

Capacity Building, Climate Education, and Mass Awareness

Zahid Ullah Khan¹, Shahzad Javed², Muhammad Nadeem Akhtar³
Jehanzeb Khan Orakzai⁴

KJPP

Citation:

Khan, Z. U., Javed, S., & Akhtar, M. N, Orakzai, J, K (2024). *Climate change and its implications for Pakistan*. Khyber Journal of Public Policy, 3(4), winter

Article Info:


Received: 24/09/2024
Revised: 25/10/2024
Accepted: 01/11/2024
Published: 03/12/2024

Disclaimer:

The opinions expressed in this publication do not implicitly or explicitly reflect the opinions or views of the editors, members, employees, or the organization. The mention of individuals or entities and the materials presented in this publication do not imply any opinion by the editors or employees regarding the legal status of any opinion, area, territory, institution, or individual, nor do they guarantee the accuracy, completeness, or suitability of any content or references.

Copy Right Statement:

© 2022 Khyber Journal of Public Policy

 This work is licensed under a Creative Commons Attribution 4.0 International License, which permits unrestricted use, distribution, and reproduction in any medium, provided the original work is properly cited.

Abstract:

Effective climate change mitigation and adaptation in Khyber Pakhtunkhwa, Pakistan, necessitates collaborative efforts among government institutions, civil society, and local communities. The Khyber Pakhtunkhwa Climate Change Policy outlines key intervention sectors such as agriculture, water, and forestry, yet challenges persist in education, capacity building, and public awareness. This analysis identifies significant gaps in skilled personnel, financial resources, and institutional coordination that hinder effective policy implementation. Moreover, the absence of climate-related topics in educational curricula restricts public engagement, while mass awareness campaigns struggle with inconsistent messaging. To overcome these challenges, it is essential for government agencies, educational institutions, and community organizations to work together, developing inclusive strategies that emphasize targeted capacity-building programs, enhanced climate education, and cohesive awareness campaigns. These efforts can cultivate a resilient society prepared to confront both current and future climate impacts.

Key words:

Climate change, capacity building, climate education, public awareness.

¹ Information Group

² Railways Group

³ Provincial Management Service-KP

⁴ Faculty Member National Institute of Public Administration (NIPA), Peshawar

Introduction

Effective implementation of climate change mitigation and adaptation strategies in Pakistan, particularly in Khyber Pakhtunkhwa, requires collaborative efforts from government institutions, civil society, and local communities (Saeed, 2020). The Khyber Pakhtunkhwa Climate Change Policy provides a framework for provincial action, outlining key sectors for intervention, including agriculture, water, and forestry (Government of Khyber Pakhtunkhwa, 2022). To enhance policy impact, capacity-building initiatives for government officials and local stakeholders are crucial, focusing on climate-resilient practices and disaster risk reduction (Ahmed & Iftikhar, 2022). Simultaneously, integrating climate change education into school curricula and promoting mass awareness campaigns can foster a culture of sustainability, driving behavioral change and community-led initiatives (Raza, 2023; IPCC, 2021).

Problem Statement

At the global and national levels, initiatives have been taken to address climate change vulnerabilities; however, there appears to be a significant gap in education, capacity building, and public awareness. Consequently, a comprehensive analysis is needed to identify the challenges faced at the federal level and particularly by the Khyber Pakhtunkhwa government in effectively implementing climate change policies and to propose recommendations for improvement.

Scope

This study aims to:

- Encompass a multidimensional approach to the issue, taking into account both national and global aspects related to capacity building, climate education, and mass awareness regarding climate change.
- Provide comprehensive insights into the challenges posed by existing policies at the national and provincial levels in capacity building, climate education, and mass awareness.
- Conduct a detailed comparative analysis with India to put forth certain recommendations and a way forward, using different analytical tools.

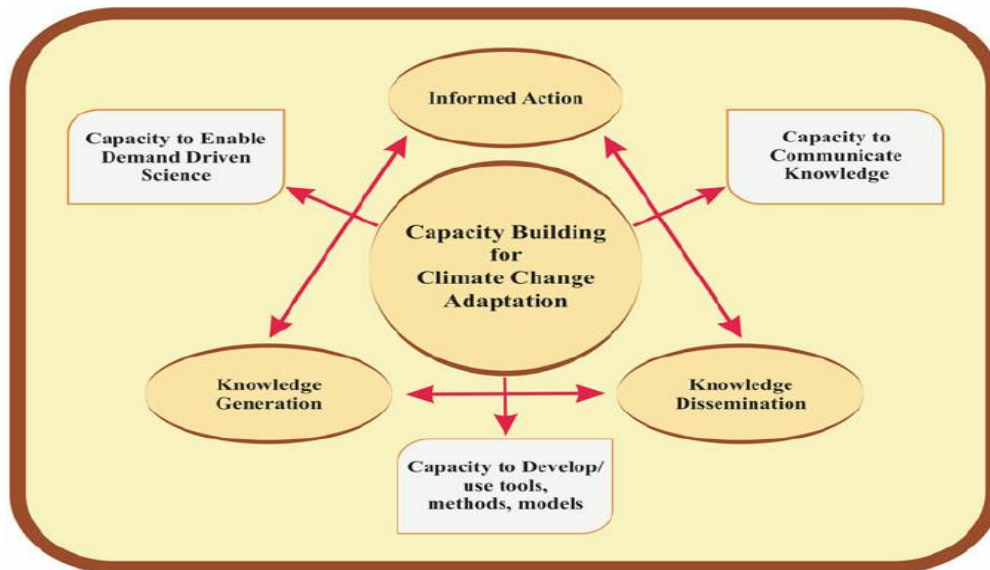
Research Methodology

Qualitative and quantitative approaches have been applied, utilizing both primary and secondary sources. These sources include the institutional legal framework, policies at the provincial and federal levels, and research articles published on climate change. Additionally, interviews were conducted with ten groups in their respective departments regarding climate change capacity building, education, and mass awareness. Besides this, comparative analysis, gap analysis, statistical analysis, and PESTEL analysis have been conducted, followed by a log framework.

Literature Review

The capacity building, climate education, and mass awareness regarding climate change at the national level and Khyber Pakhtunkhwa level reveal a complex interplay of challenges and opportunities that hinder effective climate action. Various studies highlight the critical gaps in institutional capacity and the lack of trained professionals in governmental and non-governmental organizations, which impede the implementation of climate-related programs (Awan et al., 2022; Khan et al., 2023). Additionally, the integration of climate education within school curricula remains insufficient, with many educational institutions failing to address climate change comprehensively, resulting in a lack of awareness among students (Ali & Bibi, 2023). This is compounded by limited resources allocated for training educators and the absence of consistent communication strategies that can engage the broader public effectively (Raza & Ali, 2023). Furthermore, existing mass awareness campaigns often deliver mixed messages, which can confuse stakeholders and dilute public engagement (Saeed et al., 2023). The literature also points to the necessity of fostering collaboration among various stakeholders, including government agencies, educational institutions, and community organizations, to create cohesive strategies that enhance climate education and awareness (Khan & Ahmad, 2023). By synthesizing these findings, it becomes clear that a multifaceted approach is essential to address the critical issues surrounding climate change in Khyber Pakhtunkhwa, emphasizing the need for increased investment in capacity building, comprehensive climate education, and targeted mass awareness initiatives to empower communities and enhance resilience against climate impacts.

