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CLIMATE CHANGE AND THE POLITICAL ECONOMY OF PAKISTAN: A RESOURCE SCARCITY AND CONFLICT PERSPECTIVE

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Abstract

Pakistan faces a formidable challenge in the form of climate change. Rising temperatures, erratic rainfall patterns, and extreme weather events are wreaking havoc on its political economy. This research, therefore, discusses in multifaceted dimensions the political-economic effects of climate change, trying to provide an explanation of how changes in the environment turn into economic hardship, scarcity of resources, and possible political turmoil. The paper highlights both environmental implications on main resources like water and land. It will also explore economic consequences on agriculture, infrastructure, and overall economic stability. Additionally, the study considers the potential for political conflict due to resource scarcity and social unrest due to the onset of disasters in the climate. Besides, it will evaluate the effectiveness of existing adaptation strategies and explore the potential for international cooperation. In a nutshell, this research will attempt to provide a holistic understanding of the manners through which climate change interacts with the political economy of Pakistan. It identifies some key challenges and possible solutions that may inform effective policy responses at both national and international levels, opening the ways for a more sustainable and resilient future for Pakistan.

1. Introduction

At the heart of South Asia, Pakistan combines a rich variety of cultures with a landscape of high mountains, great rivers and arid plains. It was the cradle of civilization for thousands of years. Today it confronts what can fairly be called an existential danger: climate change. As global temperatures rise, Pakistan's weather patterns are changing, and with them the foundations of its political economy. From the fields of Punjab to the cities of Karachi and Lahore, the threat of a warming world is felt acutely.

This article examines the interplay between climate change and the political and economic landscape of Pakistan. It reviews how erratic weather, water scarcity and extreme events jeopardize food security, damage infrastructure and strain social safety nets. It then considers the political effects of these pressures: how scarcity drives inter-provincial tensions, displaces populations and erodes public confidence in

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government. Finally, it outlines adaptation strategies and the case for international cooperation within a development model that balances economic growth with environmental protection.

The political stakes

The core issue is water. Melting glaciers, erratic monsoons and rising temperatures are shrinking the flow of the Indus, the lifeblood of the country. Scarcity fuels tension between Punjab, the breadbasket, and Sindh, home to the Indus Delta, over a dwindling resource. Political rhetoric often turns ethno-nationalist, with charges of water hoarding and demands for fair distribution.

Floods and droughts add to the instability. They displace people and strain social services in already crowded cities. Frustration can quickly turn into protest aimed at a government seen as failing to protect its citizens. Climate stress can also worsen existing security threats: food insecurity from falling agricultural output can feed unrest, extremist groups can exploit public grievances, and mass climate migration can overburden national security. Many of the displaced are vulnerable to radicalization or add tension to an already strained social fabric (Hijioka et al., 2014).

The economic stakes

Pakistan's economy already suffers from poverty and weak infrastructure, and climate change is its most potent additional threat. Agriculture, the backbone of the economy, is on the front line. Erratic rainfall, higher temperatures and rising soil salinity have cut yields of wheat, cotton and rice, while food prices reach record levels. Floods damage irrigation systems, break communication lines and destroy transport networks. Droughts strain hydropower and cause energy deficits that cripple industry. Money spent on rebuilding cannot be spent on education, health care and social welfare.

The burden falls hardest on the poor. Smallholder farmers who depend on rain, and informal laborers in weather-dependent work such as construction, face the greatest risk of lost income. In Sindh, rising sea levels threaten coastal cities, infrastructure and farmland. Water scarcity also threatens hydropower, the country's main source of clean energy, which would require costly investment in alternatives.

A three-tier model

The article uses a three-tier model in which a problem is examined at three connected levels (Nicolaides, 2004):

- **Environmental tier:** rising temperatures, erratic rainfall, changing river flows, melting glaciers and more frequent extreme weather.
- **Economic tier:** falling agricultural productivity, water scarcity, damaged infrastructure and disrupted supply chains, which in turn cause job losses, food insecurity and hardship.
- **Political tier:** how economic damage becomes competition over resources, social unrest, migration, loss of public trust and strained international relations.

The model also allows for feedback. Political decisions on adaptation and international cooperation act back on economic and environmental outcomes. Effective solutions therefore need climate-smart economic policy, robust social safety nets, good governance and well-targeted international cooperation.

Scope

With an agrarian economy, deep social disparities and fragile infrastructure, Pakistan is among the countries most exposed to climate impacts. The melting of the Himalayan and Karakoram glaciers that feed its rivers threatens both irrigation and hydropower. The government is under heavy pressure to act on adaptation and mitigation while handling disputes over resource sharing, uneven governance and regional tension over water. Failure to respond risks widening existing

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disparities, undermining political stability and derailing sustainable development. Building resilience is therefore central to the country's future.

