| Research Article |

# Climate Change in Pakistan and its Resilience Efforts

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***Abstract:*** *Climate change poses a critical and growing threat to Pakistan, with adverse impacts already marked across various sectors of the country's economy and environment. This paper explores the multidimensional challenges of climate change in Pakistan and examines the nation's resilience efforts in response to these challenges. Pakistan's geographical diversity, from the Himalayan and Karakoram mountain ranges to the vast plains and coastal regions, makes it particularly vulnerable to climate change-induced disasters, including extreme weather events, glacial melt, and rising temperatures. These changes have far-reaching consequences for agriculture, water resources, public health, and overall socio-economic stability. Pakistan has taken substantial steps to enhance its climate resilience in response to these challenges. The paper highlights key initiatives, such as the National Climate Change Policy and the Ten Billion Tree Tsunami Program, which reflect the country's commitment to mitigating and adapting to climate change. Despite these efforts, Pakistan faces ongoing challenges, including resource constraints and the need for improved coordination among various stakeholders.*

***Keywords:*** *Climate Change, Community Engagement, Climate Impacts, Global Warming, National Climate Change Policy, Resilience Efforts*

## Introduction

Climate change is an urgent and all-encompassing global issue that has captured the world's attention in recent decades. It is primarily driven by increased greenhouse gas emissions, largely due to

human activities such as burning fossil fuels, deforestation, and industrial processes. The consequences of this phenomenon include rising global temperatures, more frequent and severe weather events, melting polar ice caps, and rising sea levels. Climate change poses a profound threat to the environment, ecosystems, and human societies, impacting everything from agriculture and public health to geopolitical stability. Addressing this crisis requires a concerted global effort to reduce emissions, transition to sustainable energy sources, and adapt to the changes already in motion (Rasul & Ahmad, 2012). It is a multifaceted challenge that demands cooperation, innovation, and significant policy changes on a global scale.

Climate change poses a substantial and escalating threat to Pakistan, a country already grappling with various social, economic, and environmental challenges. Pakistan is experiencing a clear pattern of climate-related impacts, including more frequent and severe heatwaves, erratic monsoon patterns leading to devastating floods and droughts, and the accelerated melting of the country's vital Himalayan glaciers. These changes have dire consequences for Pakistan's agriculture, water resources, and energy security, which are deeply interconnected with the economy and livelihoods of its predominantly agrarian population. Additionally, urban areas, particularly Karachi, are facing increased vulnerability to sea-level rise and extreme weather events (Fahad & Wang, 2020). Recognizing the gravity of the situation, Pakistan has taken steps to address climate change through policy initiatives, such as its National Climate Change Policy and the establishment of the National Climate Change Authority. However, the road ahead is challenging, and international cooperation and innovative adaptation and mitigation strategies are crucial to safeguarding Pakistan's future in the face of climate change (T. Ahmed et al., 2020; Khan et al., 2016). The study addresses the impact of climate change in Pakistan and the effectiveness of its resilience efforts. The significance lies in understanding how a climate-vulnerable country like Pakistan is adapting to mitigate risks, protect vulnerable communities, and sustain economic development.

Climate Change in Pakistan

Historical climate trends in Pakistan reveal a complex and dynamic pattern influenced by a range of factors. Over the past century, Pakistan has experienced significant variations in temperature and precipitation. One notable trend is the steady increase in average temperatures. Data from the Pakistan Meteorological Department indicates that Pakistan has been warming at a rate of 0.6°C per century, with temperature rises being more pronounced in northern and western regions. This warming trend has far-reaching consequences, including more frequent and severe heatwaves, which can strain agriculture and public health systems (Saifullah et al., 2021). In terms of precipitation, the historical data indicates a notable regional variability. Coastal areas like Karachi have experienced a decrease in annual rainfall, leading to water scarcity concerns, while parts of northern Pakistan (Gilgit Baltistan) have seen an increase in rainfall, resulting in more frequent flooding events. The monsoon season, which is critical for Pakistan's agriculture, has displayed erratic patterns, with fluctuations in onset, intensity, and duration.

These trends in precipitation patterns pose challenges for water resource management, agriculture, and flood mitigation.