The Role of Capacity Building for Climate Change Adaptation.



The Role of Federal Institutions in Capacity Building for Climate Change Adaptation in Pakistan

Pakistan is highly vulnerable to climate change impacts, including extreme weather events, rising temperatures, and water scarcity. Building capacity to adapt to these changes is crucial for resilience and sustainable development. Federal institutions play a vital role in capacity building for climate change adaptation in Pakistan.

Policies and Frameworks

National Climate Change Policy (2012)

Pakistan's climate policy aims to strengthen government and community capacity for climate action through training, institutional support, research, private sector engagement, and international collaboration. Key efforts are detailed in Sections 5.4 and 6.4 on Capacity Building and Implementation.

National Adaptation Plan (2013)

The National Adaptation Plan (2013) emphasizes strengthening institutions, technical expertise, and communities for climate resilience, with a focus on agriculture, water, and infrastructure. Key actions are detailed in Sections 3.2, 4.2, and 5.2.

Climate Change Act (2017)

The Climate Change Act (2017) prioritizes capacity building by establishing the National Climate Change Authority (NCCA) to oversee training, research, public awareness, and international collaboration. The Act mandates resource allocation for these efforts, outlined in Sections 4, 7, 10, and 15.

Pakistan's Nationally Determined Contributions (NDCs) under the Paris Agreement

Pakistan's NDCs under the Paris Agreement stress capacity building in Sections 3 (Mitigation), 4 (Adaptation), 5 (Finance), and 6 (Technology Transfer). The Ministry of Climate Change is tasked with coordinating these efforts, emphasizing institutional capacity, technical expertise, and public awareness.

National Disaster Management Plan (2010)

The National Disaster Management Plan (2010) emphasizes capacity building through enhanced institutional capacity, technical expertise, and public awareness (Section 3.4). It establishes the NDMA to oversee initiatives (Section 4.2) and prioritizes training and research in disaster management (Sections 5.3 and 6.4).

Federal Institutions

Ministry of Climate Change (MoCC)

The Ministry of Climate Change (MoCC), under the Climate Change Act (2017), focuses on capacity building through institutional strengthening, research (Section 7), and international cooperation (Section 10). MoCC's initiatives support climate adaptation, emissions mitigation, and NDC implementation.

National Disaster Management Authority (NDMA)

The NDMA, under the Disaster Management Act (2010), enhances disaster risk management capacity through training and stakeholder

collaboration (Sections 5 and 6), preparing officials and communities to respond effectively to disasters.

Pakistan Environmental Protection Agency (EPA)

The Pakistan Environmental Protection Agency (EPA) prioritizes capacity building under the Environmental Protection Act (1997) (Section 6(a)) to enhance compliance and technical expertise (Section 7), promoting environmental awareness and sustainable development through training programs.

Ministry of Water Resources

The Ministry of Water Resources, under the Indus River System Authority Act (1992) (Section 5(1)(d)) and the Pakistan Water and Power Development Authority Act (1958) (Section 3(2)), enhances capacity for sustainable water management through training programs and stakeholder engagement, while collaborating on water policies and strategies.

Ministry of Food Security

The Ministry of Food Security, under the Agriculture Produce Markets Act (1977) (Section 3(1)(c)) and the Pakistan Agricultural Research Council Ordinance (1984) (Section 4(2)), focuses on capacity building to enhance agricultural productivity and food security through training programs for farmers and stakeholder engagement.

Projects and Programs at Federal Level.

Name of Project	Executed by	Funded by	Cost	Duration	Key Objective
Climate Phase II	MoCC	UNDP	540,000 USD	2023 - 2024	Train youth and women in green skills, and on eco-tourism and livelihood opportunities.
Water Sector Capacity Building and Advisory Services	Ministry of Water Resources	IDA/World Bank	44.81 (M) USD	2016 to 2021	Training and capacity building at federal and provincial levels, i.e., MoWR, O/o

Project					CEA/FFC, PCIW, PIDs, FATA, Gilgit-Baltistan.
Climate Resilient Urban	MoCC	UNDP	56.825 (M) PKR	2019-2024	Climate-resilient, safe, and sustainable cities.
Building Pakistan's Resilience to Climate Change	MoCC	WWF	77.8 (M) USD	2021 onward	Ecosystem-based flood risk management.
Water Resource Management in Leather Industrial Zone	MoCC	UNIDO	5.5 Million USD	2022 onward	Low emissions and climate-resilient development.
MYHP Project	AKRS	AKRS, UNICEF	7.8 (M) USD	2017 onward	Natural disaster response and recovery.
Sustainable Waste Management Solutions	MoCC	UNIDO	20.7 (M) USD	2022 onward	Municipal and industrial waste management.
SAR Strengthen Climate Adaptation and Resilience	MoCC	GIZ	10 (M) Euro	2021 onward	Climate adaptation and resilience risk management focusing on vulnerable populations.

S. No	Year	No. of Courses	Men	Women	Total
1.	2010	27	750	95	845
2.	2011	24	777	169	946
3.	2012	5	277	18	295
4.	2013	25	1012	124	1136
5.	2014	47	1204	239	1443
6.	2015	25	595	174	769
1	2016	20	749	111	860
8.	2017	9	288	36	324
9.	2018	27	905	163	1068
10.	2019	17	541	170	711
11.	2020	6	259	28	287
12.	2021	17	356	77	433
13.	2022	6	162	36	198
14.	2023	20	1307	406	1713
15.	2024	17	872	214	1186
Total		292	10079	2035	12114

The Role of Khyber Pakhtunkhwa's Institutions in Capacity Building for Climate Change Adaptation in the Province

Khyber Pakhtunkhwa is vulnerable to climate change impacts, including glacier melting, floods, and droughts. To address these challenges, KP's institutions play a crucial role in capacity building for climate change adaptation.

Policies and Frameworks

KP Climate Change Policy (2016)

The KP Climate Change Policy (2016) emphasizes capacity building to address climate change through training programs for officials (Section 4.2), institutional development in vulnerable districts (Section 4.3), and research collaborations with universities and organizations (Section 5.1(c)).

KP Disaster Management Policy (2015)

The KP Disaster Management Policy (2015) focuses on capacity building for disaster resilience through training programs (Section 3.2), the establishment of the KDMA to coordinate efforts (Section 4.1), and the development of disaster management plans with regular drills (Section 5.3). Section 6.2 encourages research collaborations with universities for improved disaster risk reduction.

The KP EPA Act (2014)

The KP EPA Act (2014) focuses on capacity building through stakeholder training (Section 11), research (Section 15), and collaboration with organizations for knowledge sharing (Section 26), with the Provincial Environmental Protection Council advising on these initiatives (Section 22).

Institutions

KP Environmental Protection Agency (EPA)

The KP EPA, under the 2014 Act, prioritizes capacity building through stakeholder training (Section 11) and environmental research (Section 15), enhancing regulation, enforcement, and sustainable development.

Provincial Disaster Management Authority (PDMA)

The PDMA Khyber Pakhtunkhwa, under the 2015 Act, emphasizes capacity building through training (Section 28) and disaster risk reduction research (Section 30), enhancing preparedness and resilience.

KP Agriculture Department

The Agriculture Department in KP, under the 2016 Climate Change Policy, focuses on capacity building through training in climate-resilient agriculture (Section 4.3) and research in climate-smart farming (Section 5.2).

