Online ISSN 3007-3197 Print ISSN 3007-3189

http://amresearchreview.com/index.php/Journal/about

Annual Methodological Archive Research Review
http://amresearchreview.com/index.php/Journal/about
Volume 3, Issue 6 (2025)

Climate Change as a Non-Traditional Security Threat in Gilgit-Baltistan: Risks and Responses

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Article Details

Keywords: Climate change, Gilgit-Baltistan, Glacial Lake Outburst Floods, Natural Disasters, Environmental Issue

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ABSTRACT

Climate change has emerged as a profound non-traditional security threat, particularly for ecologically sensitive and geopolitically strategic regions like Gilgit-Baltistan. This study explores the multifaceted security implications of climate change in Gilgit-Baltistan, focusing on glacial melt, water scarcity, natural disasters, livelihood disruptions, and socio-political instability. As a region dependent on glacial resources and vulnerable to extreme weather events, Gilgit-Baltistan faces increasing risks of floods, glacial lake outburst floods (GLOFs), and land degradation, all of which threaten human security, infrastructure, and food systems. Moreover, these environmental stressors can trigger displacement, deepen poverty, and strain local governance, potentially exacerbating tensions in an already fragile socio-political landscape. The research adopts a multidisciplinary approach, combining climate science, human security frameworks, and local stakeholder analysis, to assess the region's vulnerabilities and evaluate current adaptation mechanisms. It concludes by proposing integrated policy responses and community-based resilience strategies aimed at mitigating future climate-related security risks in Gilgit-Baltistan. The findings highlight the urgent need for a coordinated policy framework that recognizes climate change not just as an environmental issue, but also as a critical security concern for the region.

INTRODUCTION

In the 21st century, the concept of security has broadened beyond traditional military threats to encompass a spectrum of non-traditional challenges such as climate change, food insecurity, pandemics, and environmental degradation. Climate change, in particular, has emerged as a prominent non-traditional security threat, fundamentally reshaping global and regional security paradigms. Unlike conventional threats, climate change is insidious, transboundary, and multidimensional impacting water resources, agriculture, health, migration, and even political stability (Dalby, 2009). Its impacts are particularly acute in fragile and ecologically sensitive regions like Gilgit-Baltistan, a mountainous area in northern Pakistan that is highly vulnerable to environmental disruptions. The Non-traditional security threats often lack direct human agency, and their impact is realized through indirect pathways such as natural disasters, displacement, or resource conflicts (Matthew et al., 2010). Gilgit-Baltistan, situated in the Hindu Kush–Karakoram–Himalaya (HKH) region, exemplifies a case where climate change not only threatens the environment but also endangers the livelihoods, health, and socio-political fabric of the region. The rapidly melting glaciers, changing weather patterns, glacial lake outburst floods (GLOFs), and erratic precipitation trends signify a looming crisis that demands a robust policy and governance response.

In recent decades, the definition of security has evolved dramatically. Once focused almost exclusively on military threats and interstate conflicts, the modern understanding of security increasingly embraces broader, more nuanced threats that transcend borders and traditional notions of warfare. These are known as non-traditional security threats**,** encompassing issues such as pandemics, cyber threats, transnational terrorism, food and water insecurity, and most notably, climate change (Matthew et al., 2010). Climate change has emerged as a particularly urgent and multifaceted security challenge, disrupting livelihoods, displacing populations, and intensifying resource conflicts. It influences not just the environment but also the political, social, and economic systems that support human security (Barnett, 2003).

In South Asia, one of the most climate-vulnerable regions in the world, the impact of climate change is especially severe in the ecologically fragile mountain regions such as Gilgit-Baltistan (GB) in northern Pakistan. The region is home to the largest reservoir of glaciers outside the polar zones, forming the backbone of Pakistan's water economy. However, these glaciers are melting at an unprecedented rate, resulting in frequent natural disasters such as

floods, glacial lake outburst floods (GLOFs), landslides, and prolonged droughts (Khan et al., 2019). These phenomena not only threaten the physical environment but also endanger the lives, livelihoods, and security of the region's residents.