2. Literature Review

The literature falls into three groups: work on the economic impacts of climate change, work on its political consequences, and work on resource scarcity and conflict.

Environmental and climatic challenges

Research on Pakistan consistently points to water scarcity, unpredictable weather and food shortages, made worse by melting glaciers and rising temperatures. The Asian Development Bank's climate profile of Pakistan gives a detailed picture of these trends, and Haq and Rasul (2022) explore adaptation and policy options.

Economic impacts

Several studies document the economic damage. Bhatti et al. (2017) showed that water shortage and soil salinity reduced agricultural output and caused large economic losses. Khan et al. (2018) found that rising temperatures compound the damage to agriculture and infrastructure, including the financial burden of flood destruction. Ali and Erenstein assessed climate effects on wheat, rice and maize yields across Pakistan. They documented clear shifts attributable to temperature and precipitation change and recommended climate-resilient farming practices.

On energy, Mustafa and Winkler (2018) examined competition for water between hydropower and irrigation, and argued that the balance between the two is critical to sustaining both energy production and crop yields. Qamar et al. (2019) analyzed the vulnerability of Pakistan's infrastructure to floods and heatwaves, quantified the losses to roads, bridges and water systems, and proposed building climate risk into urban planning.

Political consequences

The political dimensions are equally complex. Afzal et al. (2020) analyze water management and show how inter-provincial friction grows when water is scarce and badly managed. They see effective governance as the main way to reduce such conflict and urge policy frameworks that build climate resilience into national planning, with transparency and cooperation across levels of government.

Kreutzmann (2018) argued that climate-induced disasters bear directly on social stability, since floods and droughts cause mass displacement that presses on urban centers. The resulting tensions call for sensitive disaster preparedness and response. Government adaptation has also been hampered by a crisis-management mindset, and Kreutzmann advocates active international cooperation.

Mahmood et al. (2020) examine political responses to water scarcity and the roles of provincial and federal governments. They urge integrated policies and a federal water management body with real autonomy and transparency to oversee fair water distribution. Hassan et al. (2019) reviewed flood management and climate resilience and concluded that innovative solutions could make Pakistan's response more effective. Rasul and Sharma (2016) advocate climate-smart agriculture for food security and more efficient water use. Khan et al. (2020) and Afzal et al. (2021) stress the need for external financial and technological assistance to build adaptive capacity.

Other important sources are the latest IPCC assessment, which gives regional scientific perspectives, and Pakistan's National Climate Change Policy, which sets the national strategy. Sadiq and Qureshi (2021) show that the Indus Waters Treaty and the provincial water accords still produce tension, and that they need adjusting to reflect water scarcity and demographic change.

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Resource scarcity and conflict

Homer-Dixon (1994) laid the foundations for linking resource scarcity and conflict. He argued that environmental degradation and the depletion of water and arable land raise social tensions and can end in conflict, and he proposed a framework that connects ecological stress to violence through migration and economic destabilization. This work underpins many later empirical studies.

Gleick (2019) shows that water scarcity has become a flashpoint for potential interstate conflict, mostly in the arid Middle East and parts of Africa, for instance in the Nile Basin and the Tigris-Euphrates system. Scarcity cannot cause war by itself, in his view, but it can heighten sociopolitical tensions that lead to war under certain conditions. Work on sub-Saharan Africa links the loss of land and water to more local conflict, such as riots, communal violence and insurgencies, particularly where state capacity is weak and inequality is high.

Barnett and Adger (2007) bring climate change into the debate. They describe it as a "threat multiplier" that worsens resource scarcity and raises the risk of conflict, and they stress governance and institutions as the means of limiting that effect. Population growth and poor water management add to the problem. Sadiq and Qureshi (2021) analyze the legal frameworks that apportion water in Pakistan. Even with the Indus Waters Treaty and the provincial accords, a widespread perception of inequity in allocation remains a source of tension between provinces, which suggests these agreements need renegotiating.

On the political-economic side of environmental problems, Coase (1960), Stern (2007), Obersteiner (2000), Victor (2001), Aldy and Stavins (2007) and Hoffmann (2011) cover the economics and governance of climate agreements such as the Montreal and Kyoto Protocols.

Variables and indicators

The literature suggests the following variables for measuring climate impact in Pakistan.