One of the most significant historical climate trends in Pakistan is related to the melting of its glaciers. As home to some of the world's highest mountains, Pakistan heavily relies on glacial meltwater for its rivers, and these glaciers are rapidly receding due to rising temperatures. This not only impacts water availability for agriculture and hydropower generation but also raises concerns about glacial lake outburst floods. Understanding these historical climate trends is crucial for policymakers and scientists in Pakistan to develop effective adaptation and mitigation strategies as they grapple with the complex realities of climate change in the region (Abid et al., 2019). Pakistan bears the stark evidence of climate change impacts, manifesting in multiple ways. Rising temperatures are a notable consequence of global warming. Over the past few decades, Pakistan has witnessed a consistent uptrend in its average temperature, particularly in its northern and western regions. This increase in temperature exacerbates the frequency and intensity of heat waves, posing grave risks to human health and agricultural productivity. The changing rainfall patterns are another conspicuous indicator. The monsoon season, which is pivotal for Pakistan's agriculture, exhibits erratic behavior, with delayed onsets, shortened durations, and uneven distribution of rainfall (Ali et al., 2021). These shifts disrupt the agricultural calendar, leading to droughts in some areas and floods in others, both of which significantly affect food security and livelihoods.

The Himalayan and Karakoram glaciers, which serve as vital freshwater sources for Pakistan's rivers, are receding at an alarming rate due to rising temperatures. This retreat jeopardizes water availability for irrigation, hydroelectric power generation, and drinking water. Coastal areas, especially Karachi, have witnessed rising sea levels and increasing vulnerability to storm surges and saltwater intrusion, impacting both infrastructure and livelihoods. These pieces of evidence, among others, underscore the urgent need for Pakistan to adapt to the changing climate by implementing effective strategies, such as water resource management, sustainable agriculture practices, and disaster preparedness, to safeguard the well-being and resilience of its population (Safdar et al., 2019). Climate change poses significant vulnerabilities and risks to Pakistan, a country already grappling with a multitude of socio-economic challenges. One of the most immediate threats is the increasing frequency and intensity of extreme weather events, such as floods, droughts, and heatwaves. These events can devastate communities, disrupt agriculture, and damage critical infrastructure, leading to loss of life and property (Hussain et al., 2020).

Another major concern is the impact of climate change on water resources. Pakistan heavily depends on the Indus River system for its water supply, and the Himalayan glaciers feeding into this system are receding due to higher temperatures, posing a long-term threat to water availability. Moreover, sea-level rise can increase the risk of saltwater intrusion along the coast, contaminating freshwater sources. These water-related challenges can lead to conflict and strain relations between provinces and

neighboring countries. The vulnerabilities and risks associated with climate change in Pakistan demand urgent attention and action, including adaptation measures, sustainable resource management, and international collaboration to mitigate the impacts of a changing climate on this vulnerable nation (Hussain et al., 2019).

## Impacts of Climate Change in Pakistan

The impacts of climate change in Pakistan are increasingly evident and pose significant challenges to the nation's environment, economy, and society. One of the most noticeable consequences is the increase in extreme weather events, including more frequent and severe floods, droughts, and heatwaves. These events lead to the displacement of communities, destruction of infrastructure, and loss of lives and livelihoods, particularly affecting vulnerable and marginalized populations. The changing precipitation patterns and rising temperatures are significantly affecting agriculture, which is a cornerstone of Pakistan's economy. Reduced crop yields, water scarcity, and shifting growing seasons threaten food security and income for millions of people (Fahad & Wang, 2020). Climate change exacerbates health issues, as it contributes to the spread of diseases, particularly in flood-prone areas, and worsens air quality, leading to respiratory problems in urban areas. These impacts emphasize the urgent need for comprehensive adaptation and mitigation strategies to safeguard Pakistan's future against the adverse effects of climate change (Nawaz et al., 2019).

## Agriculture and food security

Climate change has had profound and detrimental impacts on agriculture and food security in Pakistan. The country heavily relies on its agricultural sector as a key driver of the economy and a source of livelihood for millions of people. Changing precipitation patterns and rising temperatures are causing significant disruptions in traditional cropping cycles. Increased instances of droughts and heatwaves are diminishing crop yields, particularly for staples like wheat, rice, and cotton. Water scarcity is a critical concern, as the Indus River system, the lifeline of Pakistan's agriculture, faces growing challenges due to changing glacial melt patterns (Shabbir et al., 2020). The loss of arable land and decreasing agricultural productivity are seriously jeopardizing food security, with a higher risk of malnutrition and hunger among vulnerable populations. The unpredictable climate conditions are making it increasingly difficult for farmers to plan and manage their crops effectively. Extreme weather events, including heavy monsoons and flash floods, can destroy standing crops and infrastructure, leading to immense financial losses for farmers. These climate-induced vulnerabilities are putting pressure on the food supply chain, leading to rising food prices and threatening the overall food security of the country (Fujimori et al., 2019; Mukhopadhyay et al., 2021).

