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AN ASSESSMENT OF GOVERNANCE AND CLIMATE CHANGE ADAPTATION IN KHYBER PAKHTUNKHWA: A CASE STUDY OF DISTRICT BUNER

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Abstract
Khyber Pakhtunkhwa (KP) is among the most climate-vulnerable provinces of Pakistan, and within it, District Buner has emerged as a focal point of recurrent flood disasters, most recently the catastrophic cloudburst-induced flash floods of August 2025. This paper examines the relationship between governance structures and climate change adaptation in Buner, asking whether the institutional architecture established under the Khyber Pakhtunkhwa Local Government Act, 2013, and the provincial Climate Change Policy 2022 translates into effective local adaptation. Using a qualitative, document-based case-study design that draws on government policy documents, disaster statistics, demographic census data, and the multi-level governance literature on climate adaptation, the study finds that Buner's adaptation deficit stems less from an absence of policy than from weak vertical coordination between federal, provincial, and district tiers; limited fiscal and technical capacity at the local government level; environmental degradation linked to deforestation and unregulated marble mining; and a persistent gap between policy formulation and field implementation. The paper situates these findings within multi-level governance theory and recommends catchment-based coordination, climate-budget tagging, accelerated early-warning investment, stronger mining and land-use regulation, and empowered local government institutions as priorities for strengthening adaptive governance in Buner and similarly exposed districts of KP.

1. INTRODUCTION

Climate change has moved from a long-term projection to a lived emergency in Pakistan. Despite contributing less than one percent of global greenhouse gas emissions, Pakistan was ranked the world's most climate-vulnerable country for the year 2022 in the Germanwatch Climate Risk Index 2025, owing largely to monsoon floods that affected more than 33 million people, killed over 1,700, and caused damages of nearly USD 15 billion (Germanwatch, 2025; Dawn, 2025; Geo News, 2025). Khyber Pakhtunkhwa (KP), Pakistan's mountainous north-western province, sits at the centre of this vulnerability because of its steep topography, monsoon exposure, and dependence on rain-fed agriculture and forest resources (Government of Khyber Pakhtunkhwa [GoKP], 2022a, 2022b).

Within KP, District Buner has become emblematic of the province's climate emergency. On 15 August 2025, a cloudburst that released more than 150 millimetres of rain within a single

hour triggered flash floods across Buner, sweeping away homes, hotels, and roads and killing more than 150 people in the district within one week, part of a province-wide death toll exceeding 300 (Business Recorder, 2025; Mongabay, 2025). This was not an isolated event: KP had already experienced devastating floods in 2010 and 2022, and Buner itself has a documented history of flash flooding linked to deforestation, unregulated marble mining, and weak drainage infrastructure (Vocal Media, 2025; World Wide Fund for Nature [WWF], 2025).

The recurrence of such disasters raises a governance question that is at least as important as the climatological one: why does a province with an approved Climate Change Policy (GoKP, 2022a), a Climate Change Action Plan (GoKP, 2022b), a functioning Provincial Disaster Management Authority, and a constitutionally devolved local government system (GoKP, 2013) continue to suffer catastrophic, repeated losses in the same districts? This paper argues that Buner's vulnerability cannot be explained by policy absence alone; it must be understood through the lens of governance, the vertical and horizontal coordination, institutional capacity, and resource allocation that determine whether written policy is translated into adaptive practice on the ground.

Specifically, this study pursues three objectives: first, to map the multi-level governance architecture responsible for climate adaptation and disaster management in Buner; second, to assess the district's exposure to climate-induced hazards using available demographic and disaster data; and third, to identify the principal governance gaps that constrain effective adaptation, drawing on the broader literature on multi-level climate governance. The paper proceeds as follows: Section 2 reviews the theoretical literature on governance and climate adaptation; Section 3 profiles the study area; Section 4 outlines the methodology; Sections 5 and 6 present the governance architecture and disaster data; Section 7 assesses adaptation measures and governance gaps; and Sections 8 and 9 discuss the findings and offer policy recommendations.

2. Literature Review and Theoretical Framework

Climate change adaptation has increasingly been understood not merely as a technical or environmental challenge but as a governance challenge. Adger (2001) was among the first to argue that the distribution of vulnerability and adaptive capacity is fundamentally shaped by "scales of governance" — that is, by how responsibility, resources, and decision-making authority are allocated across levels of government. Building on this, Adger, Arnell, and Tompkins (2005) proposed that successful adaptation requires coordinated action across scales, from the household and community level up to national and international institutions, because climate risks and the resources needed to manage them rarely sit within a single administrative tier.