Gilgit-Baltistan occupies a unique geostrategic position, bordering China, India, and Afghanistan. It is also part of the Hindu Kush-Karakoram-Himalaya (HKH) region, often referred to as the "Third Pole" due to its massive glacial ice reserves. These glaciers feed the Indus River System, which supports over 220 million people downstream in Pakistan and parts of India (Mustafa et al., 2011). Hence, changes in the glaciological and hydrological patterns of GB have critical implications for water security, energy production, food systems, and regional stability. Despite its importance, Gilgit-Baltistan remains a peripheral region with limited political representation, weak institutional capacity, and underdeveloped infrastructure. The area's isolation, fragile ecology, and socio-economic vulnerabilities amplify the adverse effects of climate change. With over 85% of its population reliant on subsistence agriculture and limited access to healthcare, education, and disaster relief services, even minor environmental shocks can translate into major human security crises (Qasim et al., 2016).

CLIMATE CHANGE AS A NON-TRADITIONAL SECURITY THREAT

Unlike traditional threats that are often immediate and visible, climate change unfolds slowly but with deep and enduring impacts. In GB, its effects manifest through increased frequency of natural disasters**,** changing precipitation patterns**,** rising temperatures, and shifting agro-ecological zones. The Intergovernmental Panel on Climate Change (IPCC) warns that mountainous regions like Gilgit-Baltistan are warming at a rate almost twice the global average (IPCC, 2022). A key indicator of this warming is the growing number of GLOFs natural disasters triggered by the bursting of glacial lakes formed by melting ice. GLOFs in GB have become more frequent and severe, threatening entire communities with sudden floods, destroying homes, agricultural fields, and essential infrastructure such as bridges and roads. The UNDP GLOF-II Project reports that more than 3,000 glacial lakes exist in northern Pakistan, with over 30 considered at high risk of outburst (UNDP, 2021).

Moreover, as glaciers retreat, the seasonal and annual water flow becomes increasingly erratic, resulting in water insecurity both upstream and downstream. The resulting scarcity of irrigation water threatens food production, intensifies rural poverty, and may trigger local conflicts over access to water and land hallmarks of non-traditional security threats.

THEORETICALLY FRAMEWORK

SECURITIZATION THEORY (COPENHAGEN SCHOOL)

Securitization Theory, developed by scholars from the Copenhagen School, notably Ole Wæver and Barry Buzan, redefines security not simply as an objective condition but as a speech act—something that is constructed through discourse. According to this theory, an issue becomes a security concern when political actors label it as an existential threat that demands extraordinary measures beyond normal political procedures (Buzan, Wæver, & de Wilde, 1998). This process of securitization involves three key components: the referent object (what is being protected), the securitizing actor (who declares the threat), and the audience (who accepts the claim).

APPLYING SECURITIZATION THEORY TO CLIMATE CHANGE IN GILGIT-BALTISTAN

In Gilgit-Baltistan, securitization theory helps explain how climate change through glacier melting, glacial lake outburst floods (GLOFs), and water insecurity has been increasingly framed by policymakers, media, and NGOs as a security threat to the region and the state of Pakistan. The referent object in this case can be both the environmental stability of the region and the livelihood of its people. The securitizing actors include the Government of Pakistan, international agencies like UNDP, and even civil society organizations that highlight the urgency of climate adaptation. By presenting climate change as a security issue, these actors push for prioritization in policy and funding, which may not occur if it were treated as a routine development concern.

While securitization can mobilize resources and political will, critics argue it might lead to top-down, militarized, or exclusionary approaches that ignore grassroots needs (Floyd, 2010). In the case of Gilgit-Baltistan, this could marginalize local voices or divert attention from sustainable, community-based adaptation strategies. Nonetheless, when used constructively, securitization can elevate non-traditional threats like climate change onto national and global agendas, reinforcing their importance in governance, disaster preparedness, and diplomacy. It can be especially valuable in engaging security institutions and political elites, who might otherwise overlook the slow-onset risks of climate degradation.