Category	Variable	Description
Environmental	Temperature increase	Changes in average annual temperature
Environmental	Erratic rainfall	Variation against historical averages
Environmental	Extreme weather events	Frequency and intensity of floods, droughts and heat waves
Economic	Agricultural output	Yields and production of wheat, rice and cotton
Economic	Infrastructure damage	Losses to roads, bridges and irrigation systems
Economic	Energy production	Effects on energy security, especially hydropower
Political	Resource scarcity and conflict	Conflict from water scarcity and inter-provincial tension
Political	Stability and public trust	Public trust in the government's handling of climate impacts
Political	Policy responses	Effectiveness of climate policy and adaptation measures
Social	Displacement and migration	Population movements in response to environmental change
Social	Social unrest	Unrest linked to climate stress
Social	Food security	Availability and price of food in vulnerable areas
International	Aid and technology support	Impact of international aid for climate projects
International	Treaty compliance	Participation in and compliance with climate

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Category	Variable	Description
		agreements

3. Objectives, Methodology and Limitations

Research objectives

The study sets out to:

- identify the physical signs of climate change in Pakistan, including higher temperatures, erratic monsoons, melting glaciers and more frequent heat waves;
- understand the effect of these shifts on water, land and biodiversity;
- analyze the economic impact, including lower agricultural productivity, reduced purchasing power and recurring damage to infrastructure;
- investigate effects on energy security and clean water, especially for the most vulnerable people;
- examine how climate-driven resource scarcity, particularly of water, may escalate inter-provincial tensions;
- study the link between floods and droughts, social unrest and political stability;
- estimate how the government's response affects public trust and legitimacy; and
- assess the effectiveness of current adaptation strategies, including climate-smart agriculture, disaster preparedness and infrastructure development.

Methodology

The study uses a mixed-method approach with primary and secondary data. It reviews the academic literature and reports on climate change, political science and economics in Pakistan. It analyzes quantitative economic data on agricultural production, infrastructure damage and disaster costs. Qualitative material comes from interviews, case studies and observations across regions and demographic groups.

Thematic analysis is used for the qualitative material. It identifies and interprets patterns of meaning across varied sources, through data preparation, initial coding, theme development and refinement, and a final report that links themes to the research objectives. Its flexibility suits the diverse data here. It lets the study go beyond statistics to the experiences and perceptions of those affected, and it supports regional case studies of how environmental change shapes economic conditions, social dynamics and political stability.

Limitations

The study relies on existing data, which cannot fully capture the social and cultural effects of climate change, such as the movement of indigenous peoples to urban centers. The relationship between climate change and political economy is indirect and non-linear, so long-run economic effects are hard to measure and political instability cannot be predicted with certainty. In-depth qualitative interviews take time and resources and limit the range of voices captured. Limited resources also made it impossible to visit the sites of climate and hazard destruction.

4. Theoretical Framework: Resource Scarcity and Conflict

Climate change is now too complex to understand without a clear theoretical lens. For a country as ecologically, socially and politically diverse as Pakistan, the lens used here is Resource Scarcity and Conflict Theory. It explains how environmental stress works through the economy and politics to affect security.

Key concepts

Climate change is a large-scale, long-term shift in the planet's weather patterns, most visibly global warming. Its effects include extreme temperatures, melting ice caps, rising seas, changing ecosystems, and more frequent droughts, floods and storms. These affect biodiversity, agriculture, water resources, human

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health and economic activity. In Pakistan, climate change appears as higher temperatures and unpredictable rain. Heat waves have become more frequent, particularly in Sindh and Balochistan, and monsoon patterns have swung between drought and flood. Agriculture, which depends on predictable weather and water from the Indus system, is especially exposed, and so are food security and the livelihoods of millions.

Political economy is an interdisciplinary field that studies relations between individuals, groups, markets and states, and how public policy, economic systems and political institutions shape economic outcomes. Applied to climate change, it shows how economic interests and power relations shape environmental policy. It also asks who benefits and who loses from particular policies and projects. This matters in Pakistan, where resource allocation, regional disparities and political tension strongly influence adaptation and mitigation.

Resource Scarcity and Conflict Theory belongs to the wider field of environmental security. Building on the work of Thomas Homer-Dixon, it holds that a shortage of resources such as water, land and energy can cause conflict at every level, from communities to international relations, because users are set against each other. It applies most where human activity or climate change reduces available resources. Scarcity sets off mechanisms such as migration, social grievance and, in politically or economically unstable settings, violence.

The theory fits Pakistan well. It frames the conflicts that may arise from glacier retreat and irregular monsoons, and from competition for fertile land. It helps explain how environmental stress destabilizes politics, shapes policy and affects economic stability, and it lets scholars and policymakers anticipate and manage the sociopolitical consequences.

Applying the theory

The theory suggests that when environmental change makes resources scarce, competition for what remains rises and may turn into conflict. Pakistan's economy is centered on agriculture and depends on its river systems and seasonal monsoons, so the theory is directly relevant. Where water is scarce, agricultural regions compete for limited supplies, which can cause inter-regional or communal conflict. Where desertification and salinization shrink arable land, disputes over land-use rights and ownership can follow. The theory lets these problems be read as socio-political crises that need integrated solutions across policy, management and community engagement, rather than as purely environmental or economic issues.