This insight gave rise to the concept of multi-level governance (MLG) in climate adaptation studies. Bulkeley and Betsill (2005) demonstrated, in the context of urban climate politics, that adaptation outcomes depend on the interplay between supranational, national, and local actors, with local governments often left to implement obligations they had little role in designing. Subsequent research extended this framework to the Global South, where the gap between formal policy commitments and street-level implementation tends to be wider because of constrained fiscal space, weak technical capacity, and political instability (Agrawal, 2008). Agrawal's (2008) influential analysis of local institutions in climate adaptation found that decentralised institutions — when adequately resourced and empowered — are uniquely positioned to translate national adaptation goals into locally appropriate action, because they hold context-specific knowledge about vulnerability and possess, at least in principle, the legitimacy to mobilise community participation.

A second important strand of the literature distinguishes between adaptive capacity and adaptation itself. Smit and Wandel (2006) define adaptive capacity as the latent ability of a system to adjust to climate stimuli, while adaptation is the realised action. They argue that adaptive capacity is unevenly distributed even within a single country, shaped by access to information, financial

resources, social networks, and — crucially — institutional support. This distinction is analytically useful for the present study because it allows the separation of two related but distinct governance failures: a capacity deficit, in which a district genuinely lacks the resources or expertise to adapt, and an implementation deficit, in which capacity may exist at higher tiers of government but is not transmitted to where it is needed.

Within the South Asian and Pakistani context specifically, scholars have repeatedly noted that climate governance suffers from what might be called a "paper-to-practice" gap. Following the Eighteenth Constitutional Amendment, which devolved the subject of environment to the provinces, KP became responsible for designing its own climate response, leading to the first Provincial Climate Change Policy in 2017 and its revision in 2022 (GoKP, 2017, 2022a). Yet independent assessments of the 2022 policy cycle have found that several provincial climate policies, including KP's, were approved hastily, shortly before the dissolution of the respective provincial assemblies, and have not been meaningfully implemented because of insufficient political will rather than poor drafting (PreventionWeb, 2023). This observation is consistent with Agrawal's (2008) argument that institutional design is a necessary but insufficient condition for adaptation; without sustained political commitment and resource flow to the local level, even well-conceived policy documents remain largely aspirational.

A further dimension relevant to Buner is the relationship between local government structure and disaster governance. The Khyber Pakhtunkhwa Local Government Act, 2013, as amended in 2019, devolved a range of administrative and fiscal functions to district, tehsil, and village or neighbourhood councils (GoKP, 2013). However, empirical assessments of the Act's accountability mechanisms — including the Local Government Commission, monitoring committees, and councils — have identified structural weaknesses that limit the practical authority of elected local bodies relative to the provincially appointed bureaucracy, particularly the Deputy Commissioner, who retains the lead role in district-level disaster management (Khaliq & Yasin, 2025; Janjua, 2022).

Taken together, this literature suggests a working framework for the present study: climate adaptation outcomes in a district such as Buner are best understood as the product of (a) the formal allocation of authority and resources across governance levels, (b) the adaptive capacity present at each level, and (c) the extent to which political commitment sustains the translation of policy into implementation. The empirical sections that follow apply this framework to Buner using available demographic, institutional, and disaster data.

3. Study Area Profile: District Buner

District Buner is located in the Malakand Division of Khyber Pakhtunkhwa, bordered by Swat to the north and Mardan and Swabi to the south (Khyber Pakhtunkhwa Board of Investment and Trade [KPBOIT], n.d.). The district covers approximately 1,865 square kilometres and rises from about 1,200 feet in its southern lowlands near Totalai to over 9,500 feet at Dosara Peak in the north (KPBOIT, n.d.). This dramatic elevation gradient, combined with three principal rivers — the Barandu, Chamla, and Budal — running through narrow valleys, creates conditions highly conducive to flash flooding whenever intense, localised rainfall occurs (Vocal Media, 2025).