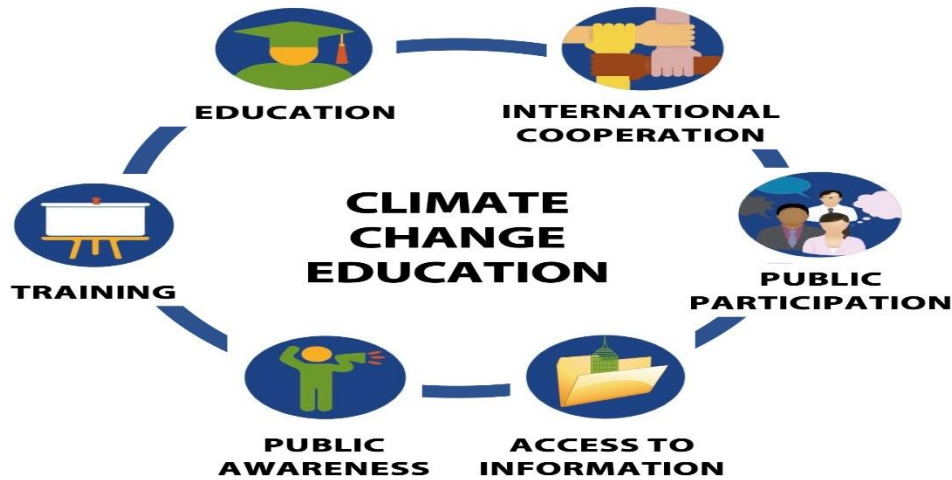
KP Forest Department

The Forest Department in KP, under the 2019 Act, prioritizes capacity building for sustainable forest management (Section 6) and conducts training on climate-resilient practices and reforestation (Section 11).

Projects

Name of Project	Executed by	Funded by	Cost	Duration
SAP 039	P&D Deptt KP	UNDP & World Bank	9.8 Million USD	2024 on word
BTTP	Environment Deptt KP	Local	13.669 Billion PKR	2019 on word
BTASP	Environment Deptt KP	Local	372 Million PKR	2022 on word
Climate Resilience through Horticulture Intervention in KP	Agriculture Department	World Bank	778 Million PKR	2022 on ward
GZD Command Area	Agriculture Department	Local & World bank	4.23 Billion PKR	2016 on ward
KP-RISP	P&D Department	Local & World Bank	109 Billion PKR	2023 on word
KP-FSSP	Agriculture Department	Local, ADB & Japan Aid	88 Million USD	2024 on word
KP-RAP	C&W Department	Local & World Bank	69.440 Billion PKR	2022 on ward

The Role of Climate Education for Climate Change Adaptation.



The Role of Federal Institutions in Climate Education for Climate Change Adaptation in Pakistan

Climate education is crucial for climate change adaptation in Pakistan. Federal institutions play a vital role in promoting climate education.

Policies and Frameworks

National Climate Change Policy (2012)

The National Climate Change Policy (2012) emphasizes integrating climate education into school curricula (Section 3.5) and capacity-building programs for stakeholders (Section 4.2(c)). It also supports public awareness campaigns (Section 5.3(d)) and the establishment of research centers for climate change management (Section 6.2).

Climate Change Act (2017)

The Climate Change Act (2017) prioritizes climate education and awareness in Pakistan by mandating the promotion of education through curricula and training (Section 9), the establishment of research centers (Section 10), and capacity building for stakeholders (Section 12).

National Education Policy (2017)

The National Education Policy (2017) emphasizes climate education for sustainable development by integrating it into curricula (Section 4.3), including sustainable living skills (Section 5.2.0), and providing teacher training in climate change (Section 7.3).

Pakistan's Nationally Determined Contributions (NDCs)

Pakistan's Nationally Determined Contributions (NDCs) stress the importance of climate education for adaptation (Section 3.2), capacity building for stakeholders (Section 4.1(c)), and promoting sustainable lifestyles (Section 5.3).

Federal Institutions

Ministry of Climate Change (MoCC)

The Ministry of Climate Change (MoCC) is tasked with promoting climate education in Pakistan under the Climate Change Act (2017), coordinating nationwide programs (Section 5), and developing curricula for stakeholders (Section 9(1)(c)), while also establishing research centers (Section 12(1)(d)).

Ministry of Education and Professional Training (MoEPT)

The Ministry of Education and Professional Training (MoEPT) is responsible for integrating climate change education into Pakistan's educational framework as mandated by the National Education Policy (2017), which includes curriculum incorporation (Section 4.3), development of sustainable living skills (Section 5.2.0), and teacher training programs (Section 7.3).

National Disaster Management Authority (NDMA)

The National Disaster Management Authority (NDMA) promotes climate education under the Disaster Management Act (2010) by raising awareness (Section 4(h)), coordinating training programs (Section 5(1)(c)), and developing guidelines for educational curricula (Section 6(2)(d)).

Pakistan Environmental Protection Agency (EPA)

The Pakistan Environmental Protection Agency (EPA) promotes climate education by conducting public awareness programs (Section 6), training stakeholders (Section 7(1)(c)), and collaborating with educational institutions to integrate climate education into curricula (Section 12(2)(d)).

Higher Education Commission (HEC)

The Higher Education Commission (HEC) promotes climate education by advancing research in environmental science (Section 3(2)(c)), establishing climate study centers (Section 4(2)(b)), and developing related curricula (Section 10(1)(d)).

Projects

Name of Project	Executed by	Funded by	Cost	Duration
Climate Box	MoCC	UNDP (the Government of the Russian Federation.)	\$766,422	2017-2021
Recharge Pakistan	MoCC Federal Flood Commission (FFC) WWF-Pakistan	Green Climate Fund (GCF) (USAID) Coca-Cola Foundation and WWF-Pakistan	66 Million USD 21 Million USD	2023 on ward
Pakistan Hydro met & Climate Services Project (PHCSP)	MoCC	World Bank	188 (M) USD	2018-2024
Ten Billion Tree Tsunami Phase-1	MoCC	Govt of Pakistan PSDP	125 Billion PKR	2019-2023

The Role of Khyber Pakhtunkhwa's Institutions in Climate Education for Climate Change Adaptation in the Province

Khyber Pakhtunkhwa (KP) is vulnerable to climate change impacts. Climate education is crucial for adaptation.

Policies and Frameworks

KP Climate Change Policy (2016)

The KP Climate Change Policy (2016) emphasizes climate education by integrating it into school curricula (Section 4.2.3), establishing university research centers (Section 5.1.2), and promoting capacity building and public awareness (Sections 6.3.1 and 7.2.2).

KP Environmental Protection Act (2014)

The Khyber Pakhtunkhwa Environmental Protection Act (2014) mandates climate education through public awareness programs (Section 11(1)(c)), curriculum integration (Section 15(2)(d)), and training for stakeholders (Section 20(1)(e)).

KP Provincial Disaster Management Authority (PDMA) Act (2012)

The KP PDMA Act (2012) mandates public awareness programs on climate and disaster management (Section 5(1)(f)), collaboration with educational institutions for curriculum development (Section 6(2)(c)), and training centers for stakeholders (Section 12(1)(d)).

The Khyber Pakhtunkhwa Universities Act (2012)

The KP Universities Act (2012) requires universities to promote climate change research (Section 5(1)(v)), establish centers for related education (Section 11(2)(iii)), and develop sustainability-focused curricula (Section 15(1)(vii)).

