ADVANCE SOCIAL SCIENCE ARCHIVE JOURNAL
Available Online: https://assajournal.com
Vol. 05 No. 02. April-June 2026.Page# 26-37
Print ISSN: 3006-2497 Online ISSN: 3006-2500
Platform & Workflow by: Open Journal Systems

A Critical Evaluation of Pakistan National Climate Change policy 2012

Abdul Basit (Corresponding Author)
Pakistan Institute of Development Economics (PIDE), Islamabad
Email: hadeedian97057@gmail.com
Orcid: https://orcid.org/0000-0002-8281-8302

ABSTRACT

This study demonstrates a critical evaluation of Pakistan's National Climate Change Policy 2012, investigating its effectiveness in addressing the country's growing environmental challenges. The research examines the key policy objectives, implementation strategies, and institutional framework in relation to climate change adaptation and mitigation. It appraises the extent to which policy corresponds with international climate commitments and sustainable development goals; nevertheless, it identifies the gaps in governance, execution and monitoring operations. Specifically, attention is given to the sectoral responses, evapotranspiration, agriculture, water resources, and disaster risk management. Furthermore, the study explores the role of stakeholders, policy coherence, and institutional capacity in shaping climate outcomes. Findings reveal that the policy provides a comprehensive framework. Nevertheless, its influence has been constrained due to weak implementation, limited resources, and coordination challenges.

Keywords*: National Climate Change Policy 2012, NCCP 2012, Pakistan, Climate Change Policy*

Background

Climate change has evolved as one of the most critical global challenges of this century, significantly impacting economic development, environmental sustainability, and social well-being (1). The idea of sustainable development gained importance when societies began recognizing the constrained nature of natural resources and the need to preserve them for future generations. This realization led to global efforts to acknowledge the environmental degradation and climate change through international cooperation and policy frameworks. World War II resulted in global attention towards environmental protection, leading in major international conferences such as the Stockholm Conference of 1972, and thereafter Earth Summits (2). These initiatives provide the foundation of global environmental governance, establishing the United Nations Framework Convention on Climate Change (UNFCCC) in 1992. The UNFCC launched the principle of common but differentiated responsibilities, providing developed countries the primary responsibility for minimizing the greenhouse gas emissions while encouraging developing nations to primarily focus on adaptation strategies (3).

Pakistan, as a developing country and a member of multiple international climate agreements, designed the National Climate Change Policy (NCCP) in 2012(4). The policy was formulated as a comprehensive framework addressing adaptation, mitigation, water security, energy, agriculture, and disaster management. Despite the country commitment with the international resources, the implementation of NCCP-2012 has remained weak (5). Nevertheless, the country is one of the most climate vulnerable countries in the world instead of contributing slightly to global greenhouse gas emissions. Pakistan faces severe risks including droughts, water scarcity, glacial melting, floods, and others (10). The 2010 floods, affecting millions and causes economic losses, highlighted the urgency of effective climate policy implementation. Nevertheless, climate change has not gained significant attention from the political side due to the limited electoral appeal (6).

The critical factor contributing to policy failure is the mismatch between the global climate framework and local socio-political realities. In policy implementation, the social onto plays a crucial role. In Pakistan, the range of perceptions present in cultural, religious, political, and economic contexts creates barriers to effective policy execution (7). This study critically analyzes the NCCP-2012 by investigating its employment challenges, primarily focusing on the gap between policy design and societal perception (8).

This study will discuss that the failure of policy implications is not because of the technical capacity rather than socio-political misalignment and weak institutional accountability.
This study critically analyzes the policy integrated in environmental, social, and economic dimensions, and assesses the degree that it aligns with the international climate commitments. The study evaluates the role of natural resources such as water resources in developing nations, when they take initiatives to address climate change. If society focuses on managing water resources, consequently, it moves towards sustainable development. Therefore, the present study focuses on the water sector. The NCCP-2012 also mainly focuses on water resources in Pakistan (9). This study will help towards further studies to understand the NCCP-2012, and its critical analysis highlights the aspects that provide the accurate information for further research. Hence, this study will contribute towards future research to gain an understanding of previous policies and their impact on society.

Methodology

This study employed the mixed methods research approach, both qualitative and quantitative methods, to provide a comprehensive evaluation of climate change policy in Pakistan.

Quantitative Analysis

The quantitative analysis primarily focuses on metrological data analysis to understand climate trends and future projections. The key parameters include the rainfall patterns, evapotranspiration, maximum and minimum temperature, and standardized precipitation index (SPI). Data was collected from 56 meteorological observatories across Pakistan for the period 1951-2015. Further metrological data has been collected from different observation stations as per the geographical locations shown in Fig. 1 below:

