

**Revisiting Climate Change as a Non-Traditional Security Threat to
Pakistan: A Comparative Analysis**



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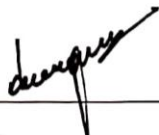
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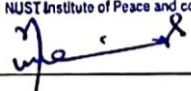
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DEDICATION

To the resilient people of Pakistan, who stand at the frontline of climate change and continue to endure with unwavering strength.

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LIST OF ACRONYMS

COP21	21st Conference of the Parties
COP26	26th Conference of the Parties
COP28	28th Conference of the Parties
BTU	British Thermal Unit
CAF	Cancun Adaptation Framework
CGP	Clean Green Pakistan
CCA	Climate Change Act
CCC	Climate Change Committee
CRI	Climate Risk Index
CNG	Compressed Natural Gas
COPRI	Conflict and Peace Research Institute
ESR	Eco-System Restoration Initiative
EV	Electric Vehicle
ECBC	Energy Conservation Building Code
EPA	Environmental Protection Agency
EU	European Union
AR5	Fifth Assessment Report
FAR	First Assessment Report
AR4	Fourth Assessment Report
GLOFs	Glacial Lake Outburst Floods
GEF	Global Environment Facility
GCF	Green Climate Fund
GHGs	Greenhouse gases
GDP	Gross Domestic Product
HLPF	High-Level Political Forum
HDI	Human Development Index
HFCs	Hydrofluorocarbons
IBIS	Indus Basin Irrigation System
IPCC	Intergovernmental Panel on Climate Change
LiFE	Lifestyle for Environment
MTBF	Medium-Term Budgetary Framework
MAF	Million Acres Feet
MRV	Monitoring Reporting and Verification
NAPCC	National Action Plan on Climate Change
NAP	National Adaptation Plan
NDRMF	National Disaster Risk Management Fund
NSS	National Security Strategy
NSIG	National Strategy Implementation Group
NDCs	Nationally Determined Contributions
NTS	Non-Traditional Security
NATO	North Atlantic Treaty Organization
ND-GAIN	Notre Dame Global Adaptation Initiative
OECD	Organisation for Economic Co-operation and Development
PCCB	Paris Committee on Capacity Building
PoU	Prevalence of Undernourishment
SAR	Second Assessment Report

AR6	Sixth Assessment Report
SRCLC	Special Report on Climate and Land
SRCCOC	Special Report on the Ocean and Cryosphere
SDGs	Sustainable Development Goals
TCFD	Task Force on Climate-Related Financial Disclosures
TBTP	Ten Billion Tree Tsunami Program
TAR	Third Assessment Report
UK	United Kingdom
UNDP	United Nations Development Programme
UNEP	United Nations Environment Programme
UNFCCC	United Nations Framework Convention on Climate Change
UNGA	United Nations General Assembly
UNSC	United Nations Security Council
US	United States
WASH	Water, Sanitation and Hygiene
WMO	World Meteorological Organization

ABSTRACT

Climate change has been redefined as a non-traditional security (NTS) threat to Pakistan, emphasizing the interlinkages between socio-economic and environmental vulnerabilities and national security. The research adopts a qualitative methodology, integrating primary data from various sources such as newspaper articles, policy documents, and INGO documents, along with secondary resources including peer-reviewed journal articles and books. Employing a deductive research strategy, the study focuses on understanding climate change as an NTS threat, aligning with the interpretive paradigm to gain an in-depth understanding of specific contexts and subjective experiences. Comparative analysis with the UK, US, and India suggests that legally binding targets and the alignment of climate policies with national security and development goals could strengthen Pakistan's response to climate-induced threats. Key findings highlight that climate change exacerbates existing issues such as overpopulation, water management challenges, and the impact of extreme weather events, contributing to socio-economic instability. The study critiques Pakistan's climate policies for their limited effectiveness, citing poor implementation, weak integration with security concerns, and insufficient financial resources. The research concludes that addressing these systemic constraints is crucial for improving the country's climate resilience and security.