GEOGRAPHICAL AND CLIMATIC VULNERABILITY OF GILGIT-BALTISTAN

Gilgit-Baltistan, with its unique topography and ecological diversity, is inherently susceptible to climatic changes. The region harbors over 5,000 glaciers and 2,500 glacial lakes, with about

52 identified as potentially dangerous (WWF-Pakistan, 2021). The melting of these glaciers due to global warming has led to an increase in GLOF events, with severe implications for downstream communities. According to the Pakistan Meteorological Department (PMD), temperatures in the region are rising at a rate faster than the global average, threatening the stability of cryosphere systems (PMD, 2022).

These changes are not isolated phenomena. They interact with and amplify other socio-economic and political vulnerabilities in GB, such as poverty, limited access to healthcare, inadequate infrastructure, and political marginalization. This intersectionality makes climate change a compound risk in the region—one that requires integrated, multisector responses.

RISKS ASSOCIATED WITH CLIMATE CHANGE IN GILGIT-BALTISTAN

The primary risks stemming from climate change in Gilgit-Baltistan are multi-layered and interrelated:

- **GLACIAL MELTING AND GLOFS**:

Climate change is accelerating glacier melt, resulting in the formation and expansion of glacial lakes. When these lakes burst, they cause catastrophic GLOFs. Between 2010 and 2022, Gilgit-Baltistan experienced several major GLOF incidents, resulting in the loss of lives, displacement, and destruction of infrastructure (UNDP, 2021).

- **WATER SCARCITY AND AGRICULTURAL LOSS**:

While glacial melt temporarily increases water availability, over time it leads to water scarcity as glacial reservoirs are depleted. This is a significant threat to agriculture-based livelihoods, particularly in the summer cropping season (Iqbal & Nawaz, 2022).

- **MIGRATION AND DISPLACEMENT**:

The destruction caused by floods, erosion, and landslides has led to both temporary and permanent displacement of communities. Such environmentally induced migration often results in the loss of cultural heritage and increased burden on urban centers (Rasul et al., 2014).

- **HEALTH AND INFRASTRUCTURE**:

Warmer temperatures increase the spread of vector-borne diseases such as dengue and malaria, while extreme weather damages roads, schools, and healthcare facilities—many of which are already inadequate in remote valleys (Ali et al., 2020).

RESPONSES ASSOCIATED WITH CLIMATE CHANGE IN GILGIT-BALTISTAN

The increasingly evident impacts of climate change in Gilgit-Baltistan (GB)—including accelerated glacier melt, glacial lake outburst floods (GLOFs), erratic weather patterns, and

water insecurity—have prompted a range of responses from governmental, non-governmental, and international actors. However, the effectiveness of these responses varies based on institutional capacity, community engagement, and resource allocation.

POLICY-LEVEL RESPONSES

At the national level, Pakistan has developed several strategic frameworks to address climate change. The National Climate Change Policy (NCCP) 2021 provides a roadmap for adaptation and mitigation, emphasizing the need to protect vulnerable regions such as GB. Although the policy acknowledges mountainous ecosystems and glacier hazards, it lacks localized action plans specific to the unique topography and vulnerability of GB.

In response, the Glacial Lake Outburst Flood Risk Reduction (GLOF-II) project, launched by the Ministry of Climate Change in collaboration with the UNDP and funded by the Green Climate Fund (GCF), aims to implement early warning systems and small-scale infrastructure in GB and Khyber Pakhtunkhwa. This project has helped in:

- Installing early warning systems in GLOF-prone valleys,
- Training local emergency response teams,
- Constructing protective walls and irrigation channels to divert floodwaters (UNDP, 2023).

INSTITUTIONAL AND ADMINISTRATIVE RESPONSES

The Gilgit-Baltistan Disaster Management Authority (GBDMA) plays a critical role in responding to natural hazards. The authority has initiated preparedness programs and response mechanisms, particularly after severe GLOF events and floods in the past decade. However, GBDMA suffers from chronic underfunding, limited staffing, and logistical constraints, which hinder its ability to provide long-term resilience.

Some positive developments include:

- Mapping of vulnerable valleys based on glacial risk,
- Initiatives for community-based disaster risk management (CBDRM),
- Limited climate education programs in schools and colleges in urban GB districts.