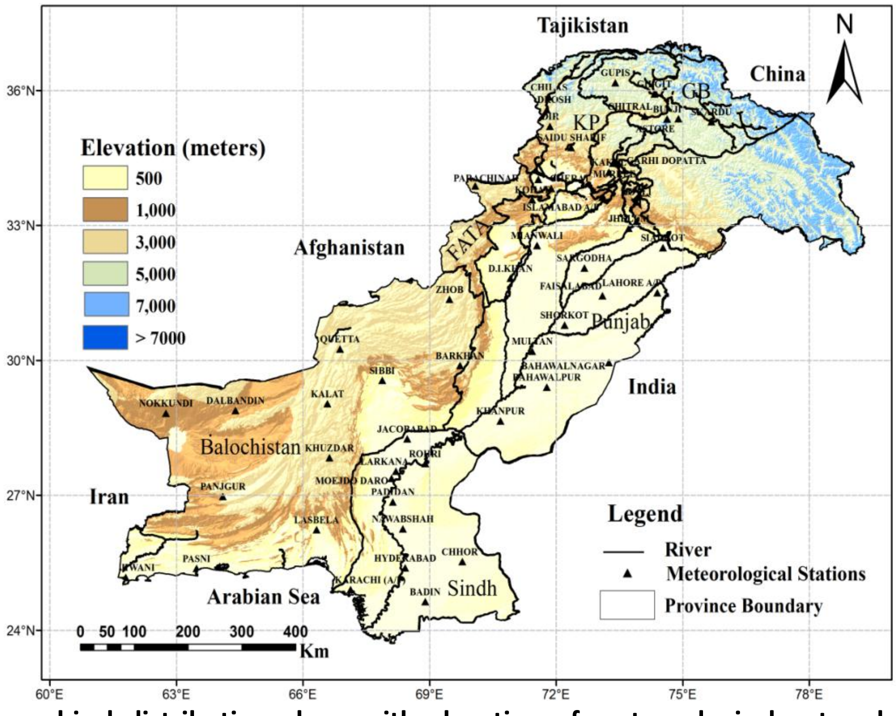

Figure 1: Geographical distribution along with elevation of meteorological network over Pakistan (Source: PMD)

Biased corrected data (temperature and rainfall) of dynamical downscaled regional climate model from "Coordinated Regional Climate Downscaling Experiment" (CORDEX) for South Asia, with resolution of 0.5°x0.5°under two "Representative Concentration Pathways" (RCPs) i.e. 4.5 and 8.5 was used for 21st century future projection as previously used by Haider and Ullah, 2019. We divided the data into three time slices i.e. near (2011-2040), mid (2041-2070) and far future (2071-2100) over each of the region to identify the variation over these time periods. The data of temperature (maximum and minimum) to calculate evapotranspiration (ET) has been used by the most famous Hargreaves method, as being used around the world (Hargreaves, 1994). The study conducted in the recent decades shows that Hargreaves temperature-based method provides reliable values of ET for monthly time scale (Hargreaves and Allen, 2003).

Statistical tools such as Mann-Kendall trend tests and Sen's slope estimator were used to determine the magnitude and significance of climatic trends. Furthermore, future climate projections were analyzed by utilizing the regional climate models under Representative Concentration Pathways (RCP 4.5 and RCP 8.5).

Qualitative Analysis

This component includes the descriptive analysis of NCCP-2012. The review policy of documents and institutional frameworks. Various case studies and archival records, and interviews with stakeholders. The concept of social ontology was explored to understand the segments of Pakistani society that perceive climate change. These perceptions were investigated across several domains, including religious, political, institutional, and community perspectives.

Data Integration

The integration of qualitative socio-political analysis with quantitative climate data provides a holistic understanding of policy effectiveness. This approach highlights the interaction between the societal responses and environmental realities, which is crucial for evaluating climate policy outcomes.

Results & Discussion

Study findings reveal significant regional variations in drought patterns, rainfall, temperature, evapotranspiration, and water resource availability. All the regions employed different polices, specifically the National Climate Change Policy (NCCP-2012).

Climatic Trends and Regional Variations

The analysis of annual rainfall trends represents a mixed pattern across the country. In the Punjab and Khyber Pakhtunkhwa, the rainfall represents a significant increase; nevertheless, in the regions of Azad Jammu Kashmir (AJK) and Sindh, it significantly decreases. This spatial variability demonstrates that climate change influences are not uniform across the country. Whereas, the increased rainfall in different regions may temporarily increase the water stress, decreasing precipitation in the vulnerable areas instance, Sindh represents drought risks.

