

# Climate Change Challenges for South Asia: The Need for a Regional Research Hub

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## *Abstract*

South Asia, which is home to nearly a quarter of the world's population, is on the brink of a major environmental crisis. Climate change is not a distant phenomenon here but a stark reality that is already disrupting food security, human health, and the socio-economic fabric of the region. The diverse landscape of the region—from the towering Himalayas to the fertile deltas and long coastlines—are highly sensitive to the impacts of climate variability. In recent years, the vulnerability of South Asia to extreme weather events has significantly increased, with rising temperatures and humidity, erratic monsoon patterns, and frequent landslides and floods threatening its agricultural systems, human livelihoods, and overall development becoming the norm. As the region grapples with these challenges, the need for immediate action to build resilience to climate disasters and enhance food security has become more urgent than ever.

## *A Region under Climate Siege*

The scientific consensus on climate change is unequivocal. Rising concentrations of greenhouse gases, particularly carbon dioxide, have accelerated global

warming, resulting in more frequent and more intense weather extremes. For South Asia, this means hotter and more humid summers, increased rainfall variability, and more severe storms. The frequency and intensity of extreme rainfall events (ERE) have already surged across India, Nepal, and Bangladesh. In some regions of these countries, extreme precipitation events that were once rare have now become annual occurrences.

The South Asian monsoon and the westerly winds, the lifeblood of the region's agricultural sector, and consequently of the economy, have become increasingly unpredictable. Changes in the onset, duration, and intensity of the monsoon and shifts in rainfall patterns cause both floods and droughts in the same year. In Nepal, flash floods triggered by heavy monsoon rains have devastated communities, while parts of Bangladesh face an increased risk of cyclones, storm surges, and inundation from rising sea levels. Himalayan glaciers, which provide freshwater to millions of people, are retreating at an alarming rate, jeopardizing water security for countries downstream. At the same time, glacial lakes are increasingly frequently breached, as the recent breach of two glacial lakes in the Everest region illustrated. These changes undermine local ecosystems and livelihoods.

As climate extremes become more frequent, they not only impact natural ecosystems but also place immense stress on critical infrastructure. Many of South Asian infrastructures, in both rural and urban areas, were designed based on historical climate patterns. They are not equipped to handle the new climate realities. Aging bridges, roads, and dams are increasingly vulnerable to extreme weather, and the economic costs of repair and replacement are soaring.

## The Food Security Challenge

Agriculture in South Asia is inextricably linked to climate conditions. The region is heavily reliant on monsoon-fed agriculture, with rice, wheat, and pulses serving as staple crops. Climate change currently threatens the stability of food production. For example, even a small increase in temperature during the growing season can result in significant losses in the fields of crops such as rice and wheat. The warmer climate has already begun to reduce crop yields, and projections indicate that this trend will worsen in the coming decades.

In Bangladesh and coastal India, sea-level rise and saltwater intrusion have damaged arable land, rendering it less productive or entirely unusable. In the northern plains of India and Pakistan, erratic rainfall and heatwaves have put additional stress on water resources, exacerbating drought conditions. As crop yields decline, food prices rise, making it harder for the poorest segments of society to afford basic nutrition. According to FAO data, the number of undernourished people in South Asia has been rising steadily over the last decade, reversing years of progress in reducing hunger.

Furthermore, the region is witnessing a shift in cropping patterns. Farmers are increasingly abandoning water-intensive crops in favor of more climate-resilient varieties. Making this transition is not always easy, however. Many farmers lack access to resources, climate information, capacity-building support, and infrastructure needed and are consequently left vulnerable to climate-induced poverty. Moreover, the increased prevalence of pests and diseases due to changing weather patterns has exacerbated the challenges faced by farmers.

## Human Health at Risk

The impacts of climate change on human health are profound and multifaceted. In South Asia, rising temperatures and humidity are already contributing to heat stress, which disproportionately affects vulnerable populations, particularly those living in urban slums. The urban heat island effect, where cities, due to human activities, are significantly warmer than surrounding rural areas, is becoming a major public health concern. In cities like Delhi, Mumbai, and Karachi, heatwaves have claimed thousands of lives in recent years. Even Kathmandu, which is situated in the Mahabharat hills, summers are becoming uncomfortable due to the rise in humidity and the effects of the urban heat island.

Beyond heat stress, climate change contributes to the spread of water- and vector-borne diseases. The increased incidence of floods creates ideal breeding grounds for mosquitoes, which in turn results in a surge in diseases such as malaria and dengue fever. The contamination of water supplies during flood events also increases the risk of diarrheal diseases, which are already a leading cause of child mortality in the region.

Food insecurity, driven by declining agricultural productivity, also poses significant health risks. Malnutrition is on the rise, particularly among children, a fact which has long-term implications for human development. Chronic malnutrition leads to stunting, which not only decreases physical growth but also impedes cognitive development. As more families struggle to afford nutritious food, the region is likely to face a growing burden of non-communicable diseases such as diabetes and heart disease which are linked to poor diets.

## Climate-Induced Migration

One of the most visible human responses to climate change in South Asia is migration. As floods, droughts, and rising sea levels make it increasingly difficult for people to sustain their livelihoods, many are forced to leave their homes in search of safer and more stable environments. Bangladesh, with its low-lying coastal areas, is already experiencing significant internal displacement due to rising seas and more frequent cyclones. In India, rural populations affected by drought often migrate to urban centers, adding to the pressures on already overcrowded cities.