Keywords: Climate Change, Non-Traditional Security threats, Pakistan, Vulnerability, Adaptation, and Resilience

Chapter 1

INTRODUCTION

Climate Change has emerged as one of the most pressing non-traditional security (NTS) threats in contemporary international relations. It has broad implications that transcend national borders influencing socio-economic stability and national security of states. Countries like Pakistan can be seen on the verge of vulnerability that is characterized by environmental and socio-economic challenges, requiring a re-examination of traditional security paradigms. One of the major aims of this study is to redefine climate change as an NTS threat to Pakistan (World Economic Forum, 2024). This study also aims to draw lessons from the UK, the US, and India to enhance Pakistan's strategic response by providing a comparative analysis in the next chapters.

When it comes to Pakistan, the study explores the impacts of climate change on various sectors including water resources, public health and agriculture. Owing to rising temperatures, unpredictable precipitation patterns, and an increase in the frequency and intensity of extreme weather events such as floods and droughts the economic stability and social fabric has been disturbed badly (Government of Pakistan & Ministry of Climate Change, 2021). This makes a linear chain of challenges that is aggravating the country's vulnerabilities including political instability, poverty and lack of robust infrastructure that collectively hamper its adaptive capacity. Rapidly growing recognition that environmental factors are pivotal to understanding and managing the complexities of national and international security is highlighted by the urgency of addressing climate change as a security threat in Pakistan.

This research study is grounded in the changing discourse on security studies especially the shift from traditional military-centric perspectives to a more comprehensive approach that integrates socio-economic and environmental dimensions. The traditional school of thought with its focus on state-centric and military threats is criticized by the critical and Copenhagen schools of thought (Buzan, Wæver, & De Wilde, 1998). The other two schools of thought advocate for a broader understanding of security including NTS threats such as climate change. In particular, the Copenhagen school of thought introduced the concept of "securitization" which involves framing certain issues as existential threats requiring extraordinary and immediate measures. This makes a clear foundation for this research by drawing a conceptual framework to examine climate change as an NTS threat in Pakistan (Warner & Boas, 2019). The study also considers the role of the Intergovernmental Panel on Climate Change (IPCC) and the United Nations

Framework Convention on Climate Change (UNFCCC) i.e. global institutions in shaping global climate policy and its implications for Pakistan. To provide a comprehensive analysis, this research employed a qualitative methodology incorporating both secondary and primary data sources. Policy documents, relevant newspaper articles and INGOs reports make primary resource data while peer-reviewed journal articles and books come under secondary data. Keeping this approach throughout the research allowed a deeper understanding of the topic by offering insights into a complex interplay between climate change and security in Pakistan.

The whole research revolves around some key terms that are explained in the current chapter. Adaptive capacity is the ability of a community or system to adjust to manage potential damages and climate change impacts (Zhai & Jae-Eun Lee, 2024). Owing to institutional and various socio-economic barriers this capacity does not always lead to successful adaptation (Folke, 2006). Sensitivity is the degree to which one can estimate to which extent a climate stimulus is impacting a system or population including economic disruptions or temperature change. Resilience as referred to in Smit & Wandel, 2006 involves the capability of maintaining normal functioning despite shocks and external pressures. IPCC has described the degree to which a system is exposed to negative impacts of climate that are determined by lack of adaptive capacity and sensitivity as called Vulnerability. The Vulnerability Index considers factors including environmental changes and socioeconomic conditions leading to a unique vulnerability index for each state (Brooks, 2003). State's exposure, ability to adapt and sensitivity are reflected by this index with scoring high on the index being more susceptible to climate change. States' vulnerability and adaptive capacity are determined by factors such as food security, health, ecosystem integrity and water resources (Adger, 2006). Depending on geography and a state's vulnerability, the effects of climate change vary. The Climate Risk Index (CRI) offers a basis for comparing the exposure of countries affected by climate-related events and sensitivity (Zhai & Jae-Eun Lee, 2024). The following figure shows the visual representation of the conceptualization of vulnerability.