Institutions

KP Environmental Protection Agency (EPA)

The KP Environmental Protection Agency (EPA) is essential for climate education, conducting public awareness programs (Section 11(1)(c)), collaborating with educational institutions to integrate

climate education into curricula (Section 15(2)(d)), and establishing training programs for stakeholders (Section 20(1)(e)).

KP Provincial Disaster Management Authority (PDMA)

The KP Provincial Disaster Management Authority (PDMA) promotes climate education through public awareness programs, collaboration with educational institutions for curriculum development, and the establishment of training centers for stakeholders (Sections 5(1)(f), 6(2)(c), & 12(1)(d)).

Department of Elementary & Secondary Education

The KP E&SE Department is mandated to include climate education in curricula, as stated in Section 10(1)(b) of the Right to Free and Compulsory Education Act (2017), and requires private schools to do the same under Section 12(2)(a) of the Schools and Colleges Registration and Admission Regulation Rules (2020).

Department of Agriculture

The KP Agriculture Department is mandated by law to promote climate education for farmers, focusing on sustainable practices under the Agriculture Produce Marketing Regulatory Authority Act (2016) and soil conservation techniques as required by the Soil Conservation Act (2019).

Department of Higher Education

The KP Higher Education Department advances climate education through legal mandates. The KP Universities Act (2012) requires universities to promote research in environmental science and climate change (Section 5(1)(v)), establish centers for climate change and disaster management (Section 11(2)(iii)), and integrate climate change into curricula (Section 15(1)(vii)).

University of Peshawar (Centre for Climate Research)

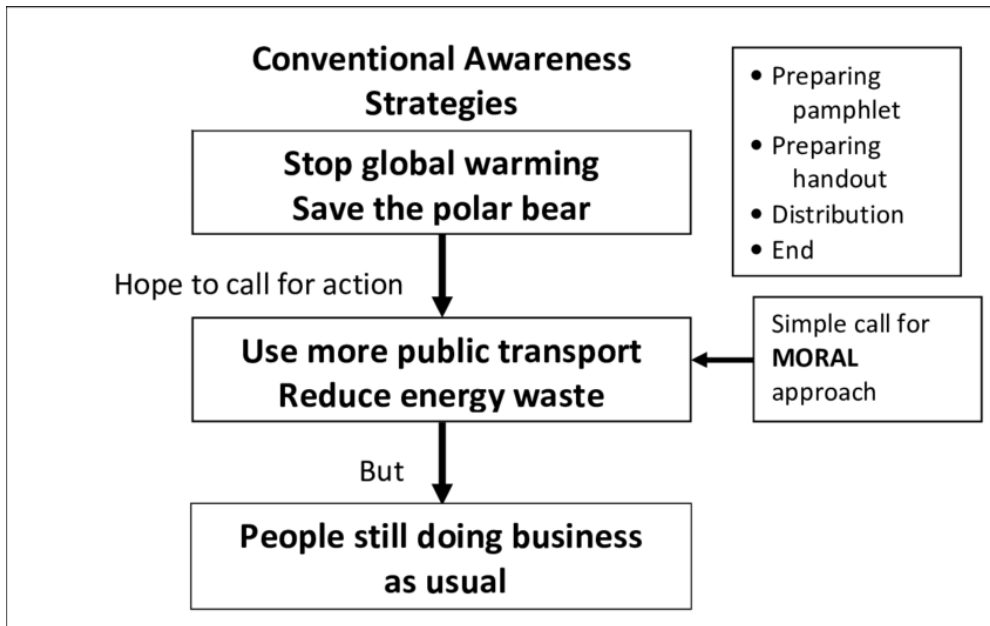
The University of Peshawar's Centre for Climate Research promotes climate education and research in KP, focusing on interdisciplinary studies and capacity building. It aims to develop climate change mitigation and adaptation strategies.

Projects

Name of Project	Executed by	Funded by	Cost	Duration
KP-RETP	P&D Deptt KP	IFAD	30.265 Billion PKR	2021 on word
BTTP	Environment Deptt KP	Local	13.669 Billion PKR	2019 on word
BTASP	Environment Deptt KP	Local	372 Million PKR	2022 on word
BRT Peshawar	T&MTD KP	Local ADB AFD	70 Billion PKR	2018 on ward
KPIAIP (IDA- Credit)	Agriculture Deptt	World Bank	30.048 Billion PKR	2019 on ward
Climate Resilience through Horticulture Intervention in KP	Agriculture Department	World Bank	778 Million PKR	2022 on ward
GZD Command Area	Agriculture Department	ADP World bank	4.23 Billion PKR	2016 on ward
KP-RISP	P&D Department	Local World Bank	109 Billion PKR	2023 on word
KP-FSSP	Agriculture Department	Local ADB Japan Aid	88 Million USD	2024 on word
KP-RAP	C&W Department	Local World Bank	69.440 Billion PKR	2022 on ward

The Role of Mass Awareness for Climate Change

Adaptation



Overview of Mass Awareness in Pakistan

Pakistan is part of the developing world, where around 40% of the population is aware of climate change, compared to developed nations like Japan, the EU, and the USA, where the ratio exceeds 90%. Still, 40% of adults worldwide are unaware of climate change, and this ratio increases to 65% in developing countries (IPRI-2022).

Media Landscape in Pakistan

Print Media

- There are approximately 945 newspapers in the country. The print media is published in 11 languages, with Urdu and Sindhi as the largest language groups.
- Urdu newspapers are dominant in rural areas, while the English media primarily focuses on urban consumers.
- Print media coverage is limited, with some exceptions like Rina Saeed Khan, an environmental journalist who regularly writes about climate issues in *Daily Dawn*.

Electronic Media

- Presently, there are around 142 TV channels and 235 FM radio stations operating in the country, with a viewership of 141 million, consisting of both satellite and terrestrial TV channels.
- Electronic media rarely discusses climate change, except during occasional events like International Days observed for climate change, e.g., Earth Day, Biodiversity Day, etc.

Digital Media/Social Media

- Pakistan has a large internet user base and high mobile phone penetration, with 193.9 million cellular subscribers, of which 127.06 million have 3G/4G access, and 140.7 million have broadband connections.
- Social media has vast potential for rapid information sharing on climate change, including the internet and cellular phones. Popular applications among new media users include Twitter, Facebook, WhatsApp, and Instagram.

Conventional Media Forums

In addition to this, there are more than 0.8 million mosques, churches, and other religious places in Pakistan, which also serve as media forums for public awareness.

Government Initiatives in the Area of Mass Awareness

- According to the PEMRA Rules 2017, 10% of airtime on all electronic media must be dedicated to public interest messages/awareness. This has set a parameter for the allocation of rates in public sector advertisements under the Advertisement Policy, 2021.
- Earmarking of up to 2.5% of the total budget outlay for advertisement and publicity in PC-1 of the PSDP Projects (Federal Government Direction 2022).

The Role of Federal Institutions in Mass Awareness for Climate Change Adaptation in Pakistan

Pakistan faces significant climate change impacts, necessitating effective adaptation and awareness measures. This analysis examines federal institutions' roles in promoting climate resilience through mass awareness.

Policies and Frameworks

National Climate Change Policy (2012)

The National Climate Change Policy (2012) of Pakistan highlights the need for public awareness on climate change. It mandates public campaigns to educate citizens on its causes and adaptation (Section 4.2.3), integrates climate education into school curricula (Section 5.1.2), and calls for a media cell to share information through various channels (Section 6.3.1).