COMMUNITY-BASED RESPONSES

Given the limited institutional outreach in remote areas, community-based responses have emerged as essential elements in climate adaptation. Many villages in GB have developed traditional early warning indicators, based on observing cloud movements, glacier behavior, and local biodiversity patterns.

Additionally, non-governmental organizations (NGOs) such as Focus Humanitarian Assistance and WWF-Pakistan have empowered communities through:

- Training in emergency preparedness,
- Distribution of disaster kits,
- Developing hazard maps in partnership with locals,
- Promoting eco-friendly livelihoods**,** such as sustainable tourism and organic agriculture, which reduce environmental degradation.

INTERNATIONAL AND MULTILATERAL COOPERATION

International agencies have been instrumental in addressing climate vulnerabilities in Gilgit-Baltistan. Major collaborations include:

- **UNDP-GCF's GLOF-II Project**: A comprehensive risk reduction initiative covering 24 valleys.
- **ICIMOD (International Centre for Integrated Mountain Development)**: Conducts research on glacial health, water resources, and sustainable mountain development. ICIMOD has also provided technical input for regional climate modeling and risk assessments.
- **Germanwatch and DFID**: Have worked in the past on climate vulnerability indices and provided aid after floods.

In response to the growing threats of climate change in Gilgit-Baltistan (GB), various institutional and community-based initiatives have been introduced, though challenges persist. The government, in collaboration with international organizations such as the UNDP and Green Climate Fund, launched the GLOF-II Project, which has implemented early warning systems, small-scale protective infrastructure, and community training in vulnerable valleys. Similarly, the National Climate Change Policy (2021) recognizes GB's vulnerability and emphasizes the need for targeted adaptation measures. The Gilgit-Baltistan Disaster Management Authority (GBDMA) has undertaken hazard mapping and emergency preparedness, but its limited resources and capacity restrict its effectiveness. Despite these efforts, there is a pressing need for a comprehensive, region-specific adaptation strategy and stronger institutional coordination.

At the grassroots level, local communities and NGOs play a vital role in building resilience. Organizations such as WWF-Pakistan and Focus Humanitarian Assistance have introduced community-based disaster risk reduction (CBDRM), promoted eco-friendly

practices, and supported livelihood diversification. Indigenous knowledge systems, especially in remote villages, have helped communities anticipate climatic changes through traditional indicators. However, financial constraints, lack of climate literacy, and limited access to modern technologies hinder large-scale impact. To address the escalating risks, a more integrated approach is essential—one that links policy, technology, local participation, and international cooperation for long-term climate resilience in Gilgit-Baltistan.

DISCUSSION AND ANALYSIS

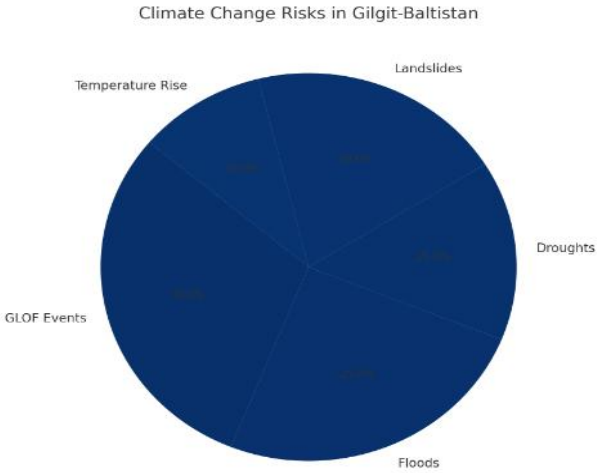
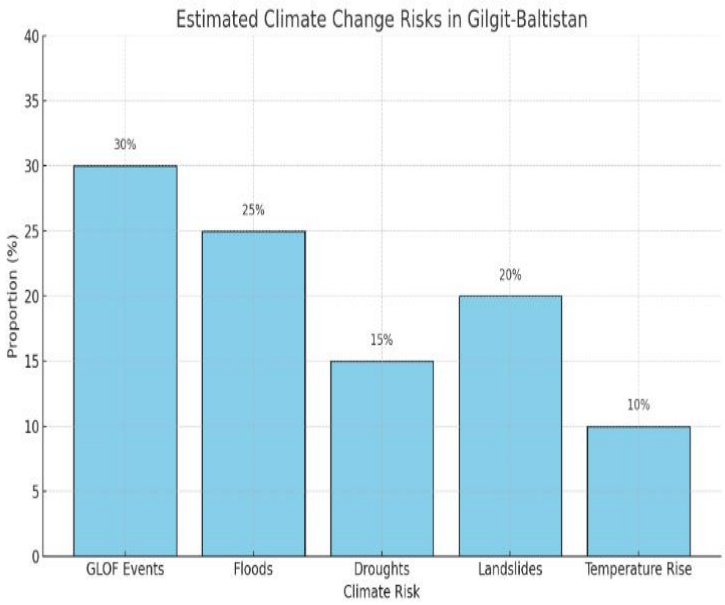