## Water resources and availability

Climate change is exerting significant pressure on Pakistan's water resources and availability, exacerbating existing water-related challenges in the country. The most immediate and critical concern

is the accelerated melting of the Himalayan and Karakoram glaciers, which feed the Indus River system, providing the majority of Pakistan's freshwater. Rising temperatures have led to the retreat of these glaciers, causing increased water runoff in the short term but posing a severe threat to future water availability. This threatens the sustainability of agriculture, which is a crucial component of Pakistan's economy and food security. Additionally, changing precipitation patterns and the unpredictability of monsoons can lead to both devastating floods and prolonged droughts, making water management even more challenging. The country's rapidly growing population further intensifies the pressure on available water resources, making it essential for Pakistan to develop comprehensive water management strategies to adapt to the changing climate (Amanullah et al., 2020).

Inadequate water management, inefficient use of water resources, and contamination of freshwater sources are also contributing to Pakistan's water crisis. Poor water quality and the spread of waterborne diseases further endanger public health and overall well-being. Climate change exacerbates these issues by influencing the distribution and availability of freshwater. Addressing these challenges requires sustainable water resource management practices, the promotion of water-saving technologies, and the development of resilient infrastructure to cope with extreme weather events and shifting water patterns (Mahmood & Jia, 2016). International collaboration and concerted efforts are essential to ensure that Pakistan can secure its future water resources in the face of climate change (Ali et al., 2009).

## Health and well-being

The impact of climate change on the health and well-being of Pakistan's population is becoming increasingly evident. One of the most direct consequences is the heightened risk of heat-related illnesses and deaths due to more frequent and intense heat waves. Rising temperatures can also exacerbate respiratory problems, particularly in densely populated urban areas with air pollution issues. Climate change is contributing to the spread of vector-borne diseases like malaria and dengue fever, as changing weather patterns create more favorable conditions for disease-carrying mosquitoes (Hussain et al., 2020). Flooding resulting from extreme weather events can lead to waterborne diseases and a range of public health issues due to contaminated water sources. These health challenges underscore the urgent need for healthcare infrastructure improvements, public awareness campaigns, and government policies to address climate-related health risks (Dhimal et al., 2021).

Mental health and psychological well-being are also impacted by climate change in Pakistan. Disasters like floods and droughts can lead to the displacement of communities and loss of homes and livelihoods, which can trigger mental health issues such as anxiety, depression, and post-traumatic stress disorders. The ongoing stress associated with unpredictable climate conditions and the economic instability resulting from climate-related disruptions can take a toll on individuals and communities (Fatima, 2022). In the face of these emerging challenges, mental health support systems and community resilience-building initiatives are crucial to help Pakistan's population cope with the psychological

impacts of climate change and ensure their overall well-being.

### Biodiversity and ecosystems

Climate change is posing a significant threat to the biodiversity and ecosystems of Pakistan, which encompass a wide range of ecosystems from the coastal regions along the Arabian Sea to the northern mountainous areas. Rising temperatures and shifting weather patterns are altering habitats and disrupting the life cycles of many plant and animal species. This can lead to reduced biodiversity, as some species may struggle to adapt or face local extinction, disrupting the delicate ecological balance. Notably, the melting of Himalayan glaciers, a direct consequence of climate change, is causing changes in river flow and threatening freshwater ecosystems, affecting species that rely on these habitats for their survival (Fatima, 2022; Sintayehu, 2018).

The increased frequency of extreme weather events, such as floods and droughts, has a profound impact on ecosystems. Floods can wash away habitats and displace species, while droughts can lead to the desiccation of wetlands and water bodies, affecting aquatic ecosystems and their inhabitants. These changes have cascading effects on human populations as well, particularly in regions dependent on ecosystems for their livelihoods. Protecting biodiversity and ecosystem health in Pakistan is crucial not only for the preservation of its rich natural heritage but also for the well-being of its people, who depend on these ecosystems for resources and services (Ishaq et al., 2016; Khan et al., 2016). Effective conservation efforts, habitat restoration, and climate adaptation strategies are essential to mitigate the negative impacts of climate change on Pakistan's ecosystems and the species that inhabit them.