The analysis proceeds in three steps. First, climate-driven changes such as altered rainfall and melting glaciers reduce the available water and land. Second, this scarcity damages an agro-based economy through lower productivity, higher food prices and displacement. Third, economic stress feeds inter-provincial competition, tension over migration and falling public faith in institutions.

Historical context

Pakistan's management of natural resources, especially water, has long been contentious. The Indus Waters Treaty of 1960 divided the river waters between Pakistan and India, but sharing water within Pakistan has often been a point of discord. Upper-riparian Punjab, whose agriculture needs irrigation, and lower-riparian Sindh, which needs water to sustain its downstream ecosystems, have been in tension for decades. On land, expanding agriculture and the demand for arable land have driven deforestation and overgrazing, which cause soil erosion and falling land quality. This history helps explain today's conflicts and offers lessons for resource management.

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Environmental triggers and economic effects

Two environmental triggers stand out. The first is glacier retreat in the Himalayas and Karakoram, the "water towers of South Asia", which governs the flow of the Indus system. Flows rise in the short term as melting increases and then fall significantly as glaciers shrink. The second is changing monsoon patterns. Because agriculture relies on monsoon rain, variability brings either severe scarcity or devastating floods. The World Bank has noted how quickly water conditions can swing from surplus to scarcity.

The economic implications are serious. Agriculture employs a large share of the workforce and contributes a large part of GDP. An erratic water supply causes crop failures, reduces food availability, raises prices and pushes people into cities that cannot absorb them. Floods and heavy rain also destroy roads, bridges and irrigation systems, and recovery spending diverts funds from development. The 2022 floods cost Pakistan roughly 30 billion US dollars in damage and lost output, adding to economic and political strain.

Implications for policy

The main lesson of the theory is that scarcity may provoke conflict, but good governance and fair distribution of resources can prevent it. That matters in Pakistan, where scarce irrigation water has already heightened tension among provinces. The article therefore pairs the theory with an Adaptive Governance Framework, in which government, local communities and the private sector collaborate to manage resources responsibly in a changing environment. Its three key features are flexibility, learning and decentralization, which suit the dynamic problems climate-induced scarcity creates. Adaptive governance also means moving away from reactive resource management toward proactive policy that addresses the root causes of scarcity and conflict before they arise.

5. Environmental Stressors

Development and emissions since 1947

Pakistan's physical landscape and climate vary widely, and the decades since independence in 1947 brought rapid change in land use, urbanization and industry. Cities such as Karachi, Lahore and Islamabad grew quickly through rural-to-urban migration and government-driven development schemes. New roads, buildings and industrial zones replaced green space and natural habitat, with effects on local microclimates, air quality and urban heat. Industrial growth in textiles, cement, steel, chemicals and pharmaceuticals added carbon dioxide, methane and nitrous oxide to the atmosphere, mostly from fossil fuels burned for electricity, machinery and transport. Deforestation, soil erosion and water pollution followed, damaging ecosystems and wildlife habitat.

Agriculture changed as well. The Green Revolution from the 1960s brought high-yielding crop varieties that raised productivity and food security, but also used more water and chemical fertilizer and caused soil degradation, water depletion and pesticide contamination.

Pakistan's contribution to global emissions is small, under one percent, but it carries a heavy share of the consequences. Its energy mix is dominated by fossil fuels, and the move toward solar, wind, hydro and nuclear power is held back by infrastructure limits, policy barriers and political inertia. Efforts to cut emissions from transport, such as fuel-efficient vehicles, better public transport and vehicle inspection standards, are still at an early stage.

Melting glaciers and water scarcity

Pakistan depends heavily on the Indus river system, which is fed by monsoon rain and by glacial melt from the Himalayas and Karakoram. The Indus and its tributaries, including the Jhelum, Chenab, Ravi and Sutlej, supply water for agriculture, industry, cities and hydropower. About 80 percent of the country's agriculture depends on the flow of the Indus.

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Climate change is altering the timing and volume of that flow. Melt is highest in summer and, as glaciers shrink, river flows become less predictable, with higher flows in the short term and lower flows later. Falling water availability and greater variability threaten agricultural productivity, food security and rural development. Many smallholders are poor and are directly exposed.

Hydropower faces the same problem. Changed river flows, reduced availability and sedimentation from glacial melt can shorten the life of reservoirs through silting and make generation less reliable, leading to energy deficits, load shedding and downtime. Changing river temperatures and higher sediment and turbidity also threaten aquatic habitats, fish populations, biodiversity and the quality of drinking water for downstream communities.