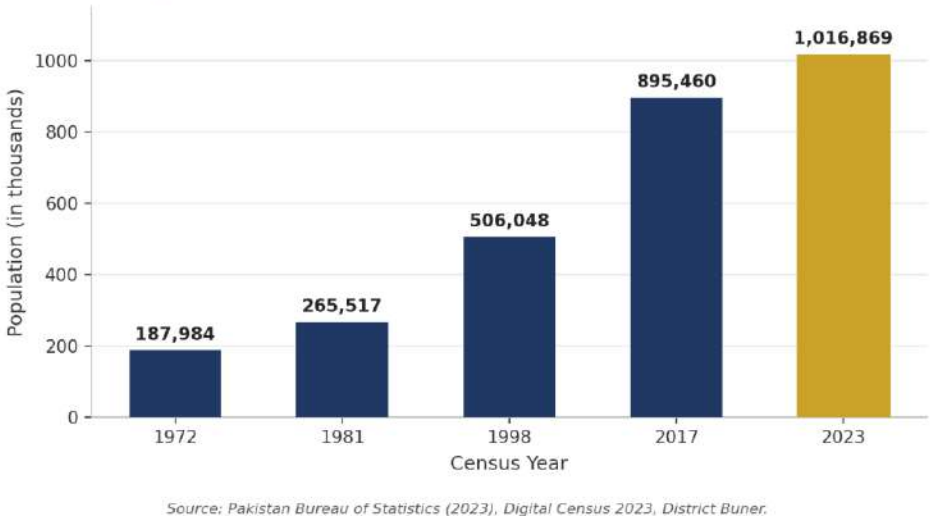
According to the Pakistan Digital Census 2023, Buner's population reached 1,016,869, having grown from 895,460 in 2017, 506,048 in 1998, and 265,517 in 1981 — an increase of roughly 13.5 percent in just the six years between the last two censuses (Pakistan Bureau of Statistics [PBS], 2023). The population is almost evenly split between males (508,172) and females (508,669), the entire district is classified as rural, and literacy among persons aged ten and above stands at approximately 43.8 percent (PBS, 2023). Pashto is overwhelmingly the dominant first language, spoken by 95.9 percent of residents (PBS, 2023). Table 1 and Figure 1 summarise these demographic indicators.

Table 1. Demographic Profile of District Buner, 2023 Census

Indicator	Value
Total population (2023)	1,016,869
Population (2017 census)	895,460
Population (1998 census)	506,048
Population (1981 census)	265,517
Male population	508,172
Female population	508,669
Population aged 0–14 years	444,419
Population aged 15–64 years	535,935
Population aged 65+ years	36,320
Area	1,865 km²
Rural population share	100%
Literacy rate (age 10+)	≈43.8%
Pashto as first language	95.9% of population

Source: *Pakistan Bureau of Statistics (2023), Digital Census 2023, District Buner.*

Figure 1. Population Growth in District Buner, 1972–2023



Source: *Pakistan Bureau of Statistics (2023)*

Economically, Buner's population depends heavily on rain-fed agriculture, livestock, small-scale trade, and remittances from overseas workers (Vocal Media, 2025). The district also possesses

substantial mineral wealth: it is estimated to hold roughly 68 percent of Pakistan's marble reserves, with several hundred marble factories and mines currently operating, mostly without comprehensive environmental safeguards (KPBOIT, n.d.).

This natural-resource dependence has a direct bearing on climate vulnerability. Unregulated marble extraction and the clearing of pine-forested hillslopes for fuel, construction, and agriculture have reduced the vegetative cover that would otherwise slow rainfall run-off and stabilise slopes (WWF, 2025). A 2025 ecological assessment of KP's Billion Tree Afforestation Project found that province-wide tree cover increased from 25.0 percent in 2015 to 30.0 percent in 2023 following reforestation efforts (Mehmood et al., 2025), yet WWF's (2025) analysis of the August 2025 floods concluded that deforestation and land-cover change in Buner, Swat, and neighbouring districts continued to accelerate run-off and amplify flood magnitude, indicating that province-level afforestation gains have not been evenly realised at the local catchment scale relevant to Buner.

Buner also carries a recent history of conflict and militancy: in 2009, the district was briefly seized by Tehrik-i-Taliban Pakistan militants before being cleared by the Pakistan Army (KPBOIT, n.d.). This episode is relevant to the present study because post-conflict reconstruction priorities, security-related budget reallocations, and interrupted local government cycles have historically diverted administrative attention away from longer-term development and environmental planning in the district — a pattern broadly consistent with the wider finding that climate adaptation tends to be deprioritised in administratively stressed local contexts (Agrawal, 2008).

4. Methodology

This study adopts a qualitative, document-based case-study design appropriate for an exploratory governance assessment of a single district. Case-study methods are well suited to questions that ask "how" and "why" a particular outcome — in this instance, recurrent climate vulnerability — emerges from the interaction of multiple institutional actors over time (Yin, 2018), and the approach is broadly consistent with the multi-level governance tradition reviewed in Section 2.