### Infrastructure and urban areas

Climate change is taking a toll on the infrastructure and urban areas of Pakistan. The country's rapidly growing urban centers are particularly vulnerable to the effects of climate change. Increased temperatures, changing precipitation patterns, and the rise in the frequency of extreme weather events, such as floods and heat waves, are straining urban infrastructure. Poorly designed and inadequately maintained drainage systems are exacerbating flooding in many cities, leading to damage to roads, buildings, and essential services, as well as health risks for urban populations (Mustafa, 2011). The urban heat island effect is making cities even more susceptible to extreme temperatures. Rising temperatures can intensify energy demands for cooling and air conditioning, overloading the electrical grid and causing blackouts. This not only disrupts daily life but also poses significant risks to vulnerable populations, such as the elderly and those with pre-existing health conditions. To address these challenges, Pakistan must invest in climate-resilient infrastructure, improve urban planning, and enhance disaster preparedness. Sustainable, climate-adaptive city designs and policies are essential for minimizing the impact of climate change on Pakistan's urban areas and ensuring the well-being of its citizens (Rayan et al., 2021).

Resilience Efforts in Pakistan

Pakistan has recognized the urgency of building resilience against the impacts of climate change. With a population highly dependent on sectors vulnerable to climatic variations. Over recent years, Pakistan has been actively engaged in implementing strategies, policies, and projects aimed at enhancing its ability to withstand the adverse effects of climate change and to adapt to an increasingly unpredictable climate (Ahmad & Afzal, 2021). These resilience efforts span a wide range of sectors, including agriculture, water management, infrastructure, and health are informed by the understanding that climate change poses not only environmental and ecological risks but also substantial socio-economic and public health challenges to the nation.

## Government policies and initiatives

The government of Pakistan has recognized the urgent need to address climate change and has taken several significant policies and initiatives to mitigate its impacts and build resilience. One of the key milestones is Pakistan's National Climate Change Policy, which was approved in 2012. This policy outlines the country's commitment to addressing climate change by promoting sustainable development, reducing greenhouse gas emissions, and adapting to the changing climate (W. Ahmed et al., 2020). In 2016, Pakistan also launched the National Climate Change Adaptation Plan (NCCAP), which focuses on climate resilience strategies in sectors like water, agriculture, health, and energy. The Green Pakistan Program, initiated in 2017, aims to increase forest cover and promote afforestation, recognizing the role of forests in carbon sequestration and environmental sustainability (Hussain et al., 2020; Khan et al., 2020).

Pakistan has introduced various clean energy initiatives, such as the Alternative and Renewable Energy Policy, to diversify its energy mix and reduce carbon emissions. The "Clean and Green Pakistan" campaign seeks to improve solid waste management, mitigate urban heat islands, and promote sustainable urban planning. Pakistan has sought to collaborate with international partners on climate change mitigation and adaptation efforts (Usman et al., 2020). It has actively engaged in the international climate negotiation process and has received support from organizations like the United Nations and the Green Climate Fund to implement projects and strengthen its capacity to address climate change. These policies and initiatives underscore Pakistan's commitment to combating climate change and building a more sustainable and climate-resilient future (Bowman & Minas, 2019). However, significant challenges remain in terms of implementation, resource allocation, and public awareness, and continued efforts are essential to meet the country's climate goals.

During the tenure of PM Imran Khan he introduced the "Protective Area Initiative" for ecological governance and management. Under this initiative 15 national parks were included in protective areas

and under this 15% of the country's land area is included in the protected areas while before this initiative the percentage was only 13. However the project was the part of 'Green Stimulus' vision.

## National Climate Change Policy

Pakistan's National Climate Change Policy, approved in 2012, represents a critical step in the nation's efforts to address the profound challenges posed by climate change. The policy is designed to provide a comprehensive framework for guiding Pakistan's response to climate change, with a focus on mitigation and adaptation strategies. It reflects the country's commitment to global climate goals and emphasizes the need for sustainable development that considers climate resilience (Kengo, 2022). One of the primary goals of the National Climate Change Policy is to reduce greenhouse gas emissions and promote energy efficiency. It seeks to transition Pakistan towards a low-carbon economy by encouraging the use of renewable energy sources, improving energy conservation, and enhancing the energy efficiency of industries and buildings. Additionally, the policy outlines strategies to enhance the resilience of sectors vulnerable to climate change, such as agriculture, water resources, and health. It prioritizes adaptation measures to help communities cope with the impacts of changing climate patterns, including more frequent and intense heatwaves, floods, and droughts (Mumtaz, 2018).