Migration often exacerbates existing socio-economic inequalities and puts additional strain on urban infrastructures. The influx of climate migrants into cities leads to the growth of informal settlements, where access to clean water, sanitation, and healthcare is limited. These settlements are highly vulnerable to both climate shocks and health crises, creating a vicious cycle of poverty and vulnerability.

## Resilience and Adaptation: A Way Forward

Addressing the twin challenges of climate change and food security in South Asia requires a multi-pronged approach focusing on resilience and adaptation. Building climate-resilient agricultural systems is key to ensuring food security for the millions of people living in the region. Farmers need to adopt climate-smart agricultural practices such as the cultivation of drought-resistant crop varieties, improved irrigation techniques, and better soil management. In addition, governments must invest in agricultural research to provide farmers with the tools and knowledge they need to adapt to changing climate conditions.

Water management is another critical area. With precipitation becoming scarcer and more unpredictable, South Asian countries need to improve their water conservation and distribution systems. They must invest in modern irrigation infrastructure, promote rainwater harvesting, and protect watersheds. Regional cooperation in transboundary water management, particularly in the Ganges-Brahmaputra-Meghna (GBM) basin, is essential to avoid conflicts and ensure equitable access to water resources.

Urban resilience is equally important. Cities in South Asia must be equipped to handle the growing risks posed by climate change. Infrastructure must be strengthened to withstand extreme weather events, early warning systems improved, and disaster preparedness for floods, heatwaves, and air pollution enhanced. Governments should also prioritize building green infrastructure, such as parks and wetlands, to mitigate the urban heat island effect and provide natural buffers against floods.

In the realm of public health, governments must strengthen health systems to better respond to climate-related health risks. Efforts should include expanding access to healthcare in vulnerable communities, improving disease surveillance systems, and raising public awareness about the health impacts of climate change. Ensuring that urban planning takes health risks into account is also crucial to protecting the most vulnerable populations from the effects of climate change.

### International Cooperation and Policy Action

Since the challenges posed by climate change in South Asia are not confined to national borders, regional and international cooperation is essential. South Asian

nations must work together to develop regional strategies for climate adaptation and disaster risk reduction. Organizations such as the South Asian Association for Regional Cooperation (SAARC) have a critical role to play in fostering collaboration on climate-related issues, including water management, food security, and health.

At the global level, South Asia needs increased support in the form of climate finance. The region is one of the world's most vulnerable to climate change, yet it has limited financial resources to invest in adaptation and mitigation efforts. Wealthier nations, which bear historical responsibility for the bulk of greenhouse gas emissions, must fulfill their commitments under international climate agreements to provide funding, knowledge, and technical support to developing countries in South Asia.

Furthermore, global efforts to reduce greenhouse gas emissions are essential for limiting the worst impacts of climate change in South Asia. The region is already experiencing the consequences of a warming planet, and, without drastic reductions in emissions, the situation will only deteriorate. The international community must prioritize ambitious action on climate change to ensure that South Asia and the world have a sustainable future.

### Conclusion: The Necessity of a South Asian Research Hub for Tackling Climate Challenges

South Asia stands at a critical juncture. The impacts of climate change are already being felt across the region, with devastating consequences for food security, human health, and socio-economic stability. To address these challenges makes building resilience and adaptive capacity imperative. By investing in climate-smart agriculture, improving water management, strengthening

urban resilience, and enhancing public health systems, South Asia can adapt to the worst effects of climate change and thereby ensure a better future for its people. Meeting these objectives will require not only national action but also regional cooperation and international support. Climate change is a global problem, so only through collective action can we protect the most vulnerable and ensure a sustainable future for all.

As South Asia faces the escalating impacts of climate change, developing a coordinated, research-driven approach becomes ever more urgent. A South Asian research hub dedicated to climate change would be a critical pillar in the region's response to its growing environmental and climate challenges. Such a hub would foster cutting-edge research, bringing together the brightest minds from across the region and the globe to explore the emerging multifaceted challenges of climate change and to offer solutions in areas such as food security, public health, and resilient infrastructure.

A regional research hub would not only facilitate the sharing of knowledge and best practices but would also foster innovation in developing innovative climate adaptation strategies. By integrating scientific, technological, social, and indigenous knowledge, this research hub could develop context-specific solutions tailored to South Asia's diverse landscapes and socio-economic conditions. Moreover, the hub could act as a conduit for policy recommendations, providing governments with evidence-based insights to shape their national adaptation plans and climate resilience policies.

A South Asian research hub would enable greater regional cooperation on shared challenge such as transboundary water management, disaster risk

reduction, and agricultural sustainability. Collaborative research initiatives would ensure that the region would be able to respond cohesively to shared climate risks and build resilience at the local, national, and regional levels. Furthermore, by partnering with international organizations and research institutions, the hub could secure the financial and technical resources it would need to scale up its efforts and enhance South Asia's capacity to address the global climate crisis.

In climate-vulnerable South Asia, the establishment of a research hub is not merely an option; it is a necessity. With the right resources, collaboration, and strategic direction, such a hub could play a transformative role in safeguarding the future of millions of people, both driving sustainable development and leading the region's fight against climate change.