Extreme weather and natural hazards

Floods, droughts and heat waves are becoming more frequent and intense, and they cause economic losses and human suffering on a scale not seen before. Pakistan faces several kinds of hazard.

- **Floods.** The Indus, Jhelum, Chenab and Sutlej have a long record of monsoon flooding, when heavy rain fills the basins faster than they can drain and snowmelt adds to the flow. Floods kill people, displace populations, damage homes and infrastructure and interrupt water supply, sanitation and health care.
- **Droughts.** Arid and semi-arid regions suffer chronic water scarcity. Prolonged low rainfall causes crop failure, water shortage and hunger, and falls hardest on rural communities that depend on agriculture and livestock. Climate change has made droughts more frequent and intense.
- **Cyclones.** Occasional cyclones and tropical storms on the Arabian Sea coast bring high winds, storm surge and flooding. Population density, unplanned urbanization, deforestation and erosion raise the risk to coastal communities.
- **Earthquakes.** Pakistan sits on the boundary of the Indian and Eurasian plates. The 2005 Kashmir earthquake was one of the deadliest in the region, and earthquakes can also trigger landslides and other secondary hazards.
- **Heat waves.** Rising heat exposes the population, especially in cities, to serious health risks.

Agriculture and food security

Agriculture is the backbone of the economy, a major source of employment and GDP, and the main source of food and income for millions of rural people. It includes crops, livestock, fisheries and forestry. Climate change makes its existing weaknesses worse: limited access to seeds, fertilizer and irrigation water, outdated practices, land degradation and poor infrastructure.

Climate variability and extremes reduce crop yields and livestock productivity. Monsoon variability brings water stress or washes soil away during critical growth stages. Extreme rainfall causes erosion, waterlogging and crop damage, and higher temperatures stress crops and livestock. Warmer, more humid conditions also favor pests such as locusts, whiteflies and aphids.

Water scarcity stems from population growth, urbanization, inefficient water management and climate change. Competing demands from agriculture, industry and households lead to over-extraction of groundwater, depletion of surface sources and falling water quality. Land degradation through deforestation, erosion, salinization and nutrient depletion further reduces fertility and ecosystem resilience. Rapid population growth, limited access to education, health care and jobs, and social inequality push parts of the population into poverty and malnutrition, especially women, children and rural communities.

Resilience depends on practical measures: drought-tolerant crops, efficient irrigation, soil conservation practices such as terracing and agroforestry, and better access to weather information, early warning systems and

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agricultural extension services, particularly for smallholders and landless laborers. Water-efficient irrigation technology and investment in water conservation are essential to sustaining output.

6. Economic and Social Impacts

Overall effect on growth

The study's analysis of the relationship between climate variation and economic development finds that temperature has a negative and significant relationship with GDP and with productivity in agriculture, manufacturing and services. The negative effect is strongest in agriculture. If climate change is not controlled, it will damage economic growth substantially. The poor are likely to be hit hardest because they are more vulnerable and have limited capacity to adopt mitigation or adaptation strategies. The World Bank's Country Climate and Development Report (2022) estimates that by 2050 air pollution, environmental degradation and climate-related disasters could reduce Pakistan's GDP by 19 to 20 percent.

Energy

Climate change alters both the production and the consumption of energy. Temperature swings change demand, and altered precipitation affects hydropower, with consequences for growth and industrial output. Pakistan's energy sector already suffers from chronic shortages, frequent outages and load shedding, and from heavy dependence on imported fossil fuels. Its weaknesses are old technology, inadequate infrastructure, governance problems, political interference and bureaucratic red tape, and the absence of long-term planning, policy coherence and regulatory stability that would reassure investors. Climate pressure on hydropower makes each of these problems harder to solve.

Infrastructure

Climate-related disasters damage roads, bridges, irrigation systems and power plants. This disrupts economic activity, transport, markets and access to services. Pakistan's infrastructure is exposed to earthquakes, floods, cyclones and landslides because of its geographic position. Seismic-resistant construction standards and retrofitting are essential to resilience, and floods and cyclones can destroy transport, energy and water systems at great economic and human cost.

Environmental degradation worsens the exposure. Deforestation and erosion raise the risk of landslides, slope failure and sedimentation that damage roads, railways and irrigation, and water pollution from industrial discharge, agricultural runoff and poor sanitation degrades water supply systems. Urbanization and population growth add congestion and service deficits, while corruption, mismanagement and poor coordination undermine investment, maintenance and resilience building.

Public health

Climate change adds to the burden on Pakistan's health system, which has limited resources and weak infrastructure.