One of the primary objective of the NCCP is to build climate resilient infrastructure but still we are not taking strong actions in this domain. The policy also underscores the importance of building institutional capacity to address climate change and fostering international cooperation. It recognizes that effective climate action requires collaboration among government agencies, private sectors, civil society, and the international community. Furthermore, the policy emphasizes the need for public awareness and education on climate change issues. While the National Climate Change Policy provides a robust framework for addressing climate change in Pakistan, successful implementation remains a challenge, and ongoing efforts are necessary to achieve the policy's objectives and mitigate the nation's vulnerability to climate change (Raza et al., 2020).

## International collaborations and agreements

Pakistan has actively engaged in international collaborations and agreements related to climate change to address the global nature of this pressing issue. Pakistan is a signatory to the United Nations Framework Convention on Climate Change (UNFCCC) and the Kyoto Protocol, reflecting its commitment to the global effort to combat climate change. The country's participation in these agreements enables it to access financial resources and technical assistance to support climate action. Pakistan has also collaborated with international partners to implement climate change projects and access funding from organizations like the Green Climate Fund. In 2017, Pakistan signed an agreement with the Green Climate Fund to receive support for projects aimed at building climate resilience and reducing greenhouse gas emissions. These collaborative efforts are essential to advance climate adaptation

and mitigation projects in Pakistan, particularly in vulnerable sectors like agriculture and water management (Fahad & Wang, 2020).

Protected Areas Initiative

Pakistan has achieved notable progress in its effort to establish and maintain protected areas, acknowledging the crucial significance of safeguarding its diverse range of species and untouched geographical features. The nation possesses a wide array of protected areas, each making a valuable contribution to the preservation of distinct ecosystems and biodiversity. One of the noteworthy examples is Hingol National Park located in Balochistan, which is renowned for its vast terrains showcasing the Hingol River and exceptional fauna such as the Baluchistan bear. Khunjerab National Park, situated in the region of Gilgit-Baltistan, serves as a tangible manifestation of Pakistan's dedication by offering a suitable ecological environment for the preservation of endangered species such as the snow leopard and Marco Polo sheep. Deosai National Park, commonly referred to as the "Land of Giants," exemplifies the nation's commitment to conserving high-altitude habitats and the Himalayan brown bear (Jabeen & Khan, 2022).

These projects are components of a more comprehensive approach aimed at achieving a harmonious equilibrium between conservation efforts and sustainable development practices. Efforts beyond the purview of official institutions, encompassing the active participation of local communities and fostering international alliances. Despite the persistence of challenges such as habitat degradation and poaching, there are ongoing programs that prioritize the identification of solutions that can simultaneously improve both the natural environment and the livelihoods of individuals inhabiting and near these protected areas (Khan, 2020). The protected areas project in Pakistan places significant importance on responsible management and community engagement, aiming to safeguard the country's natural heritage and promote a mutually beneficial coexistence between humans and the environment.

## Community-based adaptation efforts

Community-based adaptation efforts in Pakistan have emerged as a critical approach to tackling the local impacts of climate change. Given the country's diverse ecosystems and socio-economic vulnerabilities, these community-driven initiatives are tailored to address the unique challenges faced by different regions. Communities in rural areas, particularly those dependent on agriculture, have adopted strategies like changing crop patterns, developing water management practices, and using climate-resilient farming techniques to cope with shifting weather patterns, reduced water availability, and more frequent extreme weather events (Schipper et al., 2014). The community-based adaptation efforts often involve capacity-building and awareness-raising activities to empower local populations to respond effectively to climate change.

Non-governmental organizations and government agencies have been instrumental in facilitating these initiatives by providing technical support, promoting indigenous knowledge, and fostering

collaboration among community members. The participatory nature of community-based adaptation efforts not only strengthens local resilience but also helps in preserving traditional practices and knowledge, thus ensuring the sustainability of these strategies. In a nation as diverse as Pakistan, where climate impacts can vary drastically from one region to another, these grassroots efforts represent a crucial component of the country's broader strategy to tackle the multifaceted challenges posed by climate change (Ashraf et al., 2019; Shammin et al., 2022). The community based initiatives in Gilgit Baltistan and Chitral are working on the different projects especially Glacier crafting and artificial glaciers to resolve the water shortages.