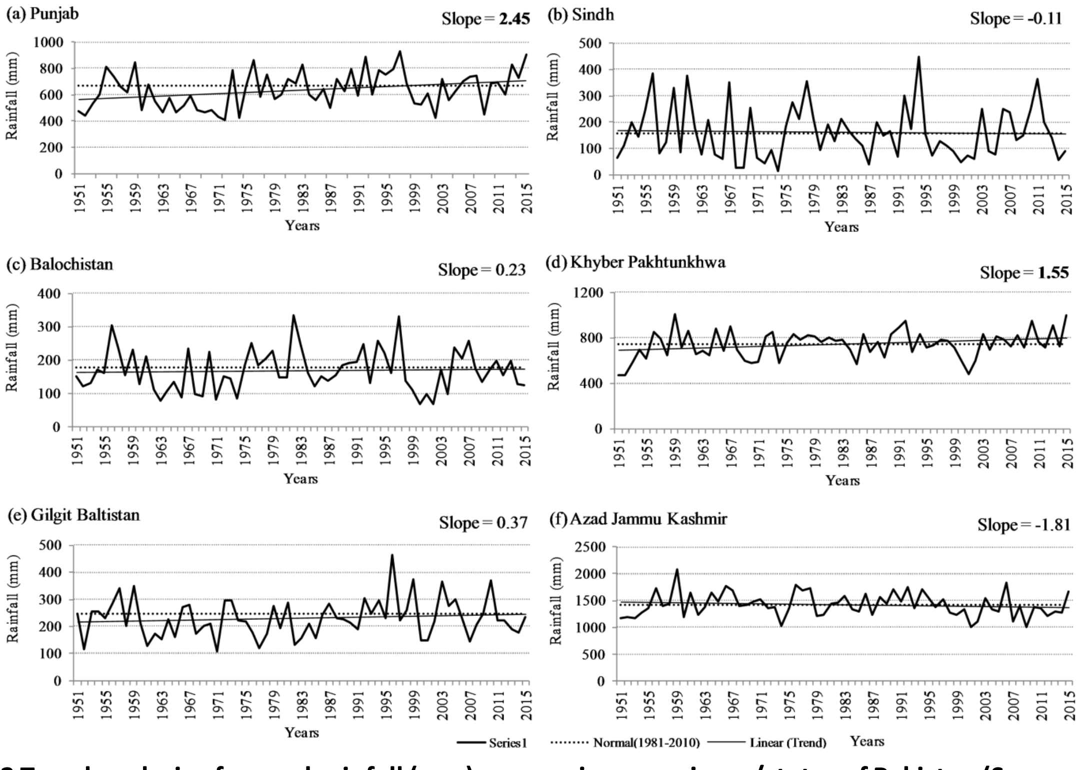

Figure 2 Trend analysis of annual rainfall (mm) over various provinces/states of Pakistan (Source: PMD).

Temperature trends further strengthen the complexity of climatic changes. In the regions of Balochistan, Gilgit Baltistan, and AJK, the mean maximum temperatures increased significantly; comparatively, in the regions of Punjab and KP, the temperature slightly decreased. In the regions of Punjab, Sindh, and Balochistan minimum temperature has increased; in the northern regions, the temperature has decreased. These variations suggest adaptation in climatic zones that directly impact water demand, agriculture, and ecosystem stability. The rising temperature in the arid and semi-arid regions increase evaporation rates and minimizes the soil moisture. This phenomenon leads to enhanced irrigation demand and creates pressure on the already scarce water resources. The regional differences also reflect a critical policy gap. NCCP-2012 adopts a generalized national approach. Furthermore, climate influences localized, region-specific strategies.

Drought Patterns and Vulnerability

The Standardized Precipitation Index (SPI) analysis recognizes severe drought periods between 1963-1976 and 1999-2002, with Balochistan and Sindh being the most vulnerable regions. The drought conditions, along with the rising ET and temperature, show a high likelihood of future water scarcity. The conditions reflect systemic weakness in the water storage management and policy responses. The NCCP-2012 fails to address long-term drought resilience. With the identification of climate threats, the policy does not effectively translate into reservoir expansion, groundwater recharge systems, and appropriate infrastructure development.

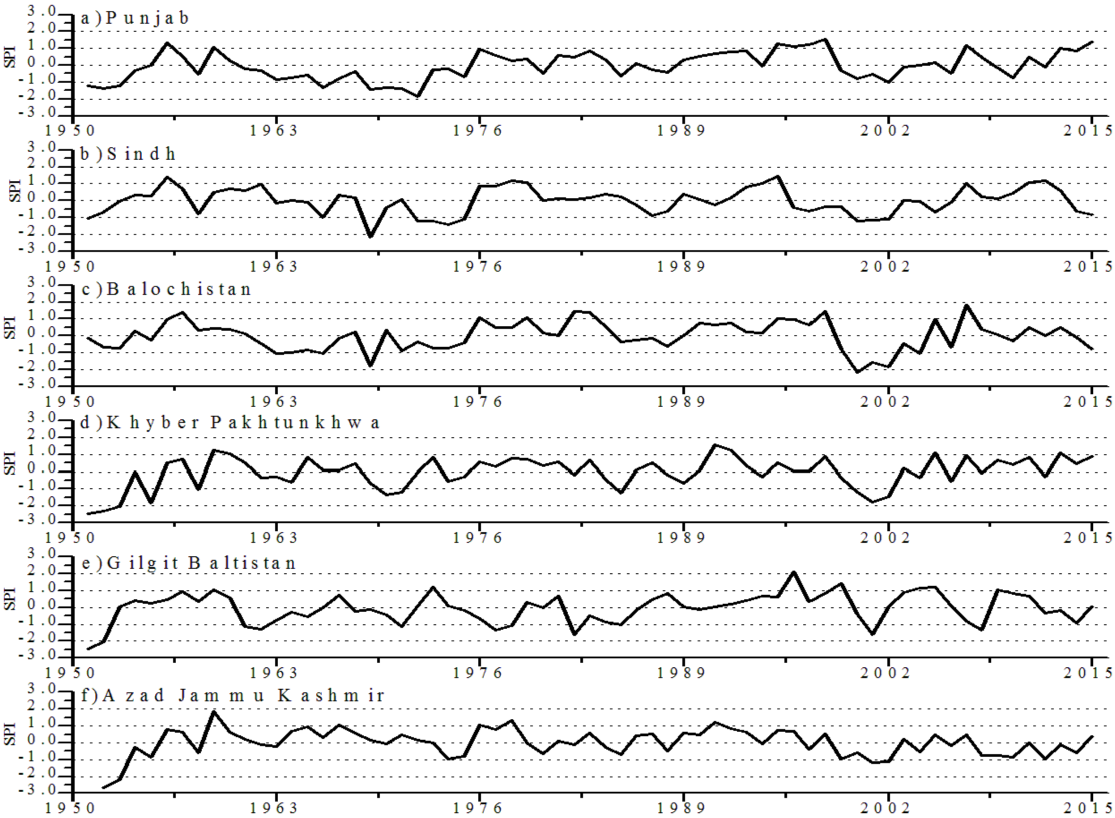

Figure 3 Time series of Standardized Precipitation Index (SPI) over different provinces/states of Pakistan (Source: PMD).