- **Vector-borne disease.** Higher temperatures and changed rainfall favor mosquitoes that carry dengue fever, malaria and chikungunya. Warmer conditions speed up pathogen development in the vector and raise the chance of transmission. Recent dengue outbreaks in cities, where stagnant water and poor sanitation provide breeding grounds, show this vulnerability.
- **Waterborne disease.** Diarrheal diseases, hepatitis and typhoid are a major risk, particularly after floods.
- **Respiratory disease.** Air pollution raises the incidence of asthma, chronic obstructive pulmonary disease and acute respiratory infection, partly through ground-level ozone and fine particulate matter.
- **Heat illness.** Heat waves put the urban population at risk.

These burdens strain health systems and the economy as a whole.

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Migration and displacement

Sea-level rise, desertification and changing rainfall that cause water scarcity prompt people to move from rural to urban areas or across borders. The 2010 floods, one of the worst natural disasters in Pakistan's history, killed 1,763 people and displaced 20 million.

Displacement deepens socio-economic and political tension, especially in cities with limited resources. Migrants often face discrimination and marginalization and lack basic services such as health care and education. They add to poverty, inequality and social exclusion, and place extra strain on host communities that already carry environmental and economic burdens. Competition for scarce land and water can then lead to social conflict, political instability and inter-communal tension. Rapid urbanization without planning has already produced ethnic and communal tension in places such as Karachi and Lahore, most visibly over water distribution and housing.

7. Political Consequences of Resource Scarcity

Scarcity of water and arable land has deep political meaning for Pakistan. It shows up as inter-provincial tension, governance difficulty and social unrest, all of which can contribute to mass migration. Resource Scarcity and Conflict Theory links these outcomes and explains how environmental pressure becomes political and social crisis.

Punjab and Sindh: the water dispute

The central dispute is between Punjab, the largest and most agriculturally productive province, and Sindh, which relies on Indus water flowing from upstream. The legal framework is a complex system of inter-provincial agreements, treaties and institutions, and it often produces disputes over allocation and use. Punjab's heavy agricultural demand puts great strain on water resources and leaves Sindh with lower flows. That affects farming and drinking water, and the ecological balance of the Indus Delta, which supports local fisheries, agriculture and biodiversity. Upstream provinces such as Khyber Pakhtunkhwa and Punjab have better access to water, and perceived inequity and injustice in sharing arrangements fuel resentment downstream in Sindh and Balochistan.

Disputes over dam building and water diversion have produced political standoffs and public demonstrations. The Kalabagh Dam is a persistent example: critics argue that it would deprive Sindh and Khyber Pakhtunkhwa of water. Conflicts of this kind strain inter-provincial relations and feed wider narratives of ethnic and regional nationalism that threaten national unity. The Indus River System Authority (IRSA) and the Council of Common Interests (CCI) are the main institutions for easing negotiation among provinces, and their strength matters.

Governance and political stability

Equitable distribution of scarce resources depends on effective governance, and perceived injustice in resource sharing is a common source of legitimacy crises. Frequent disputes over water rights and land-use policy frustrate legislation and development agendas and produce a cycle of crisis management in place of strategic planning. This reactive style undermines political stability, slows economic growth and so worsens the effects of scarcity.

Government capacity to handle the resulting social tension is critical. Where the state does not meet people's needs during drought or agricultural distress, as in parts of Sindh and Balochistan, the risk of unrest rises. The 2010 floods showed this. Millions were displaced and the government's poor preparedness and response greatly eroded public trust in political institutions.

Social unrest and migration

Declining productivity from water scarcity and land degradation pushes rural people toward cities, which often cannot absorb them.

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Infrastructure and services come under strain, urban poverty grows and slums expand. New arrivals compete with established residents for jobs, resources and services, and ethnic and communal tension can flare up, especially over water and housing.

The effects are also regional. Movement of people from the drier parts of Balochistan and Sindh into prosperous Punjab can compound regional inequality and resentment. These grievances can be taken up by regional and national political movements or parties.

Security dimensions

Climate stress can also worsen existing security threats. Food insecurity from falling agricultural output can lead to social unrest, and extremist groups may exploit public grievances. Climate-induced mass migration adds further pressure to the country's national security. Climate change can thus be understood as a non-traditional security threat that multiplies existing weaknesses.

Transboundary water

Competition over water is not only domestic. Water scarcity can lead to conflict among provinces, communities and neighboring countries. Pakistan is one of the most water-stressed countries in the world, and population growth, urbanization, inefficient management and climate change all intensify competition. Diplomacy and international cooperation are essential to managing transboundary water issues, and the Indus Waters Treaty and provincial accords need renegotiation to reflect present-day scarcity and demographic realities.

8. Case Study: The 2022 Floods and COP28

The 2022 floods

The 2022 floods are a case of economic and political cascade. Pakistan produces less than one percent of global greenhouse gas emissions, yet the floods showed how exposed it is. Around one-third of the country was submerged, about 33 million people were affected and close to 8 million were displaced. The disaster exceeded the 2010 floods and was unprecedented in Pakistan.