Data were drawn from four categories of secondary sources. First, official policy and legal documents, including the Khyber Pakhtunkhwa Climate Change Policy 2022 and Action Plan 2022 (GoKP, 2022a, 2022b) and the Khyber Pakhtunkhwa Local Government Act, 2013, as amended (GoKP, 2013), were reviewed to map the formal governance architecture. Second, demographic and statistical data were obtained from the Pakistan Bureau of Statistics' Digital Census 2023 results for Buner district (PBS, 2023) and from the Khyber Pakhtunkhwa Board of Investment and Trade district profile (KPBOIT, n.d.). Third, disaster-impact data were compiled from the Provincial Disaster Management Authority Khyber Pakhtunkhwa, the Germanwatch Climate Risk Index 2025 (Germanwatch, 2025), and corroborating news and humanitarian-sector reporting on the August 2025 Buner floods (Business Recorder, 2025; Mongabay, 2025; Vocal Media, 2025). Fourth, peer-reviewed academic literature on KP's local government accountability mechanisms (Khaliq & Yasin, 2025; Janjua, 2022), green infrastructure and adaptation planning (Rayan et al., 2022), and forest-cover change (Mehmood et al., 2025; WWF, 2025) was reviewed to contextualise the governance findings within established scholarship.

Consistent with standard practice in policy-oriented governance research, the analysis relies exclusively on data that are publicly available, verifiable, and traceable to a named institutional or academic source; no primary survey or interview data were collected for this paper, and no statistics have been estimated or simulated. Where official figures from different sources varied slightly — for instance, province-wide versus district-specific fatality counts for the August 2025 floods — the most recent and most specifically sourced figure is reported, with the source identified in the text and, where relevant, in the accompanying tables. The analysis proceeds inductively: governance structures and disaster data are first described, then evaluated against the theoretical framework set out in Section 2 to identify specific points of institutional strength and weakness.

5. Governance Architecture for Climate Adaptation and Disaster Management

Climate and disaster governance in Buner operate through at least four nested tiers of authority, each with distinct but overlapping responsibilities.

At the federal level, the Ministry of Climate Change and Environmental Coordination sets national policy direction through instruments such as the National Climate Change Policy 2021 and the National Adaptation Plan 2023, and coordinates Pakistan's Nationally Determined Contributions under the Paris Agreement (GoKP, 2022a; PreventionWeb, 2023). The National Disaster Management Authority similarly issues multi-hazard vulnerability assessments that provinces use to rank district-level disaster risk (GoKP, 2022a).

At the provincial level, two institutions matter most for Buner. The Environmental Protection Agency of Khyber Pakhtunkhwa (EPA-KP) is the lead author of the province's Climate Change Policy 2022 and Climate Change Action Plan 2022, which set sectoral adaptation targets in agriculture, water, forestry, and disaster risk reduction, updated from the original 2017 policy to incorporate the newly merged tribal districts and emerging hazards such as locust infestation and dengue outbreaks (GoKP, 2022a, 2022b). The Provincial Disaster Management Authority (PDMA-KP) is the operational arm responsible for early warning, relief, and recovery; it recently launched the Provincial Disaster Management Plan 2025–2030 to strengthen preparedness and inter-departmental coordination (PDMA-KP, 2025).

At the district level, executive authority rests principally with the Deputy Commissioner, a provincially appointed civil servant who chairs the District Disaster Management Authority, oversees revenue and law-and-order functions, and coordinates with line departments during emergencies. Although the Khyber Pakhtunkhwa Local Government Act, 2013, created an elected District Council intended to exercise devolved authority over local services and development planning (GoKP, 2013), assessments of the Act's implementation find that the Council's practical authority over budget execution and emergency response remains constrained relative to that of the Deputy Commissioner and provincial line departments (Khaliq & Yasin, 2025; Janjua, 2022).

Below the district tier, Tehsil and Village or Neighbourhood Councils are the lowest formal units of elected local government, responsible in principle for local infrastructure such as drainage, minor irrigation channels, and afforestation on communal land (GoKP, 2013). In practice, these councils typically operate with very limited discretionary budgets, and their election cycles have been interrupted at various points by amendments to the Local Government Act — including the 2019 amendment that altered the structure of local bodies and a further amendment introduced in 2025 (GoKP, 2013; Provincial Assembly of Khyber Pakhtunkhwa, 2025) — which has periodically left village-level climate and disaster functions without a sitting elected representative.

A final, increasingly important layer is international and donor-funded climate finance, exemplified by the Green Climate Fund's SAP039 project, "Integrated Climate Risk Management for Strengthened Resilience to Climate Change in Buner and Shangla Districts," approved to enhance flood early-warning systems and the dissemination of climate information services in the two districts, with an estimated completion date in September 2028 (Green Climate Fund, 2024). This project is notable precisely because it targets Buner directly, reflecting external recognition of the district's exceptional exposure, but its multi-year implementation horizon also illustrates how donor-funded adaptation often operates on a timeline that lags well behind the immediate, recurring disaster cycle the district experiences. Table 2 summarises this multi-level architecture.