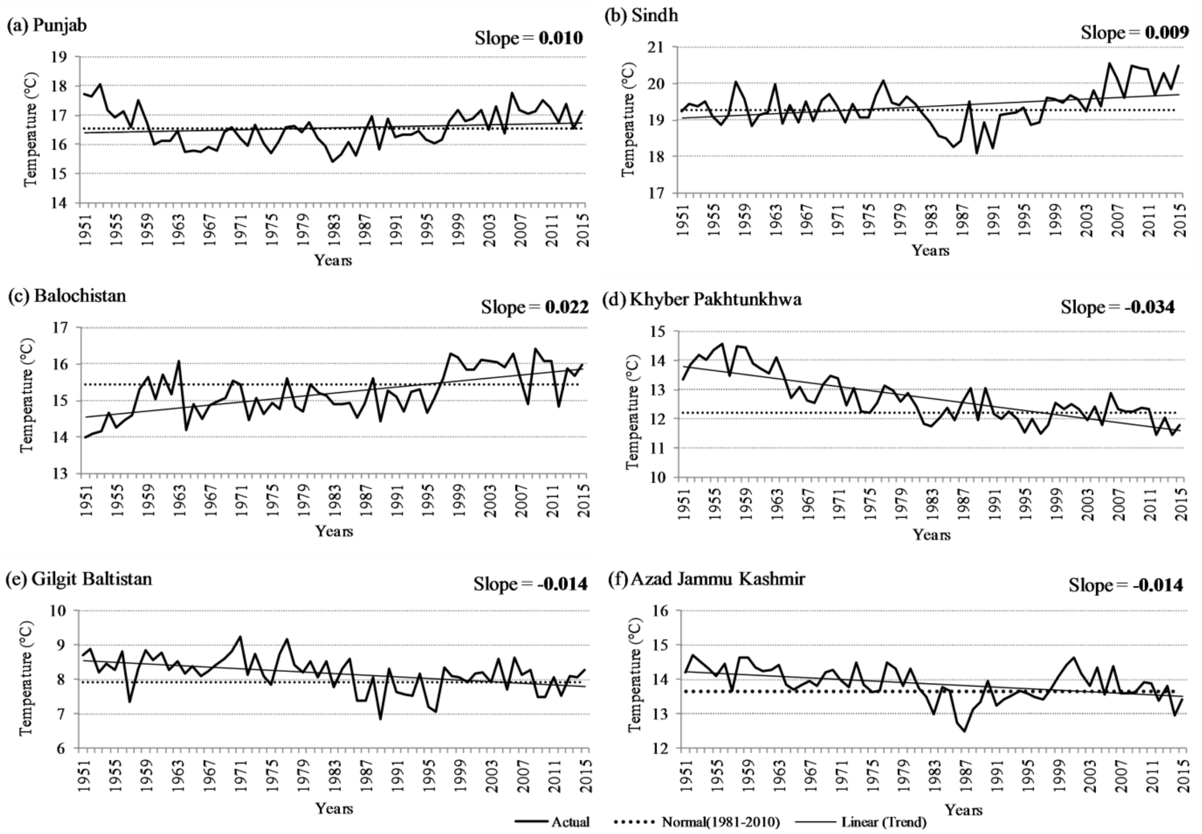

Figure 4 Trend analysis of annual mean minimum temperature (°C) over various provinces/states of Pakistan. Bold values show data is statistically significant at 95% level (Source: PMD).

Evapotranspiration and Agricultural Stress

The results demonstrate elevated trends in evapotranspiration (ET) in Sindh, Balochistan, AJK, and GB, while nevertheless decreasing trends in KP and Punjab. The increased ET level represents the water loss from the soil and vegetation, which increases the crop water requirements. Increased ET in the water-scarce areas instance Balochistan and Sindh minimize the crop yields and threaten food security. Comparatively, reducing ET in KP and Punjab offers temporary relief but does not offset the overall national water imbalance. The discussion shows that NCCP-2012 highlights that water management nevertheless lacks an effective implementation mechanism. These findings suggest that without employing ET-based irrigation planning and adaptive agricultural practices, policy remains insufficient to acknowledge the world's challenges.

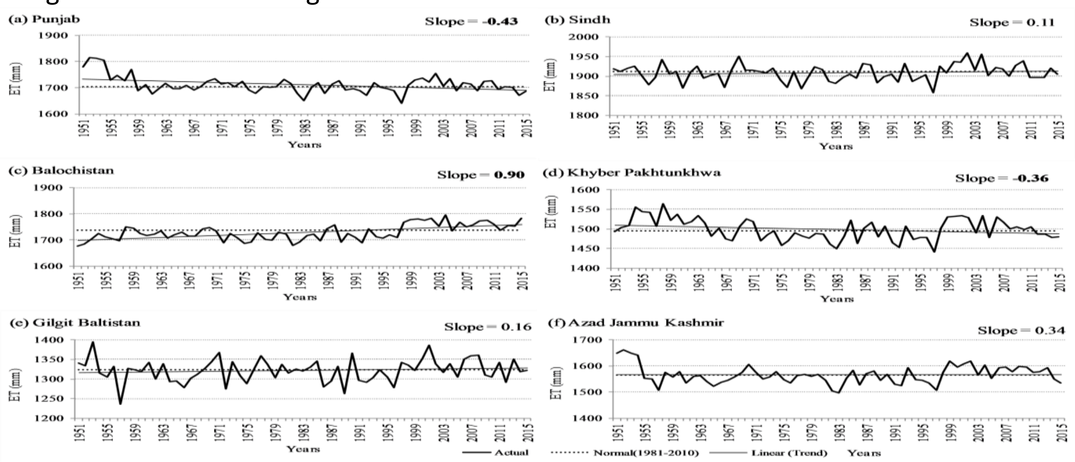

Figure 5 Trend analysis of mean annual Evapotranspiration (mm) over various provinces/states of Pakistan (Source: PMD).