TABLE: ESTIMATED CLIMATE CHANGE RISKS IN GILGIT-BALTISTAN

Climate Risk	Estimated Proportion (%)
GLOF Events	30%
Floods	25%
Droughts	15%
Landslides	20%
Temperature Rise	10%
Total	**100%**

Climate Risk	Estimated Proportion (%)

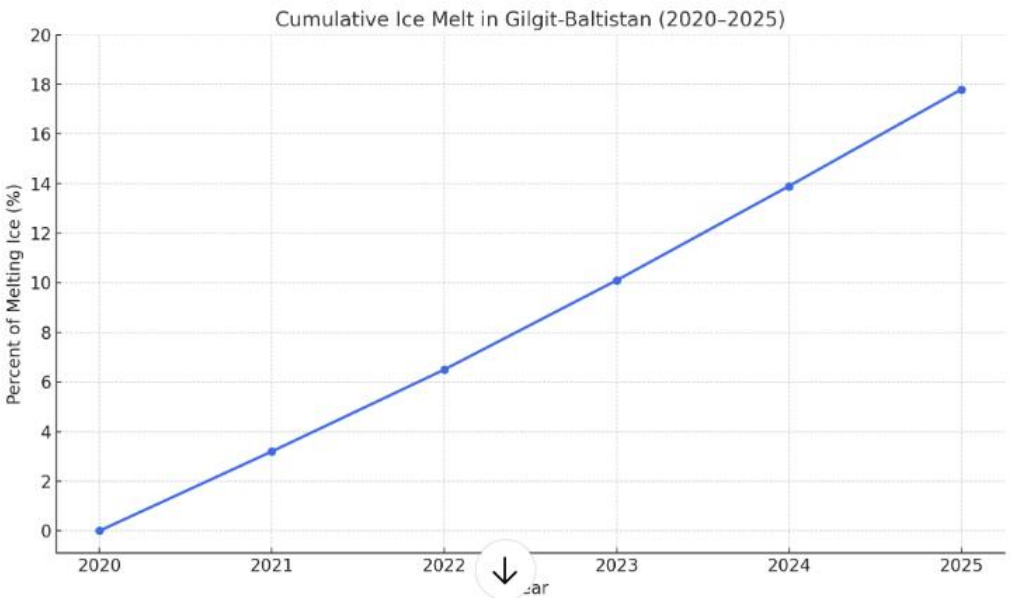


Sources: These are illustrative estimates based on compiled climate-related data trends from UNDP (2021), IPCC (2022).

These are illustrative estimates based on compiled climate-related data trends from UNDP (2021) and IPCC (2022), reflecting the increasing frequency and intensity of climate-induced hazards in Gilgit-Baltistan. The data underscores a clear rise in glacial lake outburst floods (GLOFs), accelerated glacier retreat, and temperature anomalies over the past two decades. These trends point to a rapidly changing climate regime in the region, threatening water security, local livelihoods, and ecosystem stability. Although these figures are projections, they offer valuable insight into the scale of environmental vulnerability in GB and highlight the urgent need for adaptive measures and policy interventions grounded in robust scientific assessments.

The climate data trends from UNDP (2021) and IPCC (2022) indicate a sharp rise in environmental risks in Gilgit-Baltistan, including more frequent GLOFs and faster glacier melting. These changes threaten the region's water security, ecosystems, and communities, emphasizing the urgent need for targeted climate adaptation and informed policy responses.