## Ten Billion Tree Tsunami Program

The Ten Billion Tree Tsunami Program is a landmark environmental initiative launched by the government of Pakistan in 2018 to combat deforestation, restore degraded ecosystems, and mitigate the impacts of climate change. This ambitious program aims to plant ten billion trees across Pakistan by 2023, making it one of the largest reforestation efforts in the world. The program operates on multiple fronts, including afforestation, reforestation, and the restoration of mangroves and wetlands. It focuses on a diverse range of tree species, fostering biodiversity while enhancing the resilience of ecosystems. The initiative not only aims to counteract deforestation but also to improve air quality, reduce soil erosion, and conserve water resources. One of the unique features of the Ten Billion Tree Tsunami Program is its emphasis on community involvement. It encourages local communities, especially in rural areas, to actively participate in tree planting and forest management. This not only promotes a sense of ownership but also provides economic opportunities for marginalized communities (Ashraf, 2022; Sabir et al., 2022).

The program's significance extends beyond Pakistan's borders, as reforestation efforts can contribute to mitigating climate change on a global scale. By sequestering carbon and restoring vital ecosystems, the Ten Billion Tree Tsunami Program aligns with international climate goals and sets a positive example for other nations facing similar environmental challenges. As it nears its completion, this program stands as a testament to Pakistan's commitment to environmental sustainability and serves as an inspiring model for reforestation initiatives worldwide.

## Role of non-governmental organizations

Non-governmental organizations (NGOs) play a pivotal role in countering climate change challenges by bridging gaps in climate action, fostering community engagement, and advocating for policy change. One of the significant contributions of NGOs is their ability to operate at the grassroots level, where they implement and promote climate-resilient practices and adaptation strategies. They work directly with communities, offering expertise and resources to help vulnerable populations adapt to climate impacts, such as extreme weather events, droughts, and changing agricultural conditions. NGOs often facilitate capacity-building programs, climate education, and awareness campaigns to empower

local communities to mitigate and cope with the consequences of climate change (Mumtaz, 2021). NGOs also act as critical advocates for climate policy change, often holding governments and corporations accountable for their environmental practices. They play an essential role in raising public awareness about climate issues, mobilizing public support, and pushing for stronger climate action at local, national, and international levels. By advocating for more stringent emissions reduction targets, the promotion of clean energy, and the conservation of natural resources, NGOs contribute to the broader global effort to combat climate change. They also provide a platform for citizen engagement and help ensure that climate policies are equitable and inclusive (Mumtaz, 2023).

NGOs are instrumental in facilitating international collaboration and sharing best practices. Many NGOs operate across borders, working with other organizations and governments to implement global climate agreements and initiatives. They assist in transferring knowledge and technology to countries in need and contribute to building a global community of nations and organizations committed to addressing climate change (Shahid et al., 2021). NGOs are vital actors in the collective fight against climate change, serving as advocates, educators, implementers of climate solutions, and catalysts for policy change. Their multifaceted roles are crucial in addressing the complex and interconnected challenges presented by a changing climate.

## Conclusion

The issue of climate change in Pakistan is undeniably one of great significance and determination. As this paper has detailed, Pakistan is particularly vulnerable to the adverse impacts of climate change, with its geographical and socio-economic characteristics interpreting it predisposed to a range of environmental challenges. Rising temperatures, increased flooding, erratic rainfall patterns, and glacial melt are just a few examples of the environmental threats that the country faces. The government of Pakistan, in collaboration with various stakeholders, has made substantial efforts to enhance its resilience to the effects of climate change. This paper has highlighted the multifaceted approach that Pakistan has adopted, encompassing policy frameworks, adaptation measures, international partnerships, and community engagement. The development of the National Climate Change Policy and the implementation of the Ten Billion Tree Tsunami Program are promising steps in the right direction. These initiatives demonstrate Pakistan's commitment to combating climate change and building resilience to protect its people and environment.

Despite these commendable efforts, challenges remain. Financing, capacity building, and the need for a more coherent and integrated approach to climate adaptation are areas that require further attention. The effectiveness of resilience efforts depends not only on policy formulation but also on their successful implementation at all levels of government and society. Encouragingly, there is a growing awareness of the need for climate action, and civil society, academia, and the private sector are increasingly engaged in climate resilience initiatives. As the effects of climate change continue to manifest, Pakistan needs to

remain steadfast in its commitment to building resilience. The global community, too, must provide support and collaboration to help Pakistan address the multifaceted challenges posed by climate change. Climate change knows no borders, and its consequences will reverberate far beyond any single nation. By addressing climate change and building resilience, Pakistan can not only protect its citizens but also contribute to the global effort to mitigate the worst effects of climate change. The journey to climate resilience is ongoing, and it requires persistent effort, cooperation, and innovation from all sectors of society.

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