Framework for Implementation of Climate Change Policy (2014-2030)

The Framework for Implementation of Climate Change Policy (2014-2030) mandates a national climate change awareness strategy (Section 3.2.1) to improve public understanding, integrates climate education into formal and non-formal systems (Section 4.1.3), establishes resource centers for training (Section 5.2.2), and assigns provincial governments to lead public awareness campaigns (Section 6.1.4).

Pakistan's Nationally Determined Contributions (NDCs)

Pakistan's NDCs under the Paris Agreement emphasize mass awareness for climate change mitigation, with Section 4.2.1 highlighting the need for "climate change education and awareness" and Section 5.1.3 calling for "capacity building and training" for stakeholders.

NDMA Act (2010)

The National Disaster Management Act (2010) mandates public awareness for disaster risk reduction, with Section 6(2)(d) requiring the NDMA to educate the public, Section 12(1)(c) allowing the National Executive Committee to launch awareness campaigns, and Section 23(1)(e) directing state governments to incorporate climate change education into school curricula.

Institutions

Ministry of Climate Change

The Ministry of Climate Change is essential for promoting awareness of climate adaptation, as mandated by the Climate Change Act, 2017, which requires it to educate the public (Section 4(2)(d)), conduct

awareness campaigns and training (Section 5(1)(c)), and integrate climate education into national curricula (Section 12(1)(e)).

Pakistan Environmental Protection Council (PEPC)

The PEPC promotes mass awareness of climate change, mandated by the Pakistan Environmental Protection Act, 1997, to educate the public (Section 5(1)(c)), conduct awareness campaigns and training (Section 6(2)(d)), and collaborate with educational institutions to integrate climate education into curricula (Section 15(1)(e)).

Global Change Impact Studies Centre (GCISC)

The GCISC promotes climate change awareness in Pakistan, as mandated by the Pakistan Environmental Protection Act, 1997, conducting research (Section 3), disseminating information (Section 5(1)(d)), collaborating with educational institutions (Section 6(2)(e)), and developing public awareness campaigns (Section 12(1)(f)).

National Disaster Management Authority (NDMA)

The NDMA promotes climate change awareness in Pakistan, as mandated by the National Disaster Management Act, 2010, to educate the public on risks (Section 6(2)(d)), conduct awareness campaigns and training (Section 12(1)(c)), and integrate climate education into national curricula (Section 23(1)(e)).

Ministry of Information & Broadcasting

The Ministry of Information and Broadcasting promotes climate change awareness in Pakistan, mandated by the PEMRA Ordinance 2002, to disseminate information on public interest issues (Section 4(2)(e)), produce public service messages (Section 6(1)(c)), and promote climate coverage in the media (Section 10(1)(d)).

Higher Education Commission

The HEC promotes climate change awareness through academia, mandated by the HEC Ordinance 2002, to promote research (Section 3(1)(d)), integrate climate education into curricula (Section 5(1)(e)), and establish research centers (Section 10(1)(f)).

The Role of Khyber Pakhtunkhwa's Institutions in Mass Awareness for Climate Change Adaptation in the Province

Khyber Pakhtunkhwa faces significant climate change impacts. Institutions play a vital role in promoting mass awareness and adaptation.

Policies and Frameworks

Khyber Pakhtunkhwa Climate Change Policy 2022

The KP Climate Change Policy 2018 emphasizes mass awareness and education, mandating public education (Section 4.2.3), curriculum integration (Section 5.1.2), resource centers (Section 6.3.1), and awareness campaigns by the provincial government (Section 7.2.2).

Khyber Pakhtunkhwa Climate Change Action Plan

The KP Climate Change Action Plan 2018 prioritizes mass awareness, mandating public education (Section 3.2.1), the development of educational materials (Section 4.1.3), training programs for stakeholders (Section 5.2.2), and awareness campaigns by the provincial government (Section 6.1.1).

Provincial Environmental Protection Act 2014

The KP Environmental Protection Act (2014) mandates climate change awareness, empowering the Provincial Environmental Protection Agency to educate the public (Section 6(2)(c)), conduct campaigns (Section 10(1)(d)), integrate education into schools (Section 15(2)(b)), and require industries to run awareness programs (Section 22(1)(e)).

PDMA Act (2012)

The KP PDMA Act (2012) prioritizes climate change awareness, mandating the PDMA to educate the public on risks (Section 12(1)(c)), conduct media campaigns (Section 15(2)(b)), and integrate climate education into school curricula (Section 20(1)(d)).

Institutions

Forestry, Environment & Wildlife Department

The KP Forestry, Environment & Wildlife Department's climate change awareness efforts are mandated by the Khyber Pakhtunkhwa Environmental Protection Act (2014), empowering it to educate the public (Section 6(2)(c)), integrate education into school curricula (Section 12(1)(e)), and conduct media campaigns (Section 15(2)(b)).

Provincial Climate Change Implementation Committee

The KP Provincial Climate Change Implementation Committee, under the Climate Change Act (2022), is mandated to disseminate information (Section 7(1)(d)), conduct public campaigns (Section 10(2)(e)), and collaborate with educational institutions on climate education (Section 14(1)(f)).

Environmental Protection Agency Khyber Pakhtunkhwa (EPA KP)

The KP Environmental Protection Agency (KP EPA) promotes climate change awareness under the Environmental Protection Act (2014) by conducting public campaigns (Section 6(2)(c)), integrating climate education into curricula (Section 12(1)(e)), and collaborating with media (Section 15(2)(b)).

PDMA KP

The KP PDMA promotes climate change awareness under the Disaster Management Act (2010) by conducting public campaigns (Section 12(1)(c)), collaborating with educational institutions and media (Section 14(2)(e)), and developing climate contingency plans (Section 18(1)(f)).

Khyber Pakhtunkhwa Agriculture Department

The KP Agriculture Department promotes climate awareness through laws mandating sustainable farming (Section 4(2)(d)), farmer education on soil conservation (Section 7(1)(e)), and climate-resilient water management (Section 10(2)(f)).

Comparative Study of Pakistan and India Regarding Capacity Building, Climate Education, and Mass Awareness for Climate Change Adaptation

Pakistan and India, neighboring countries in South Asia, face similar climate change challenges. The following table compares the role of government institutions in capacity building, climate education, and mass awareness for adaptation in both countries.