Future Climate Projections

This component under RCP 4.5 and 8.5 scenarios represents a consistent increase in maximum and minimum temperatures across all regions in the country, specifically Gilgit Baltistan. Rainfall patterns are more erratic, increasing in some areas, whereas declining in others, particularly in the Punjab and AJK regions. The elevated temperatures in areas accelerate the glacier melting in northern areas, leading to short term increases in river flows, where long term water shortages occur. This discussion represents dual-thread floods in high precipitation periods and droughts in low rainfall periods.

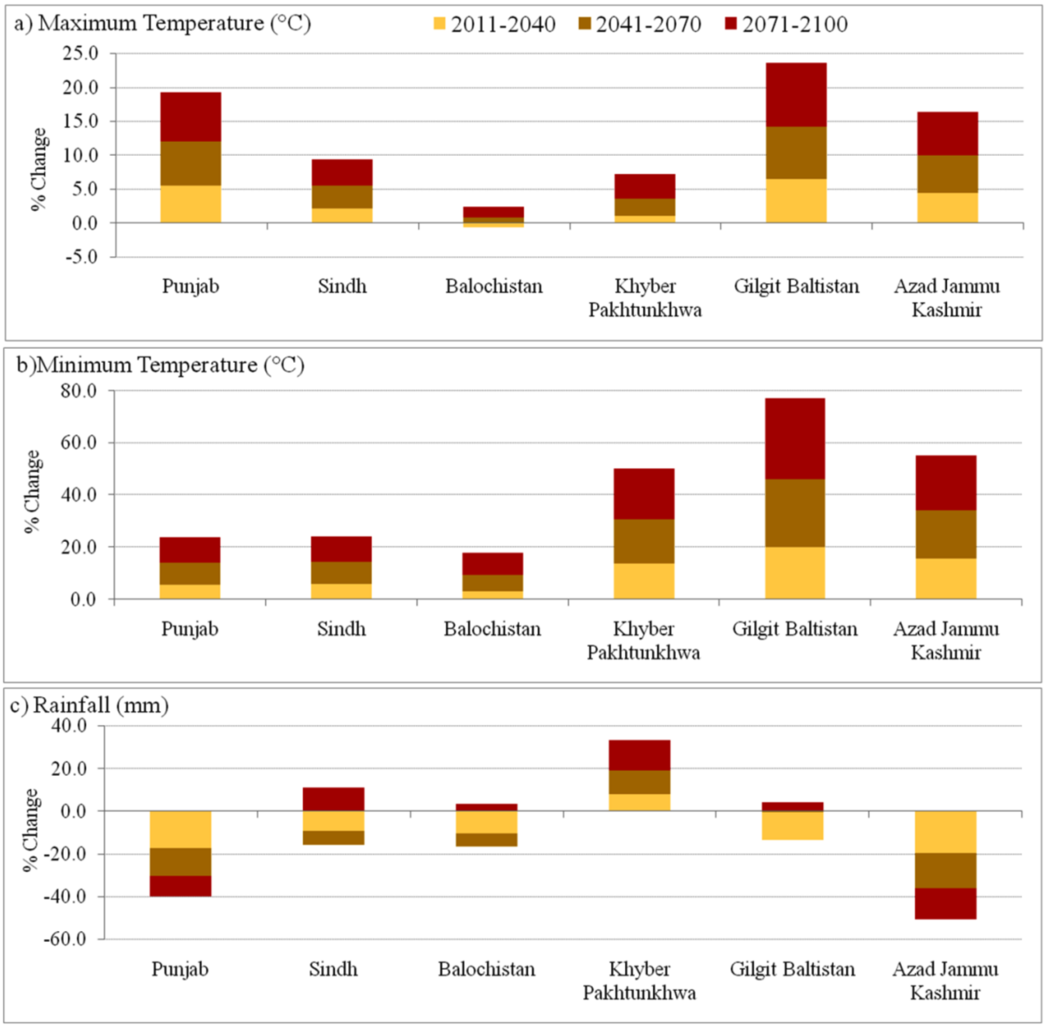

Figure 6 Percentage change in a) maximum temperature (°C), b) minimum temperature (°C) and c) rainfall (mm) under RCP 4.5 during the 21st century over Pakistan (Source: PMD).

