: Pakistan faces significant climate crisis exacerbated by extreme weather events that poses serious challenges to its environment, economy, and society. It has adverse impacts on its agriculture, food security, and coastal populations; and demands sustainable solutions to adapt and mitigate its impacts.

2. Major Climate Crisis in Pakistan

- (a) Rising temperatures are accelerating the glacial melting in the Hindu-Kush Himalayan Region
- (b) Increased flooding due to the erratic rainfall patterns and glacial melting
- (c) Rapid Sea level rise: Oceans encroaching on human settlements
- (d) Threat of water scarcity due to retreating glacial masses

keep yourself short and more meaningful

3. Significant Challenges Faced by the Pakistan due to the Climate Crisis

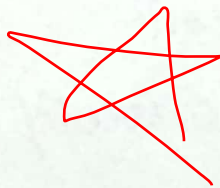
- (a) Increased Frequency and Intensity of Natural Disasters in Pakistan
- (b) Agricultural Decline due to drought and subsequent flooding

- (c) Displacement of coastal communities due to Sea-level rise in Sindh and Balochistan
- (d) Conflict over the scarce water resources

4. Sustainable Solutions to deal with climate crisis and its challenges

- (a) Disaster Risk Reduction by adopting Early Warning Systems
- (b) Climate Resilient Agriculture to reduce the food insecurity
- (c) By Building Blue - Green Infrastructure - Sponge cities to deal with floods and droughts
- (d) Smart Water Management System to reduce the conflicts

5. Conclusion.



In the fable of 'The Ant and the Grasshopper', the grasshopper enjoys the warm days of summer by singing and dancing, while the ant diligently stores food for the winter. When the cold arrives, the grasshopper finds himself unprepared and suffers as a result. This tale mirrors our current situation with climate crisis; if we continue to ignore the warnings and fail to prepare, we may face severe consequences in the future. Pakistan is already facing major climate crisis like rising temperatures that are accelerating the glacial melting in the third pole of the world. It is leading to the increased flooding and rapid sea-level rise, followed by the water scarcity in the region. The climate crisis lead to the increased frequency and intensity of the natural disasters in Pakistan. Agriculture is declining, communities are being displaced, and there is increased risk of inter provincial conflict over scarce water resources. Therefore, Pakistan needs sustainable solutions like disaster risk reduction, climate resilient agriculture and infrastructure, and smart water management systems to deal with these challenges.

Pakistan is facing rising temperatures each year that is accelerating the melting of the glaciers in the Hindukush and Himalayan region. These glaciers are the largest freshwater resource for Pakistan's rivers and their retreat would cause serious problems for its freshwater supply. International Center for Integrated Mountain Development states that 30-40% of the glacial mass in the Hindukush-Himalaya region could be lost by 2100 under current warming trends. Thus, it is a serious concern for Pakistan.

Rising temperature is not only causing glacial melting but also increasing the risk of flooding. The erratic rainfall pattern, especially in the monsoon season, is contributing to

the chances of floods in Pakistan. As it has been documented by the Pakistan Meteorological Department that monsoon season has seen a 15-20% increase in intensity in recent years leading to more frequent and severe flooding. Therefore, erratic rainfall patterns and increased glacial melting is augmenting Pakistan's climate crisis.

The erratic rainfall patterns and glacial melting is leading to rapid rise in sea-level. The oceans are encroaching on human settlements and causing salt water intrusion. NASA and UN-IPCC have been raising concerns about the mean sea-level rise in the recent years. The sea-level has risen approximately 21 cm or 8 inches in their respective research. Hence, sea-level rise is also a major climate ~~crisis~~ change concern that Pakistan is facing.

Pakistan is already facing water scarcity but the abnormal glacial melting will make it worse in the coming years. ~~glacial melting and inefficient irrigation practices~~. According to some researches, Pakistan has crossed the water scarcity threshold and is moving towards absolute scarcity. The per capita availability of water has dropped to less than 800 cubic meters/year as of 2025, down from 5000 cubic meters/year in 1947 (LEAD Pakistan, 2025 and IPRI). Therefore, acute water shortage is intensifying Pakistan's climate crisis.

These climate crisis are amplifying Pakistan's challenges by increasing the chances of natural disasters, ~~and~~ agricultural decline, displacement of coastal communities, and ~~inflaming~~ conflict over limited resources.