Aspect	Pakistan	India
Institutional Framework	<ul style="list-style-type: none"> • Ministry of Climate Change (MoCC) • National Disaster Management Authority (NDMA) • Pakistan Environmental Protection Agency (EPA) • Provincial climate change departments • Provincial Climate Change Implementation Committees • 	<ul style="list-style-type: none"> • Ministry of Environment, Forest and Climate Change (MoEFCC) • National Disaster Management Authority (NDMA) • State Climate Change Departments • National Institute of Disaster Management (NIDM) • National Clean Energy and Environment Fund (NCEEF) • Indian Meteorological Department (IMD)
Initiatives for Capacity Building, Climate Education & Mass Awareness	<ul style="list-style-type: none"> • Training programs for government officials • Climate change research and development • Community-based adaptation projects • International collaborations (e.g., UNDP, World Bank) • Climate Change Research and Development (CCRD) program • Climate Change Adaptation and Resilience (CCAR) project • National Climate Change Knowledge Portal • Climate Change 	<ul style="list-style-type: none"> • National Action Plan on Climate Change (NAPCC) • State Action Plans on Climate Change (SAPCC) • Climate Change Knowledge Portal • Training programs for officials and communities • National Climate Change Research Program • Climate Change Adaptation Program

	<p>Education and Awareness (CCEA) program</p> <ul style="list-style-type: none"> • Mass Awareness Campaigns • Provincial Climate change policies 	
Challenges	<ul style="list-style-type: none"> • Limited funding • Institutional capacity gaps • Coordination issues 	<ul style="list-style-type: none"> • Implementation gaps • Funding constraints • State-level capacity building
Differences	<ul style="list-style-type: none"> • Pakistan's institutional capacity is limited • Institutional structure and scope • Funding mechanisms 	<ul style="list-style-type: none"> • India's NAPCC and SAPCC provide a comprehensive framework • India's climate change knowledge portal is a best practice
Similarities	<ul style="list-style-type: none"> • Both countries have dedicated climate change ministries • National disaster management authorities play key roles • Emphasis on community-based adaptation 	

Gap Analysis of Pakistan and India Regarding Capacity Building, Climate Education & Mass Awareness for Climate Change Adaptation

The gap analysis identifies the gaps in capacity building, climate education, and mass awareness for climate change adaptation in Pakistan and India, highlighting areas for improvement.

GAP	Pakistan	India
Institutional Gaps	<ul style="list-style-type: none"> • limited institutional capacity (human resources, expertise) • lack of coordination among ministries and departments. • Insufficient funding for climate education initiatives 	<ul style="list-style-type: none"> • limited capacity for climate change research and development. • Insufficient funding for climate education initiatives

Capacity Building, Mass Awareness & Climate Education Gaps	<ul style="list-style-type: none"> • limited training programs for teachers and educators • inadequate climate change research and development • Insufficient community engagement and awareness 	<ul style="list-style-type: none"> • Limited training programs for state and local officials • Inadequate community engagement and awareness • Limited private sector engagement
Policy and Framework Gaps	<ul style="list-style-type: none"> • lack of comprehensive climate change education policy • insufficient integration of climate change into school curricula • limited international cooperation 	<ul style="list-style-type: none"> • limited integration of climate change into sectoral policies • insufficient monitoring and evaluation of climate education initiatives • limited international cooperation.
Common Gaps	<ul style="list-style-type: none"> • Limited funding for climate education initiatives • Insufficient community engagement and awareness • Limited capacity for climate change research and development 	

Current Situation	
Pakistan	India
<ul style="list-style-type: none"> • Limited awareness among general public (30% awareness rate) • Insufficient climate change education in schools • Inadequate media coverage 	<ul style="list-style-type: none"> • Moderate awareness among general public (50% awareness rate) • Climate change education integrated into school curricula • Significant media coverage

Desired Situation	
Pakistan	India
<ul style="list-style-type: none"> 80% awareness rate among general public Comprehensive climate change education in schools Regular media coverage and public awareness campaigns 	
GAP	
Pakistan	India
<ul style="list-style-type: none"> Awareness gap: 50% (30% current vs. 80% desired) Education gap: Climate change education not integrated into school curricula Media gap: Inadequate media coverage 	<ul style="list-style-type: none"> Awareness gap: 30% (50% current vs. 80% desired) Implementation gap: Climate change education not uniformly implemented Funding gap: Insufficient funding for public awareness campaigns

GAP Analysis Table

Category	Pakistan	India	Common Gaps
Institutional	40 %	30 %	Limited funding
Capacity Building	30 %	25 %	Insufficient community engagement
Policy & Frame Work	30 %	45 %	Limited international cooperation

Prioritization Matrix

Gap	Priority	Recommendation
Institutional capacity	High	Strengthen institutional capacity
Funding	High	Increase funding for climate change initiatives
Community engagement	Medium	Increase community engagement and awareness
Research and development	Medium	Enhance capacity for climate change research and development

PESTEL Analysis

The PESTEL Analysis focuses on the situation of capacity building, climate education, and mass awareness regarding climate change adaptation in Pakistan. The details are as follows:

Political

1. Government support: Climate change policies and initiatives demonstrate government commitment.
2. International agreements: Pakistan's ratification of the Paris Agreement and UNFCCC commitments guides climate action.
3. Regulatory frameworks: The Climate Change Act (2017) provides a legal framework.
4. Policy stability: Political changes impact climate policy continuity.

Economic

1. Funding: Insufficient allocation hinders climate initiatives.
2. Economic benefits: Climate-resilient infrastructure drives economic growth.
3. Cost of adaptation: Climate change impacts burden the economy.
4. Resource allocation: Climate initiatives compete for resources.

Social

1. Public awareness: Growing concern about climate change drives action.
2. Community engagement: Local involvement in climate initiatives enhances ownership.
3. Cultural sensitivity: Climate education is tailored to the local context.
4. Demographic changes: Population growth amplifies climate impacts.

Technological

1. Climate modeling: Advanced technologies enhance climate research.
2. Renewable energy: Solar, wind, and hydroelectric power reduce emissions.
3. Digital resources: Online climate education platforms expand access.
4. Innovative solutions: Climate-resilient infrastructure mitigates impacts.

Environmental

1. Climate change impacts: Pakistan's vulnerability to extreme events.
2. Natural resources: Sustainable management is essential.
3. Disaster risk reduction: Climate-resilient infrastructure is necessary.
4. Ecosystem services: Protection of biodiversity is crucial.

Legal

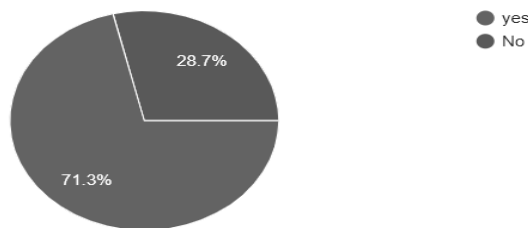
1. Climate change laws: Compliance with international agreements.
2. Policy frameworks: National and provincial climate policies guide action.
3. Regulatory enforcement: Implementation of climate laws is essential.
4. International cooperation: Collaboration on climate change.

STATISTICAL ANALYSIS

A survey was conducted through Google Forms to gather feedback from the general public regarding capacity building, climate education, and mass awareness for climate change adaptation. The analysis is as follows:

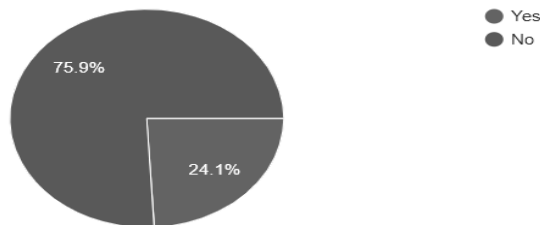
Have you studied anything about climate change in school, college or university?

261 responses



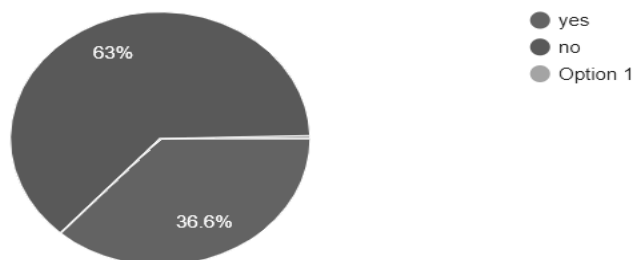
Have you got training for capacity building purpose regarding climate change ?