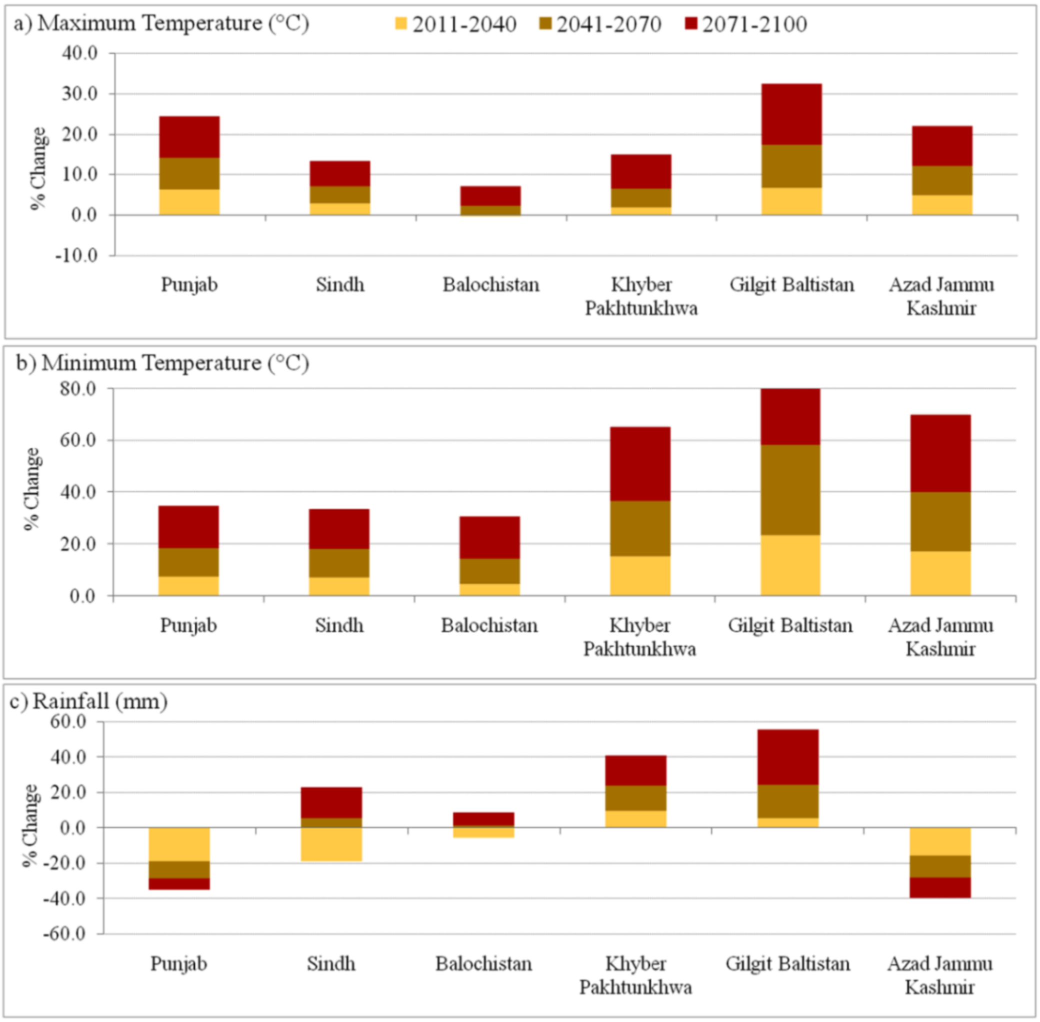

Figure 7 Percentage change in maximum, minimum temperature and rainfall under RCP 8.5 during the 21st century over Pakistan (Source: PMD).

3.5 Water Resources and Storage Capacity

The study findings reveal that Pakistan's water storage capacity is critically low in 30 days of storage compared to the recommended 120 days. Furthermore, sedimentation has minimized the capacity of major reservoirs, for instance, Mangla and Tarbela dams. The fluctuating rainfall with decking storage capacity cause severe water security challenges. The NCCP-2012 identified the importance of water management, whereas the lack of dam construction and poor maintenance of infrastructure reflect political and governance constraints.

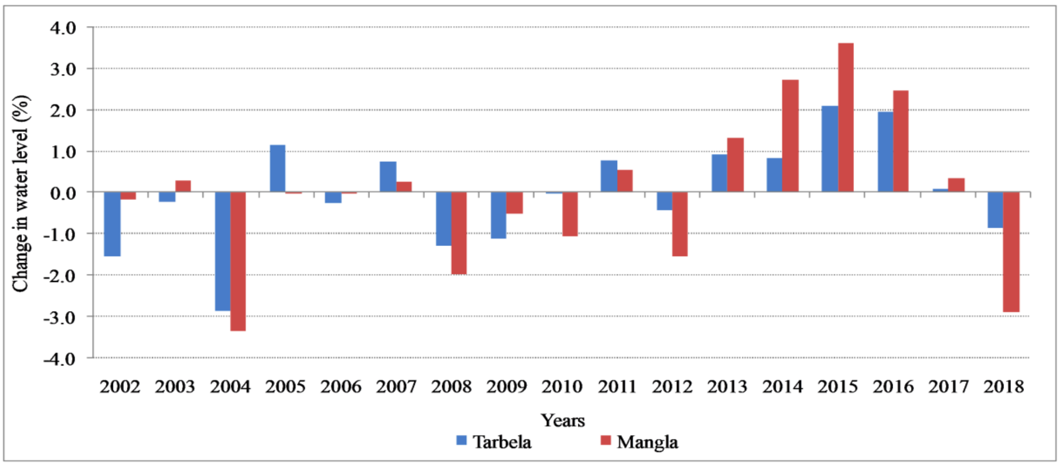

Figure 8 Percentage change in water level of two major reservoirs i.e. Tarbela and Mangla dams during 2002-2018 (Source: PMD).

Socio-Political Dimensions and Policy Failure

The study findings highlight that NCCP-2012 failure is not due to technical or scientific shortcomings but rather than socio-political factors, specifically social ontology, indicating different areas of the country have different climates which create barriers while implementing the policies.