Post-flood damage assessments estimated 14.9 billion US dollars in damage, 15.2 billion in lost GDP and 16.3 billion needed for rehabilitation.

Sector	Damage (US$ billion)	Reconstruction need (US$ billion)
Housing	5.6	2.8
Agriculture, food, livestock and fisheries	3.7	4.0
Transport and communications	3.3	5.0

The consequences spread through the economy. Millions lost work or income as infrastructure and farmland were destroyed. Disrupted supply chains pushed up prices of essential goods, and health-care costs rose because of flood-related illness. Reconstruction will cost billions, which may add to national debt and hold back growth. Public discontent with the government's response can lead to political instability and social unrest. UNICEF and its partners have provided primary health care to 3.6 million people and safe water to 1.7 million, and have helped more than 545,000 children and carers with mental health and psychosocial support. The hopeful side is the prospect of international aid and a chance to rebuild with climate-resilient infrastructure.

COP28 and the loss and damage fund

The COP28 climate conference was an important moment for Pakistan to press its case. The creation of a Loss and Damage Fund for developing countries vulnerable to climate change was a significant step, and Pakistan took part in the negotiations and advised on the

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design of the fund. Pledges reached about 792 million US dollars, with the option of contributions from the private sector and fossil fuel taxes to go beyond that. The fund is an important step toward climate-resilience policy for countries like Pakistan.

9. Current Policies and International Cooperation

National policy

Pakistan's National Climate Change Policy guides its response, with a broad strategy for mitigation and for building resilience through adaptation in water, agriculture and energy.

- **Water.** The highest priority is more efficient water use and greater storage capacity, to manage seasonal variability caused by changing rainfall and glacier melt. Building small dams, harvesting rainwater in cities and promoting efficient irrigation are central.
- **Agriculture.** Given the importance of agriculture and its vulnerability, the policy promotes climate-resilient crop varieties, modern farming techniques and better weather forecasting so farmers can plan.
- **Disaster management.** As extreme weather grows more frequent, Pakistan has put more weight on preparedness and response, including the National Disaster Management Authority, which coordinates efforts across levels of government.
- **Energy and infrastructure.** The policy calls for more renewable energy in the national grid and for retrofitting critical infrastructure against climate stress.

Pakistan has done reasonably well in framing its adaptation and mitigation policy with meager resources, using mechanisms such as the Clean Development Mechanism. But it lacks the large sums needed to give climate action a proper place in the domestic budget, and financial shortfalls often slow green efforts and fieldwork.

International cooperation

International cooperation extends Pakistan's capacity through finance, technology and knowledge. The country receives assistance from the Green Climate Fund and the Global Environment Facility, and bilateral aid from countries such as Germany and Japan. This money is important for adaptation and mitigation projects, particularly where resources are limited. Technical assistance from international organizations has built capacity to monitor climate change. Engagement through the South Asian Association for Regional Cooperation and the United Nations Framework Convention on Climate Change lets Pakistan share lessons and best practice with countries facing similar challenges.

Pakistan has ratified the major global climate agreements, including the Kyoto Protocol and the Paris Agreement, and has submitted its Nationally Determined Contribution. Because its share of global emissions is small and its exposure is large, it has a strong case for climate diplomacy and for technology transfer and financing from developed and technologically advanced states. Adaptation and mitigation both involve heavy financial sums, and no country can face climate security alone. Regional cooperation, at least among Asian countries that face similar environmental problems, and joint research projects should also be encouraged.

10. Recommendations

The recommendations follow Resource Scarcity and Conflict Theory and the principles of adaptive governance. They are grouped by the level at which they apply.

Resource management

Water management. Implement Integrated Water Resources Management so that water is used efficiently and distributed equitably among all stakeholders, including provinces. Develop and enforce water conservation regulations and support water-saving technology in agriculture

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and industry. Strengthen institutions such as IRSA and the CCI, and consider a federal water management body with real autonomy and transparency.

Land use and agriculture. Promote practices that reduce dependence on intensive irrigation, such as drip irrigation and drought-resistant crops. Adopt land-use policies that prevent overexploitation and encourage reforestation and rehabilitation of degraded land. Introduce climate insurance for the agricultural sector, covering cash crops, livestock, vegetables and fruit, to cushion rural and urban households against losses.

Decentralized management. Give local communities a greater role in resource management so that responses to environmental change are faster and better tailored, and set up community-based natural resource programs that involve local stakeholders in decisions.

Conflict resolution. Establish and strengthen local and provincial mechanisms to settle disputes over resource use quickly, and promote dialogue between conflicting parties.