The most significant challenge posed by the climate change is the increased frequency and intensity of the natural disasters in Pakistan. Pakistan's disaster profile reinforces this argument as every new disaster causes more destruction and harm than the previous one. For instance, super floods of the 2010 affected 20 million people and ~~displace~~ caused 10 billion dollars in losses, whereas, catastrophic floods of 2022 affected 33 million people and caused at least 33 billion dollars in loss (Asian Development Bank and National Disaster Management Authority). The flash floods of 2025 have also wreaked havoc in the country. The evidence suggests that challenge of natural disaster is multiplying each year.

The climate crisis has also caused a decline in the agricultural output of Pakistan. It is mainly due to the drought and subsequent flooding in the country. As it is explicitly stated by the Ministry of National Food Security and Research, Pakistan:

"crop yield for wheat and rice have declined by 10-15% over the past decade due to unpredictable weather patterns"

This highlights the substantial challenges in agricultural sector of Pakistan worsen by climate change.

The Sea-level rise is a considerable climate ~~disaster~~ challenge that is displacing coastal communities in Sindh and Balochistan. Rising sea-level is producing climate refugees in the country and is leading to migration towards safe heavens.

It is estimated that by 2050, 2 million people in Pakistan could be at risk of displacement due to sea level rise (IPCC). Ultimately, sea-level rise is a pressing challenge for Pakistan.

The threat of water scarcity is fueling inter-provincial conflict over the limited water resources. Water security is a critical issue in Pakistan's political and economic landscape of four ethnically diverse provinces. In the recent years, there has been increasing issues over water allocations and blame on Punjab's encroaching over other provinces' water resources. Therefore, water scarcity is preparing a breeding ground for the conflicts in Pakistan.

These are critical challenges and are making the situation worse with each passing day, but Pakistan can adopt sustainable approaches to mitigate the impacts of climate change. As US President Barack Obama said:

"We are the first generation to feel the effect of climate change and the last generation who can do something about it"

- Barack Obama, UN Climate Summit, 2014.

Thus, it is imperative for Pakistan to move towards sustainable solutions to deal with its climate challenges.

Pakistan must work on disaster risk reduction to deal with its climate challenges. It involves adapting early warning systems and improving weather forecasting abilities to act timely before the disaster strikes. For example, sensors, satellites and weather forecasting tools detect risks such as rising river levels or glacial melting. Messages are then sent through radio, mobile phones, or local officials to alert communities. In this way, Pakistan can adapt ~~and~~ itself to the changing climatic conditions and mitigate its adverse impacts.

Pakistan can protect its agriculture sector from climate challenges by adopting climate resilient agriculture. This will also reduce the negative impact on Pakistan's food security. For example, by adopting drought resistant crops like millets, maize, pulses, etc in Punjab and Balochistan can give lifeline to Pakistan's agriculture. Therefore, it is necessary for Pakistan to look for new ways to adapt itself with the changing climatic conditions.

~~The increased frequency and intensity of natural disasters offer unique solutions like floods and droughts can be turned~~ ~~into opportunities by~~ ~~by~~ building blue-green infrastructure in Pakistan. Sponge cities offer unique solution to deal with both drought and floods. They can store water during the floods and cloudbursts by absorbing ~~it~~ like a sponge through permeable pavements, rain gardens and it can be later used in periods of droughts. **Copenhagen** has made great strides towards climate resilience using BGI over the last decade. Therefore, Pakistan can also work towards similar solutions.

The inter-provincial conflicts over limited water resources can be resolved by smart water management systems. Pakistan is an agrarian economy and it wastes over 90% of its fresh water due to inefficient irrigation practices. By using modern irrigation methods like **drip irrigation or sprinkler system**, Pakistan can work towards sustainable management of this precious resource. Hence, it is necessary for Pakistan to adopt smart water management systems to reduce conflicts among provinces.

From this analysis, it is clear that Pakistan is facing serious ~~climate~~ climate related challenges. The record breaking temperatures, increased glacial melting followed by flooding and subsequent drought are serious concerns. These challenges can be tackled by adopting the sustainable approaches. The adoption of climate resilient agriculture, blue-green infrastructure, modern irrigation methods and early warning systems can enhance Pakistan's defence against these challenges. The broader picture reveals that, although the challenges are significant but adaptation and mitigation approaches provide solutions to deal with it.

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