Table 1: Geopolitical anatomy of Pakistani Rivers (Source: PMD)

Geo-Political Anatomy of Pakistani Rivers				
a. Indus Basin water treaty,1960 allocation of River to India				
Name of River	**River Course**	**Tributaries**	**Source of Tributaries**	**Remarks**
Satluj	1. Originates in Kailash mountain Range, Himalayas, Tibet, China 2. Himachal Pradesh, India 3. Kasur, Pakistan 4. Confluence with Chenab River at Uch Sharif, Pakistan	Spiti River, India	Himalayas, Himachal Pradesh, India	India has legal control over these rivers. Due to diversion of waters by India, most of the times these rivers remain dry in Pakistan. But unprecedented floods have also been observed due to opening of flood gates of Indian Dams towards Pakistan.
		Baspa River, India	Himalayas, Indo-Tibetan border.	
		Beas River, India	Himalayas, Himachal Pradesh, India	
Ravi	1. Originates in Himachal Pradesh, India 2. Border of Jammu & Kashmir, Indian Punjab and Indo-Pak Border. 3. Lahore, Pakistan 4. Confluence with Chenab River at Kabirwala, Khanewal, Pakistan.	Budhil, Dhona & Seul Rivers, India	Himalayas, Himachal Pradesh, India	
b. Rivers allocated to Pakistan under "Indus Waters Treaty-1960"				
Name of River	**River Course**	**Tributaries**	**Source of Tributaries**	**Remarks**
Chenab	1. Originates in Himachal Pradesh, India 2. Jammu & Kashmir, India 3. Confluence with Tawi River in Sialkot, Pakistan	Chandra & Bhaga Rivers, India	Himalayas, Himachal Pradesh, India	Pakistan and India experience disputes and differences on Dams built by India on Chenab River and its tributaries. Baglihar Dam, Pakal Dul Dam & Ratle Hydroelectric Plant are
		Tawi River, India & Pakistan	Kailash Kund Glacier, Jammu Kashmir, India	

	4. Confluence with Indus River at Liaqatpur Pakistan.			some Indian projects of disputes.
Jhelum	1. Originates in Himalayas at Pir Panjal, Jammu & Kashmir, India 2. Chakothi, Azad Kashmir, Pakistan 3. Confluence with Neelum River at Muzafarabad (AJK), Pakistan 4. Confluence with Poonch River at Mangla, Jhelum, Punjab, Pakistan. 5. Confluence with Chenab River at Trimmu Headworks, Jhang, Pakistan.	Lidder River, India	Kolhoi Glacier, Himalayas, Jammu & Kashmir, India.	Dams being built by India are not only reducing the flow of water to Pakistan but also affecting the flow. Uri Dam built by India on Jhelum River and Kishanganga Dam on its tributary i.e. Neelum River are affecting the production of Neelum Jhelum Power Plant.
		Sind River, India	Machoi Glacier, Himalayas, Jammu & Kashmir, India.	
		Neelum River, India & Pakistan	Himalayas, Bandipore District, Jammu & Kashmir, India.	
		Poonch River, India & Pakistan	Himalayas, Pir Panjal Range, Jammu & Kashmir, India	
Indus	1. Originates in Kailash Mountain Range, Tibet China 2. Ladakh, Jammu & Kashmir, India 3. Confluence with Shingo River in Skardu, Pakistan 4. Confluence with Shyok River in Skardu, Pakistan 5. Confluence with Kabul River at Attock 6. Confluence with Chenab at Liaqatpur 7. Indus River Delta in southern Sind, Pakistan and Indian Gujrat	Zanskar River, India	Kargil, Jammu & Kashmir, India	Flows in India and joins Indus in Ladakh, Jammu & Kashmir.
		Dras River & Suru River, India	Ladakh, Jammu & Kashmir, India	Flows through Indian Kargil and joins Shingo River in Indian Kashmir. Chutak Dam is built on Suru River.
		Shingo River, Pakistan & India	Deosai, Pakistan	Enters Indian Kargil and flows through India. Then enters Skardu and confluence with Indus.
		Nubra River & Shyok River, India & Pakistan	Ladakh, Jammu & Kashmir, India	After confluence with Nubra in Indian Kashmir, Shyok River enters Gilgit Baltistan, Pakistan
		Astore River, Pakistan	Himalayas, Burzil Pass (LOC), Pakistan	Astore River is tributary of Gilgit River, which is onward tributary of Indus River.
		Gilgit River, Pakistan	Shandur, Hindukash, Pakistan	Confluence with Indus at Juglot Junction, Gilgit Baltistan, Pakistan.
		Kunar River, Pakistan & Afghanistan	Broghil Pass, Chitral, Hindu-Kash, Pakistan	Flows on Durand Line. Originates in Pakistan and enters Afghanistan at Kunar Valley and then

		(including Runn of Kutch) 8. Falls into the Arabian Sea			joins Kabul River in Jalalabad.
			Kabul River, Afghanistan & Pakistan	Maidan Wardak Province, Sanglakh Range, Hindu-Kash, Afghanistan.	Enters Pakistan at Torkham, Durand Line. Kunar River is its tributary. Kabul River Basin Treaty under dispute.

Table 2: Different communities of Pakistan and their climate change ontology.