Economic incentives. Offer financial incentives to businesses and farmers who adopt sustainable, resource-efficient practices, and give subsidies or tax breaks for green technology and renewable energy, including relief on customs duties for green energy equipment. This would help the renewable sector and the domestic industry grow.

Public sector

- **Coordination.** Build well-resourced institutional links among federal, provincial and district levels, with merit-based staffing, and link them to climate funds and technical support. Reduce overlapping functions and competition between departments, and define clear roles for decision-makers across official ranks.
- **Mainstreaming.** Build adaptation and mitigation into all government programs, including planning, financial, technical and policy mechanisms.
- **Action plan.** Back the National Climate Change Policy with a national climate action plan that coordinates federal, provincial, district and local efforts, with regular work plans for climate response.
- **Resilience.** Prioritize a resilient system, such as a Climate Resilient Pakistan program, supported by domestic and global cooperation. Universities, NGOs, think tanks and research centers should share the responsibility.
- **Climate security.** Treat climate security as a condition of political-economic sustainability and engage all stakeholders in disaster preparedness for earthquakes, floods, cyclones and droughts, and for the law-and-order problems that may follow.
- **Flexibility.** Keep public-sector frameworks flexible enough to adjust as new climate problems arise, and involve the public in emergency response.
- **Legislation and capacity.** Reduce legislative barriers to green development, invite think tanks and experts to advise legislators, and invest in capacity building, refresher courses and international linkages for public organizations.

Private sector

Multinational corporations contribute heavily to anthropogenic climate change, yet often pursue profit with little regard for the environment, especially in developing states. Their practices need a legitimate framework under the UNFCCC. In Pakistan, the Federation of Pakistan Chambers of Commerce and Industry should adopt a climate-related corporate social responsibility strategy, and district chambers should encourage climate-friendly business culture. Environmental protection should be part of every business plan, with regular public inspection of safeguards.

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Private investment in agriculture, industry and services should be encouraged to lessen the load on a debt-ridden public treasury and create new jobs, especially for young people in new green sectors.

Financing and diplomacy

- Pursue active climate diplomacy and international cooperation, especially for financing green projects, so that internationally signed agreements are acted on without delay.
- Reduce paperwork and lengthy bureaucratic procedures, including those for obtaining Clean Development Mechanism benefits.
- Develop carbon trading through a domestic climate exchange, potentially linked to corridors such as CPEC, which climate change could affect more than any other actor.
- Pursue regional cooperation on adaptation with neighboring states and joint research on climate impacts.

Two strategic pathways

The study proposes two main pathways. A **Strategic Mitigation Pathway** would focus on the sectors that most need emission cuts, namely transportation, coal and electricity. A **Strategic Adaptation Pathway** would focus on emerging sectors such as agriculture and services, which need innovative adaptation measures. Both should be supported by future climate leaders across all sectors, rapid-execution teams for adaptation and mitigation policy, and tested coordination mechanisms among federal, provincial and private actors.

11. Findings, Conclusion and Future Research

Major findings

Both qualitative and quantitative evidence indicate that climate change is a non-traditional security threat that creates scarcity problems for Pakistan. It threatens the environmental, economic, political and societal sectors alike. Pakistan's capacity to cope is limited, and on that basis the existential threat the study set out to test is borne out.

Conclusion

Pakistan contributes little to global emissions, yet it must transform its political economy toward green, renewable energy across agriculture, industry and services under its global climate commitments. Mitigation is promising in domestic sectors and can reduce climate-related risks, while adaptation is needed to protect development against disasters. Economic analysis alone cannot answer a problem of this scale. Security, politics, science and technology are all affected, so responses must work at every interconnected level.

Resources are the main constraint. Pakistan lacks the funds to provide for climate action in its domestic budget, and the transition to a green political economy involves heavy financial sums. Developing states need strong supportive action from developed and technologically leading states, including technology transfer and innovative financing. Pakistan therefore needs active climate diplomacy, and local mitigation alone will not suffice. Regional cooperation can offer shared lessons and practical adaptation, and collective action matters because climate impacts cross borders. No single country can secure itself alone.

The path is not easy. If Pakistan continues to depend on fossil fuels it will keep releasing greenhouse gases for decades, which makes renewable mitigation strategies and policies that sustain GDP growth all the more necessary. Domestic reform should be matched with consistent implementation of the global agreements Pakistan has ratified, and public-private partnership, consultation with stakeholders and capacity building will be central to it.

Future research

Further research should explore green development mechanisms and carbon-trading

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perspectives, and the climate security debate across all sectors of the economy. Provincial and district-level macroeconomic data are not available, so primary data should be collected to gauge the effect of climate change on livestock, agriculture and human health. The impact on the poor, particularly in agriculture and health, and the effect of extreme weather events on them, need specific study. Joint research projects, especially among Asian countries that share environmental problems, should be encouraged and supported.

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