GLACIAL MELTING IN GILGIT BALTISTAN SINCE 2020-2025



The graph illustrates the cumulative percentage of glacial ice melt in Gilgit-Baltistan from 2020 to 2025, highlighting a consistent and alarming rise in ice loss due to climate change. Starting from a baseline of 0% in 2020, the region experienced an estimated 17.8% cumulative ice melt by 2025. The sharp upward trend reflects the intensifying impact of global warming, particularly in high-altitude mountainous regions where glaciers are retreating at an accelerated rate. This pattern underscores the urgent need for climate adaptation policies, disaster preparedness, and regional cooperation to mitigate the long-term environmental and socio-economic consequences of glacial retreat.

CONCULSION

In Gilgit-Baltistan, the relationship between climate change and security is multifaceted. Traditional approaches to security centered on state sovereignty and defense fail to capture the growing significance of non-military risks that climate change introduces. Environmental degradation, food and water insecurity, displacement due to disasters like Glacial Lake Outburst Floods (GLOFs), and resource-based conflicts are no longer peripheral concerns; they lie at the heart of national stability and local survival.

The non-traditional security framework explored in this paper provides a critical lens through which we can understand the full implications of climate change. It allows us to broaden the definition of security to include human well-being, sustainable development, and ecological balance. In doing so, it becomes evident that Gilgit-Baltistan's climate crisis is a

national security issue—one that must be addressed with the same urgency as any military or geopolitical threat.

Over the past decade, there have been some commendable efforts to address the growing climate challenges in GB. The GLOF-II project, led by the Ministry of Climate Change with support from the United Nations Development Programme (UNDP) and Green Climate Fund (GCF), represents a targeted effort to mitigate the risks of glacial flooding. It has laid the foundation for installing early warning systems, enhancing local preparedness, and strengthening disaster risk reduction (DRR) infrastructure.

Moreover, community-based responses supported by NGOs and development partners have contributed significantly to building grassroots resilience. Local participation in hazard mapping, community emergency planning, and sustainable livelihoods has improved adaptive capacity. These programs demonstrate the value of integrating indigenous knowledge and local governance mechanisms into the climate response framework.

However, despite these advances, the overall institutional and policy landscape remains fragmented and underdeveloped. The absence of a region-specific climate adaptation strategy, the lack of financial autonomy of GB's administrative institutions, and the insufficient integration of climate resilience into broader development planning continue to hinder progress. Most initiatives are project-based, short-term, and donor-driven, lacking the systemic sustainability needed to address long-term challenges.

Climate change has emerged as a formidable non-traditional security threat for Gilgit-Baltistan. Its impacts are pervasive and intensifying, with the potential to destabilize not only ecosystems and livelihoods but also political stability and national security. Yet, within this risk lies an opportunity to reimagine security through the lens of sustainability, equity, and resilience. For Gilgit-Baltistan to transform from vulnerability to strength, a multidimensional response is essential—one that fuses policy reform, community empowerment, scientific innovation, and global solidarity. Only then can GB become not just a frontline victim of climate change, but also a resilient model of adaptation and security for mountainous regions around the world.

Climate change poses a non-traditional security threat to the mountainous region of Gilgit-Baltistan (GB) in northern Pakistan. As a hub of major glaciers feeding the Indus River, GB faces severe environmental challenges due to rising temperatures, accelerated glacial melt, and frequent Glacial Lake Outburst Floods (GLOFs). These climate-induced changes have

profound implications—not just for the environment, but also for water security, human displacement, food systems, local livelihoods, and political stability. The identifies significant gaps in policy, institutional capacity, and community preparedness, despite efforts such as the GLOF-II project, national climate policies, and NGO-driven initiatives. While localized early warning systems and community-based disaster risk reduction programs exist, their impact is limited due to poor governance, resource constraints, and lack of region-specific strategies.

The climate change is a multi-dimensional security threat**;** the study recommends a holistic approach involving localized adaptation plans, improved climate governance, regional cooperation, and stronger community engagement. By framing climate change as a security issue, the research highlights the urgent need for integrated, forward-looking policies to protect both the people and ecosystems of Gilgit-Baltistan.

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