Table 2. Multi-Level Governance Architecture for Climate Adaptation in Buner

Level	Lead Institution(s)	Principal Role
Federal	Ministry of Climate Change & Environmental Coordination; National Disaster Management Authority	National policy (NCCP 2021, NAP 2023); NDC commitments; multi-hazard vulnerability assessment
Provincial	EPA-KP; PDMA-KP	Climate Change Policy/Action Plan 2022; disaster preparedness, early warning, and relief (PDMP 2025–2030)
District	Deputy Commissioner; District Disaster Management Authority; District Council	Emergency coordination, revenue and law and order; (intended) devolved development planning
Tehsil/Village	Tehsil Municipal Administration; Village/Neighbourhood Councils	Local drainage, minor infrastructure, communal afforestation (limited budgets and authority)
International/Donor	Green Climate Fund (SAP039 project)	District-specific flood early-warning and climate-information systems for Buner and Shangla

Source: *Compiled by the author from GoKP (2013, 2022a, 2022b), PDMA-KP (2025), and Green Climate Fund (2024).*

The overall picture is one of formally comprehensive but practically fragmented governance: policy exists at every level, yet the literature reviewed in Section 2 — and the August 2025 disaster itself — suggest that vertical coordination between these tiers, rather than the absence of any single institution, is the binding constraint on adaptation outcomes in Buner. The Business Recorder (2025) analysis of KP's climate finance notes specifically that the province's climate-related expenditure remains fragmented across departments without consistent budget tagging, making it difficult to verify whether resources allocated nationally or provincially for adaptation are in fact reaching exposed districts such as Buner.

6. Climate Trends and Disaster Impacts in Buner

Khyber Pakhtunkhwa's exposure to climate hazards is structurally rooted in its geography. The province's Climate Change Policy notes that KP sits in a mid-latitude zone identified by the Intergovernmental Panel on Climate Change as subject to increasingly erratic and intense precipitation, with monsoon rainfall predicted to shift further north and intensify in wetter, mountainous zones such as the one in which Buner lies, while accelerating glacial melt compounds flash-flood risk in already steep catchments (GoKP, 2022a).

This vulnerability has materialised in a clear historical pattern of escalating flood disasters. The 2010 floods, triggered by record monsoon rainfall, submerged roughly one-fifth of Pakistan, directly affected 20 million people nationwide, and killed nearly 2,000 (Business Recorder, 2025). The 2022 floods were even more economically destructive: more than 33 million people were affected nationwide, over 1,700 lives were lost, and damages approached USD 15 billion, with KP among the worst-hit provinces (Germanwatch, 2025; Dawn, 2025). Most recently, the August 2025 cloudburst-triggered flash floods produced the most concentrated death toll Buner has

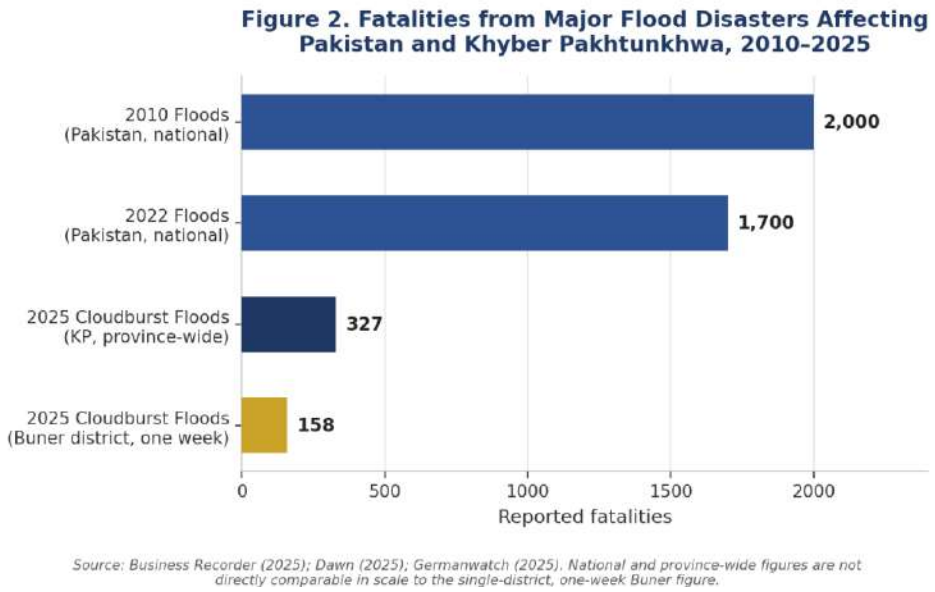
experienced in living memory: a single cloudburst event on 15 August released more than 150 millimetres of rainfall in one hour over Beshonai village, triggering flash floods that killed more than 150 people in Buner within a single week and contributed to a province-wide toll exceeding 300 fatalities, alongside damage to more than 1,600 buildings and the loss of 428 livestock across the affected districts (Business Recorder, 2025; Mongabay, 2025).