257 responses



Have you been part of the any campaign of climate change?

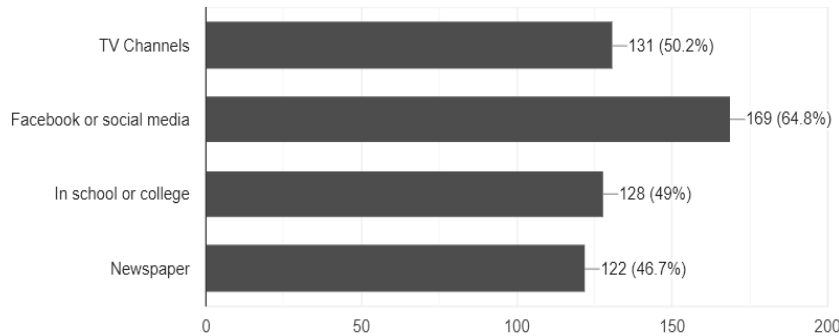
257 responses



From which source you have heard about climate change?



261 responses



Issues and Challenges

Capacity Building Challenges

- **Limited Institutional Capacity**
 - **Lack of Skilled Personnel:** The lack of trained climate change professionals in government and NGOs undermines the effectiveness of climate programs, resulting in poor responses to environmental challenges.
 - **Insufficient Training Programs:** Current capacity-building initiatives inadequately train staff, hindering their ability to effectively tackle complex climate issues.
- **Resource Constraints**
 - **Financial Limitations:** Limited budget allocations in the environmental sector restrict essential training and educational activities, undermining the development of impactful climate capacity programs.
 - **Inadequate Infrastructure:** Insufficient physical and technological infrastructure limits the effectiveness of capacity-building programs, preventing stakeholders from accessing vital training resources.
- **Coordination Issues**
 - **Fragmented Approach:** Lack of coordination among agencies leads to overlapping efforts that weaken climate change capacity-building initiatives.
 - **Poor Communication Channels:** Poor communication among stakeholder's limits collaboration and impedes progress in capacity-building efforts.

Climate Education Challenges

- **Curriculum Gaps**
 - **Inadequate Integration of Climate Education:** Many educational institutions neglect to include climate change topics in their curricula, leading to a lack of awareness among future decision-makers.
 - **Limited Resources for Educators:** Teachers often lack resources and training for effective climate education, limiting the quality of students' learning on the subject.
- **Public Awareness**
 - **Low Public Awareness:** A lack of public awareness about climate change hinders meaningful community engagement and minimizes participation in initiatives.
 - **Ineffective Communication Strategies:** Current communication strategies fail to reach marginalized communities affected by climate change, limiting the impact of awareness campaigns.
- **Engagement with Educational Institutions**
 - **Limited Collaboration with Schools and Universities:** Insufficient collaboration between environmental agencies and educational institutions undermines effective climate education initiatives.
- **Mass Awareness Challenges**
 - **Inconsistent Messaging**
 - **Mixed Messages from Authorities:** Inconsistent messaging on climate change from various entities confuses the public and undermines the effectiveness of awareness campaigns.
 - **Resource Allocation**
 - **Insufficient Funding for Awareness Campaigns:** Limited funding for mass awareness campaigns restricts their ability to effectively reach broader audiences.
 - **Cultural Barriers**
 - **Resistance to Change:** Cultural beliefs can resist climate change initiatives, necessitating tailored approaches that align with local values to promote sustainability.
 - **Socioeconomic Factors:** Vulnerable communities often prioritize immediate economic concerns over long-term environmental issues, leading to resistance against climate education initiatives.

Conclusion

The effective management of climate change in Khyber Pakhtunkhwa hinges on overcoming significant issues related to Capacity Building, Climate Education, and Mass Awareness. The current landscape reveals gaps in skilled personnel, financial resources, and institutional coordination, all of which impede the development of a comprehensive climate response. Furthermore, the lack of integration of climate-related topics in educational curricula limits public understanding and engagement. Mass awareness campaigns face challenges such as inconsistent messaging and cultural resistance, which can undermine public support for climate initiatives. To address these multifaceted challenges, it is crucial for government agencies, educational institutions, and community organizations to collaborate closely, ensuring the design and implementation of inclusive and effective strategies. By investing in targeted capacity-building programs, enhancing climate education in schools, and promoting cohesive awareness campaigns, KP can foster a more resilient and proactive society capable of tackling the ongoing and future impacts of climate change.

Recommendations & Way Forward

Based on the identified issues and challenges regarding Capacity Building, Climate Education, and Mass Awareness in Khyber Pakhtunkhwa (KP), the following recommendations and strategies are proposed to enhance the province's response to climate change:

Recommendations and Way Forward

- **Strengthening Capacity Building**
 - **Develop Comprehensive Training Programs:** Create targeted training programs on climate change for officials and leaders, collaborating with academic and international organizations to enhance effectiveness.
 - **Enhance Recruitment and Retention Strategies:** Implement policies that offer competitive salaries and professional development to attract and retain skilled personnel in environmental sectors.
- **Improving Resource Allocation**
 - **Increase Budget Allocations:** Push for increased budget allocations for climate education and capacity-building by emphasizing their long-term benefits to policymakers.

- **Leverage Public-Private Partnerships:** Encourage partnerships among government, the private sector, and NGOs to pool resources and expertise for sustainable climate action.
- **Enhancing Climate Education**
 - **Integrate Climate Change into Curricula:** Work with educational authorities to integrate climate change topics into curricula at all levels, ensuring expert input for comprehensive environmental education.
 - **Provide Training and Resources for Educators:** Equip teachers with training and resources through professional development workshops to effectively teach climate-related subjects.
- **Boosting Mass Awareness Efforts**
 - **Develop Consistent Messaging Campaigns:** Establish a cohesive communication strategy to ensure consistent climate change messaging across diverse media and to target various demographics.
 - **Engage Communities through Local Initiatives:** Encourage community involvement in climate action through local awareness campaigns and participatory activities to enhance the effectiveness of mass awareness initiatives.
- **Fostering Collaboration and Coordination**
 - **Establish Multi-Stakeholder Platforms:** Create collaborative platforms for government, educational institutions, NGOs, and communities to share knowledge and resources on climate change through regular workshops.
 - **Enhance Communication Channels:** Utilize technology to streamline communication and coordination among stakeholders for enhanced climate resilience.
- **Monitoring and Evaluation**
 - **Implement Robust Monitoring Frameworks:** Establish a comprehensive monitoring and evaluation framework to assess the effectiveness of climate initiatives and drive continuous improvement.
 - **Utilize Data for Informed Decision-Making:** Improve climate data accessibility in KP to inform policy and program development.

