

POLICY BRIEF

Enhancing Climate Resilience in Pakistan: Evidence-Based Strategies for Managing Precipitation Shifts and Disaster Risks

Abstract

Pakistan faces intensifying climate threats due to erratic precipitation, recurrent floods, and extreme heat events that jeopardize agriculture, water security, and livelihoods. Recent national and regional activities under the APN-supported project “*Enhancing Climate Resilience in South Asia and China: Predicting Precipitation Shifts and Their Impacts for Disaster Risk Reduction and Resource Security*” provided scientific and community-based evidence to guide policy action. Findings from Southern Punjab indicate that flooding (30%), increased rainfall and temperature (20%), and heatwaves (16.7%) are the dominant climatic challenges, while food and water shortages (33.3%), livestock loss (30%), and limited early warning access (23.3%) remain key vulnerabilities. The brief recommends strengthening localized early warning systems, integrating climate forecasting into district-level planning, and improving coordination among research, policy, and disaster management institutions to build long-term adaptive capacity.

Keywords

Climate resilience; precipitation variability; early warning systems; adaptation; disaster risk reduction; South Asia; Pakistan.

Relevance to Legislation

The findings directly support Pakistan’s commitments under the National Climate Change Policy (2021) and National Adaptation Plan (2023), emphasizing proactive risk reduction, integrated data systems, and regional collaboration. They align with SDG 13 (Climate Action) and Sendai Framework Priority 1: Understanding Disaster Risk by providing empirical evidence for policy decisions at federal and provincial levels.

Relevance to Environmental Problems

Pakistan's agrarian economy is heavily dependent on monsoon rainfall, making it highly vulnerable to precipitation anomalies. Increasingly frequent floods, heatwaves, and droughts are intensifying soil degradation, crop failures, and migration from rural areas. Weak institutional capacity, fragmented early warning systems, and limited climate literacy hinder community preparedness. Strengthening research-policy interfaces and localized adaptation frameworks is essential to safeguard food security and rural livelihoods. Recent climate disasters further highlight Pakistan's growing vulnerability. The catastrophic 2022 floods affected more than 33 million people across the country

Description of the Problem

Field evidence from 30 communities across Southern Punjab revealed widespread perception of climatic instability. Flooding (30%), irregular rainfall (20%), and rising temperature (13%) are now recurring stressors. Economic losses are most severe for household assets (36.7%) and livestock (30%), with reported income impacts ranging from 30% severe to 23% moderate losses. Adaptation practices such as rainwater harvesting (33.3%), crop diversification (30%), and afforestation (13.3%) are emerging, but 23.3% of respondents reported no adaptation initiatives, highlighting policy and resource gaps. Institutionally, 36.7% of participants were unaware of adaptation policies, and 40% cited insufficient subsidies and market access barriers. These findings confirm that localized resilience remains underdeveloped and requires coordinated interventions linking research, governance, and community engagement.

Recommendations

1. **Establish district-level early warning and risk mapping systems** using precipitation modeling and real-time communication channels.
2. **Integrate climate forecasting into agricultural and water management policies**, ensuring seasonal planning aligns with shifting rainfall patterns.

3. **Institutionalize research-policy coordination** among universities, NDMA, MoCC, and provincial departments for data exchange and applied research.
4. **Enhance community-based adaptation funding** through microfinance, insurance schemes, and public-private partnerships for smallholders.
5. **Promote regional collaboration** under APN frameworks for shared modeling tools, data harmonization, and monsoon prediction accuracy.
6. **Strengthen awareness programs** to expand climate literacy and support behavioral adaptation among rural populations.
7. **Develop climate-resilient infrastructure**, including flood-resistant roads, embankments, and drainage systems in high-risk districts and northern valleys.
8. **Improve glacier monitoring** and community-based early warning systems in northern Pakistan to reduce risks from GLOFs and flash floods.
9. **Increase investment in water conservation projects** such as rainwater harvesting, small dams, and efficient irrigation systems to address recurring drought conditions.

Authors

- **Prof. Dr. Wajid Nasim Jatoi:** Director, International Center for Climate Change, Food Security & Sustainability (ICCFs), The Islamia University of Bahawalpur (IUB), Pakistan
Contact: wajid.nasim@iub.edu.pk & +923339911881
- **Mr. Jaam Rehmatullah,** PhD Scholar/Enumerator & Research Associate, IUB-Pakistan.
- **Ms. Zeba Gul,** GIS Expert & Research Fellow, at ClimatExpert Consultancy Pvt. Ltd.

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