Table 3 situates these three major events comparatively, and Figure 2 illustrates the escalating human toll of Pakistan's most significant flood events since 2010, while distinguishing national, provincial, and single-district scales of measurement.

Table 3. Major Flood Disasters Affecting Pakistan and Khyber Pakhtunkhwa, 2010-2025

Year / Event	People Affected	Fatalities	Economic Loss	Buner-Specific Impact
2010 – National monsoon floods	~20 million (national)	~2,000 (national)	Submerged ~one-fifth of Pakistan	Province-wide flooding affecting northern KP catchments
2022 – National "super floods"	>33 million (national)	>1,700 (national)	~USD 15 billion	KP among worst-affected provinces nationally
2025 – Cloudburst flash floods (15 Aug)	Multiple KP districts (Buner, Swat, Bajaur, Battagram, Mansehra, Shangla)	>300 (province-wide); >150 in Buner alone (one week)	1,600+ buildings damaged; 428 livestock lost	Deadliest single flash-flood week recorded for Buner

Source: *Business Recorder (2025); Dawn (2025); Germanwatch (2025); Mongabay (2025).*



Source: *Business Recorder (2025); Dawn (2025); Germanwatch (2025).*

Two structural drivers compound this hazard exposure. First, deforestation and unregulated land-use change have measurably increased flood risk in KP's steep watersheds; a WWF (2025)

assessment directly linking forest loss to the August 2025 disaster found that Buner and adjoining districts exhibited the kind of slope destabilisation and accelerated run-off long associated with deforestation in mountainous, monsoon-exposed terrain, even though province-wide tree cover has been increasing under the Billion Tree Afforestation Project, from 25.0 percent in 2015 to 30.0 percent in 2023 (Mehmood et al., 2025). This apparent contradiction suggests that reforestation gains achieved at the provincial scale are not necessarily reaching the specific micro-catchments — including those feeding the Barandu river system through Buner — where they would most reduce flood risk.

Second, settlement and economic activity in Buner have continued to expand in hazard-exposed zones. The district's marble industry, which accounts for an estimated 68 percent of Pakistan's marble reserves and operates several hundred factories largely along valley floors and riverbanks (KPBOIT, n.d.), has historically expanded without systematic environmental or flood-risk screening, a pattern broadly consistent with the poor planning and neglect of safety measures identified by infrastructure specialists examining the August 2025 disaster (The News on Sunday, 2025). Combined with the absence of consistent early-warning dissemination at the community level — corroborated by residents' accounts of receiving no timely alerts despite Meteorological Department warnings (The News on Sunday, 2025) — these structural drivers transform what might otherwise be a manageable seasonal hazard into recurring catastrophe.

7. Assessment of Adaptation Measures and Governance Gaps

Despite the scale of recurring disaster, Buner is not without adaptation initiatives. At least four current or planned interventions merit assessment.

First, the Green Climate Fund's SAP039 project explicitly targets Buner, alongside Shangla, for integrated climate risk management, with a specific focus on strengthening flood early-warning systems and the value chain through which climate information reaches vulnerable communities (Green Climate Fund, 2024). This represents the most direct, district-specific adaptation investment currently committed to Buner, though its multi-year design, with an estimated 2028 completion date, means its protective benefits will arrive years after the August 2025 disaster.

Second, the province-wide Billion Tree Afforestation Project has produced a measurable increase in tree cover across KP, rising from 25.0 percent to 30.0 percent of land area between 2015 and 2023, with high-confidence vegetation-recovery hotspots increasing from 36.8 percent to 42.6 percent of the assessed area (Mehmood et al., 2025). To the extent that this reforestation reaches Buner's upper watersheds, it represents a genuine nature-based adaptation measure; however, as Section 6 noted, the persistence of severe flooding in 2025 suggests that gains have been geographically uneven.