Social Classes	**Climate Change Observations**	**Ontology**	**Epistemology**	**Methodology (Mitigation + Adaptation)**
Indigenous *Baltis* (Gilgit Baltistan)	Glaciers' behaviour (GLOF, depletion, surging, drying, receding, moving etc.)	Glaciers are living creatures controlled by fairies	Male Glaciers outburst more while female glaciers give less outburst.	Glacier grafting, Glacier Marriage
Indigenous Indus Bank tribes (*Mohanas, Mazaris, Miranis* etc.)	Floods	Opportunity of donations	Floods are from God, which are experienced since our forefathers.	Live on the places which are more vulnerable to floods.
Fishermen	Depletion and migration of species	Difficult years for families	Fishing is the sole bread earning profession.	Overfishing, illegal fishing, breach of coastal boundaries.
Farmers	Seasonal Change	Crop production	Sowing and harvesting times confused	Crop rotation, water pumping, confusion between indigenous and modern techniques
Poor	Torrential rains & cloud bursts	God facilitates to rich only	Problems for shelter	Use of public property like railway platforms, bridges etc.
Middle Class	Droughts	Tension to manage price hike of commodities	Save the day for family	Blaming the government. Agitations, strikes etc.
Industrialist	Greenhouse gas emission	Production is preferred on emission	Enough forests are present to suck emission of my factory	Compromise with EPAs (environment protection agencies)
Timber Mafia	Issue of deforestation.	Trees are naturally made for cutting	Forests being public property can be utilized by anyone.	Exploitation of natural resources.
Politicians	International Pressure to do more on Climate Change	An opportunity to attract more funding	It yields no votes.	Only theoretical work to satisfy donors.

Executives	Pakistan's vulnerability to climate change	Opportunities for promotion, foreign tours etc.	Slow promotion despite their intellectualism.	Creation of ministries, departments, posts etc.
Civil Society	Environment degradation	Opportunity for new projects	They are (self-made) custodian of environment protection efforts	Donor funded awareness workshops and plantation & cleanliness drives
Scientists	Global warming	Rising of temperature	02 Degree rise in temperature	Meteorological Modeling
Molvis (religious people)	Natural Disasters	God's anger	Punishment of Sins	Pardon forgiveness from God, rituals.

These results reveal that Pakistan faces a multidimensional climate crisis incorporating social, economic, and environmental factors. Irregular rainfall, rising temperatures, increasing evapotranspiration, and declining water shortages collectively threaten national sustainability. Nevertheless, the most critical issues are present in the gap between practice and policy. The NCCP-2012 offers a comprehensive framework but fails to account for local socio-cultural dynamic and governance challenges.

Recommendation

To increase the effectiveness of Pakistan's National Climate Change Policy 2012, it is recommended to enhance institutional coordination and ensure clear roles among federal and provincial bodies. Transparent reporting and data-driven assessments of employees for monitoring and evaluation. To address the technical and administrative gaps, capacity building requires local and national levels. Additionally, coordination of active stakeholder engagement, such as community participation, and the private sector should be encouraged. Policy alignment with the updated international frameworks and integration of climate considerations into all development sectors will improve resilience and ensure sustainable outcomes.

Conclusion

Pakistan National Climate Change Policy 2012 marks an important move towards monitoring the country's vulnerability to climate change and supporting sustainable development. The policy provides a robust framework that combines strategies for minimizing emissions and adapting to change across main areas like water, energy, agriculture, and disaster management. Nevertheless, this evaluation represents that, despite its strong theoretical basis, the policy's effectiveness has been hindered by issues in implementation. These include poor coordination among institutions, a lack of financial resources, and weak monitoring and evaluation systems.

References

Ahmed W, Tan Q, Shaikh GM, Waqas H, Kanasro NA, Ali S, Solangi YA. Assessing and prioritizing the climate change policy objectives for sustainable development in Pakistan. Symmetry. 2020 Jul 22;12(8):1203.

Akhundov R, Hashimov E. The environmental impact of war: Effects, challenges, and solutions. Матеріали конференцій МЦНД. 2025 Jun 23(27.06. 2025; Дніпро, Україна):103-12.

Allioui F. The Principle of Common but Differentiated Responsibility. 2025 Jan 26;1(1):64-73.

Aslam H, Muzaffar M. Barriers to Sustainable Development: Examining Pakistan's Economic Taboos and SDG Challenges. Pakistan Social Sciences Review. 2025 May 11;9(2):351-66.

Atapattu S, Gonzalez CG. Climate change. In Research Handbook on Third World Approaches to International Law (TWAIL) 2025 Oct 14 (pp. 609-621). Edward Elgar Publishing.

Bakhsh K, Latif A, Ali R, Yasin MA. Relationship between adaptation to climate change and provincial government expenditure in Pakistan. Environmental Science and Pollution Research. 2021 Feb;28(7):8384-91.

Mumtaz M. The National Climate Change Policy of Pakistan: An Evaluation of Its Impact on Institutional Change: M. Mumtaz. Earth Systems and Environment. 2018 Dec;2(3):525-35.

Ramzan M. Political Will and Climate Change Policy Implementation in Pakistan in the Post-Paris Agreement Era (2015-2023). Political Horizons. 2025 Jun 29;3(1):16-29.
Shah Z. ASSESSING POLICIES OF PAKISTAN TOWARDS CLIMATE CHANGE: PROSPECTS & CHALLENGES. Contemporary Journal of Social Science Review. 2025 Mar 13;3(1):1654-68.
Ullah MK, Khan MZ. Pakistan's Climate Crisis: An Integrated Analysis of Floods, Glacial Melt, Droughts, Water Scarcity and Biodiversity Loss. Journal of Social Sciences Development. 2025 May 20;4(2):106-19.