Log Framework

In order to implement the recommendations, the following log framework is proposed:

LOG FRAME WORK			
Activity	Action by	Timeline	Cost PKR (M)
Strengthening Capacity Building of the policy makers and field staff	PDMA, EPA,	Short & Medium	Regular Activity
Boosting Mass Awareness Efforts Ring tone Generation:	PTA, Info. Deptt, Eenvt Deptt, EPA, PDMA	Short term (occasional)	Regular Activity
Conduct research for the use of Artificial Intelligence	NDMA/PDMA, Eenvt Dept, EPA & P&D Deptt	Medium term	Project (PSDP & ADP)
Introducing On line training	PDMA, Eenvt dept. EPA KP	Short term (occasional)	Regular Activity
Encourage and facilitated the Academia/research on the scientific dimension of climate change	HED and Universities	Long Term	Project (PSDP & ADP)

References

1. Ali, T., & Hussain, M. (2023). Community engagement in climate adaptation: A case study from Khyber Pakhtunkhwa, Pakistan. *Environmental Science & Policy*, 145, 197-205. <https://doi.org/10.1016/j.envsci.2023.05.004>
2. Ahmed, N., & Ali, S. (2023). Climate education in Pakistan: Bridging the gap between policy and practice in Khyber Pakhtunkhwa. *Environmental Education Research*, 29(5), 641-657. <https://doi.org/10.1080/13504622.2023.2205256>
3. Ahmed, S., & Khan, M. (2018). Climate change adaptation: A community-based approach in Khyber Pakhtunkhwa, Pakistan. *Journal of Environmental Management*, 227, 227-235. <https://doi.org/10.1016/j.jenvman.2018.08.061>
4. Bashir, S., & Malik, A. (2023). Assessing the role of local NGOs in climate change awareness and education in Khyber Pakhtunkhwa. *Journal of Environmental Management*, 328, 116859. <https://doi.org/10.1016/j.jenvman.2023.116859>
5. Khan, H., & Raza, S. (2023). Climate change impacts on agriculture: A case study from Khyber Pakhtunkhwa, Pakistan. *Sustainability*, 15(2), 974. <https://doi.org/10.3390/su150200974>
6. Khan, M. A., & Bakhsh, K. (2020). Climate change and its socio-economic impacts in Pakistan: Evidence from Khyber Pakhtunkhwa. *Pakistan Journal of Agricultural Economics*, 3(1), 1-15. <https://doi.org/10.21776/ub.2042-3928.2020.3.1.1>
7. Khan, S. (2021). Public perceptions of climate change in Khyber Pakhtunkhwa: A survey-based analysis. *Journal of Environmental Management*, 284, 111920. <https://doi.org/10.1016/j.jenvman.2021.111920>
8. Khan, N., & Bukhari, A. (2023). The role of higher education institutions in climate change education in Pakistan: Challenges and opportunities. *Journal of Environmental Education*, 54(2), 100-115. <https://doi.org/10.1080/00958964.2023.2202149>
9. Mansoor, S., & Shah, M. (2023). Assessing the effectiveness of climate awareness campaigns in Khyber Pakhtunkhwa. *Journal of Environmental Management*, 319, 115786. <https://doi.org/10.1016/j.jenvman.2023.115786>
10. Panjwani, A. (2018). Climate education in Pakistan: Challenges and opportunities. *Pakistan Journal of Education*, 35(1), 17-29.

11. Panjwani, A., & Zafar, M. (2023). Community-based adaptation strategies to climate change in Khyber Pakhtunkhwa: A focus on education and awareness. *Environmental Science & Policy*, 147, 207-215. <https://doi.org/10.1016/j.envsci.2023.06.005>
12. Pakistan Environmental Protection Agency (EPA). (2021). Khyber Pakhtunkhwa Environmental Protection Act.
13. Pakistan Green Climate Fund (GCF). (2018). GCF Country Programme for Pakistan: Climate change adaptation and mitigation.
14. Pakistan Institute of Development Economics (PIDE). (2019). Climate change, disaster risk reduction and development: Policy framework for Pakistan.
15. Pakistan Meteorological Department (PMD). (2020). Climate Change in Pakistan: A report on climate impacts and adaptation.
16. Rehman, S. U., & Jabeen, S. (2020). The role of media in climate change awareness in Pakistan: A case study of Khyber Pakhtunkhwa. *Journal of Media and Communication Studies*, 12(1), 1-10. <https://doi.org/10.5897/JMCS2020.0806>
17. Raza, A., & Zia, H. (2021). Role of educational institutions in enhancing climate resilience in Pakistan: Case study of Khyber Pakhtunkhwa. *Journal of Environmental Education Research*, 27(2), 135-150. <https://doi.org/10.1080/13504622.2020.1846653>
18. Sadiq, M., & Ali, F. (2019). Integrating climate change into higher education in Pakistan: Challenges and pathways. *Asian Journal of Environment and Ecology*, 8(4), 1-8. <https://doi.org/10.9734/ajee/2019/v8i430121>
19. Saeed, A., & Ahmad, A. (2023). Exploring the link between climate change awareness and community resilience in Khyber Pakhtunkhwa, Pakistan. *Journal of Environmental Psychology*, 87, 102445. <https://doi.org/10.1016/j.jenvp.2023.102445>
20. Saeed, M., & Batool, S. (2019). Community-based adaptation to climate change in Khyber Pakhtunkhwa: Opportunities and challenges. *Journal of Environmental Studies and Sciences*, 9(3), 296-304. <https://doi.org/10.1007/s13412-019-00527-4>
21. Saeed, M., & Nadeem, M. (2023). Integrating climate change into local governance: Lessons from Khyber Pakhtunkhwa, Pakistan. *Urban Climate*, 53, 101435. <https://doi.org/10.1016/j.uclim.2023.101435>
22. Shah, S., & Khan, I. (2023). The role of education in promoting climate resilience in Pakistan: Insights from Khyber Pakhtunkhwa. *Journal of*

Cleaner Production, 383, 135389.
<https://doi.org/10.1016/j.jclepro.2022.135389>

23. Shahbaz, M., & Ali, S. (2023). Climate education and sustainable development in Pakistan: A focus on Khyber Pakhtunkhwa. *Sustainable Development*, 31(1), 18-29. <https://doi.org/10.1002/sd.2338>
24. UNDP Pakistan. (2023). *Pakistan Climate Change Impact Assessment Report*.
25. UNESCO Pakistan. (2023). *Education for Sustainable Development in Pakistan: A Framework for Action*.
26. World Bank Group. (2023). *Pakistan: Climate Adaptation and Resilience Building in the Water Sector*.
27. World Resources Institute (WRI). (2018). *Creating climate-resilient cities: Best practices and case studies from Pakistan*.
28. Zafar, A. (2020). Enhancing climate resilience through education: The role of teachers in Pakistan. *Journal of Environmental Education*, 51(2), 82-95. <https://doi.org/10.1080/00958964.2020.1743078>
29. Zafar, A., & Khan, I. (2023). Youth engagement in climate action: A study of Khyber Pakhtunkhwa. *Environmental Education Research*, 29(3), 275-290. <https://doi.org/10.1080/13504622.2023.2201156>
30. Zia, H., & Khan, M. A. (2023). Public engagement in climate change adaptation: Evidence from Khyber Pakhtunkhwa. *Global Environmental Change*, 79, 102233. <https://doi.org/10.1016/j.gloenvcha.2023.102233>
31. Zia, M. F., & Iqbal, A. (2020). The role of local communities in climate change adaptation in Khyber Pakhtunkhwa, Pakistan. *Sustainability*, 12(4), 1405. <https://doi.org/10.3390/su12041405>
32. Zubair, M., & Bukhari, A. (2023). Climate change policy implementation in Khyber Pakhtunkhwa: Challenges and opportunities. *International Journal of Climate Change Strategies and Management*, 15(3), 320-335. <https://doi.org/10.1108/IJCCSM-12-2022-0223>