Third, PDMA-KP's Provincial Disaster Management Plan 2025–2030 and its recently launched digital compensation platform — which allows disaster-affected households to register compensation claims through a mobile application and receive payment directly to a bank account — represent an effort to modernise post-disaster response and reduce the delays and opacity that have historically characterised relief disbursement (PDMA-KP, 2025). This is principally a response, or ex-post, measure rather than an adaptation, or ex-ante, measure, but more transparent compensation can itself support household-level adaptive capacity by enabling faster recovery and reinvestment.

Fourth, community-level and civil-society responses — such as residents organising rescue efforts in the absence of timely official intervention during the August 2025 floods (The News on Sunday, 2025) — illustrate a resilient but informal adaptive capacity that exists independently of, and sometimes substitutes for, formal governance structures. While such bottom-up responses are valuable, their existence should not be read as evidence of adequate formal adaptation; rather, following Smit and Wandel's (2006) distinction between adaptive capacity and

adaptation, informal community resilience reflects latent capacity that formal governance has not yet been able to convert into systematic, scaled protection.

Set against these initiatives, the case of Buner reveals four recurring governance gaps that are broadly consistent with the multi-level governance literature reviewed in Section 2.

Vertical coordination gap. Authority over climate adaptation is split across federal, provincial, district, and donor-funded project structures, but no single Buner-specific entity is accountable for integrating these efforts. The Deputy Commissioner's authority over disaster response is not matched by comparable authority over upstream adaptation planning, which is set largely at the provincial level (Khaliq & Yasin, 2025).

Fiscal and budget-tracking gap. Climate-related expenditure across KP departments lacks consistent budget tagging, making it difficult to verify whether allocations reach exposed districts and complicating efforts to attract additional external climate finance (Business Recorder, 2025).

Implementation-versus-policy gap. Independent assessments of the 2022 provincial policy cycle found that climate change policies in KP, like those of Sindh, were approved hastily ahead of assembly dissolution and have suffered from what one specialist interviewed by The Third Pole described as "a practice of writing good documents and then shelving them" (PreventionWeb, 2023).

Local government capacity and continuity gap. Repeated amendments to the Khyber Pakhtunkhwa Local Government Act, in 2015, 2019, and 2025, have altered the powers and composition of local councils, while assessments of existing accountability mechanisms — the Local Government Commission, monitoring committees, and code-of-conduct committees — find that they function with limited independence from provincial oversight, weakening the very tier of government best positioned to know which streams, slopes, and settlements in Buner are most at risk (GoKP, 2013; Khaliq & Yasin, 2025; Janjua, 2022).

Table 4. Governance Gaps and Corresponding Policy Responses in Buner

Governance Gap	Manifestation in Buner	Recommended Response
Vertical coordination gap	No single entity integrates federal, provincial, district, and donor efforts for Buner specifically	Establish a catchment-based coordination body for the Barandu–Chamla–Budal river basins
Fiscal and budget-tracking gap	Climate-related expenditure is not tagged or tracked consistently across KP departments	Adopt climate-budget tagging and transparent disbursement tracking
Implementation-versus-policy gap	2022 policy cycle approved hastily before assembly dissolution; weak follow-through	Institutionalise a policy-implementation review mechanism with legislative oversight
Local government capacity and continuity gap	Frequent Local Government Act amendments (2015, 2019, 2025); limited council authority relative to the Deputy Commissioner	Strengthen and protect council budgets, tenure, and disaster-planning authority

Source: *Compiled by the author from Khaliq and Yasin (2025), Janjua (2022), Business Recorder (2025), and Prevention Web (2023).*

8. Discussion

The Buner case illustrates a broader pattern documented in the multi-level governance literature: adaptation failure in climate-vulnerable developing-country districts is rarely attributable to a single missing institution but rather to the cumulative effect of weak linkages between institutions that individually appear functional (Adger et al., 2005; Bulkeley & Betsill, 2005). Buner possesses a provincial climate policy, a disaster management authority, an elected, if constrained, local government, and even a donor-funded, district-specific adaptation project, yet still suffered one of KP's deadliest single flood events in August 2025. This is consistent with Agrawal's (2008) observation that decentralisation of formal authority does not automatically produce decentralisation of effective capacity; without commensurate fiscal transfers, technical training, and sustained political attention, devolved institutions can become responsible for outcomes they lack the resources to control.

The finding that province-wide afforestation gains (Mehmood et al., 2025) coexist with worsening flood outcomes in Buner specifically (WWF, 2025) is particularly instructive. It suggests that aggregate, province-level adaptation metrics can mask significant sub-provincial unevenness, and that governance assessments, including future research, should be conducted at the watershed or catchment level rather than relying solely on provincial averages. For Buner, this implies that the Barandu, Chamla, and Budal river catchments should be treated as the primary unit of adaptation planning, rather than the administrative district boundary alone, since hydrological risk does not respect administrative lines.

The recurring tension between the Deputy Commissioner's formal authority and the District Council's intended developmental role also reflects a wider debate in Pakistani local-governance scholarship about whether the country's local government system represents genuine devolution or a more limited deconcentration of administrative responsibility (Khaliq & Yasin, 2025; Janjua, 2022). The present analysis suggests that, for climate adaptation specifically, this ambiguity has concrete costs: when an elected council lacks clear, resourced authority over land-use regulation, watershed management, or community-level early warning, those functions either default to a provincially appointed officer with many competing responsibilities or are left unperformed altogether.

At the same time, the analysis should be read with appropriate caution. As a qualitative case study relying on secondary and document-based sources, this paper cannot establish causal weights between the various governance gaps identified; for instance, it cannot determine statistically whether the fiscal-tracking gap or the implementation gap contributed more to the scale of the August 2025 disaster. Nor does the available literature yet include a published, peer-reviewed household survey of adaptive capacity specific to Buner; such primary research, ideally combining household-level surveys with hydrological and remote-sensing data at the catchment scale, would substantially strengthen future assessments of governance effectiveness in the district. The findings here should accordingly be understood as a structured mapping of governance architecture and disaster history, intended to orient, rather than substitute for, such future empirical work.

Despite these limitations, the consistency between the governance gaps identified in Buner and those documented in the wider Pakistani and South Asian climate-governance literature (PreventionWeb, 2023; Khaliq & Yasin, 2025) suggests that the findings have relevance beyond this single district, particularly for the other flood-exposed districts of northern KP — Swat, Shangla, Battagram, Bajaur, and Mansehra — that experienced similar cloudburst-triggered flooding in August 2025.

9. Conclusion and Policy Recommendations

This paper has examined the relationship between governance and climate change adaptation in District Buner, Khyber Pakhtunkhwa, against the backdrop of the catastrophic flash floods of August 2025. The analysis finds that Buner's recurrent climate disasters are best explained not by an absence of climate policy or institutions KP possesses a reasonably comprehensive provincial climate-policy architecture but by persistent

governance gaps: weak vertical coordination between federal, provincial, district, and donor-funded actors; the absence of consistent climate-budget tracking; a documented gap between policy approval and field implementation; and structural limits on the authority and continuity of elected local government relative to provincially appointed administration. These findings are consistent with, and extend to a specific Pakistani district, the multi-level governance framework developed by Adger (2001), Adger et al. (2005), Bulkeley and Betsill (2005), and Agrawal (2008).

Based on these findings, the paper offers five policy recommendations.

First, climate-adaptation planning for Buner should be organised around its three principal river catchments, the Barandu, Chamla, and Budal — rather than the administrative district alone, so that upstream land-use, forestry, and mining regulation in one tehsil is coordinated with downstream flood-protection investment in another.

Second, the Government of Khyber Pakhtunkhwa should adopt climate-budget tagging across all relevant departments, as already recommended by climate-finance analysts (Business Recorder, 2025), so that funds nominally allocated for adaptation in districts such as Buner can be tracked, audited, and, where necessary, redirected.

Third, the early-warning and climate-information components of the Green Climate Fund's SAP039 project (Green Climate Fund, 2024) should be prioritised for accelerated, phased rollout in Buner specifically, given the demonstrated lethality of short-warning cloudburst events, rather than awaiting the project's full multi-year completion timeline.

Fourth, the regulatory framework governing marble extraction in Buner should be strengthened to require environmental and flood-risk screening before new mining licences are issued, given the documented contribution of unregulated extraction and associated deforestation to slope instability and flood amplification in the district (KPBOIT, n.d.; WWF, 2025).

Fifth, the powers, budgets, and electoral continuity of Buner's District and Tehsil Councils should be strengthened and protected from frequent legislative amendment, so that elected local representatives — who possess the most granular knowledge of which settlements and streams are at risk — can exercise meaningful, resourced authority over local drainage, afforestation, and early-warning dissemination, consistent with the recommendations of recent assessments of the Khyber Pakhtunkhwa Local Government Act (Khaliq & Yasin, 2025; Janjua, 2022).

Future research should build on this governance mapping with primary, catchment-level data, combining household surveys of adaptive capacity with hydrological and remote-sensing analysis to test the relative weight of the governance gaps identified here and to evaluate whether ongoing interventions, including the Billion Tree Afforestation Project and the SAP039 climate-resilience project, are in fact reaching Buner's most exposed communities.

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