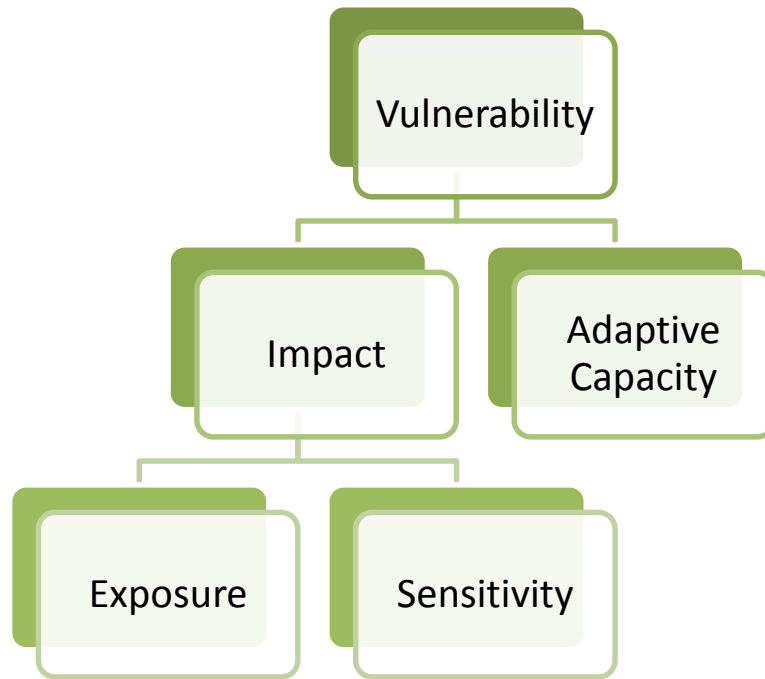


Figure 1: Conceptualization of Vulnerability (Self-Extracted).

1.1 Hypothesis

Climate change increasingly redefines Pakistan's Non-Traditional Security (NTS) through socioeconomic and environmental vulnerabilities.

1.2 Problem Statement

Climate change has been conceptualized as an NTS threat with increasing implications for Pakistan's socio-economic stability and environmental resilience. How this threat fits into Pakistan's national security framework is still a crucial knowledge vacuum. There remains a critical gap in understanding how this threat integrates into the national security framework of Pakistan. This research addresses this gap by employing a conceptual framework to analyze climate change as a security threat to Pakistan, and by conducting a comparative analysis of the best policy practices from the UK, US, and India to draw lessons for Pakistan's strategic response.

1.3 Significance of Study

This research redefines climate change as an NTS threat to Pakistan, advancing the academic dialogue beyond traditional environmental studies. Comparing policy responses from the UK, US, and India, offers unique insights that can inform Pakistan's strategic approach to climate-induced security challenges. The study fills a critical gap in the literature, providing policymakers with actionable recommendations to enhance national resilience against evolving climate threats.

1.4 Research Objectives

To analyze the climate policies of the UK, US and India while keeping in view the lens of climate security and elaborate on how these policies act as a reference to gain best practices for Pakistan. This research broadly aims to assess the impact of climate change as a Non-Traditional Security Threat to Pakistan and evaluate the policies of Pakistan for dealing with climate change as NTS (2014-2024).

1.5 Research Questions

1. What lessons can Pakistan learn from the climate policies of the UK, US, and India?
2. How does climate change exacerbate socio-economic and environmental vulnerabilities in Pakistan?
3. How effective are policies of Pakistan in addressing climate change as a Non-Traditional Security Threat (2014-2024)?

1.6 Research Methodology

The research follows a qualitative methodology that considers both the primary and secondary data resources. Among the primary data resources, the data is extracted from newspaper articles, policy documents and INGO documents. The secondary resources include relevant literature sources, including peer-reviewed journal articles and books.

The study utilizes a deductive research strategy within an interpretive qualitative framework to understand climate change as an NTS threat in Pakistan. Deduction begins with a general statement or hypothesis and explores potential outcomes to arrive at a specific, logical conclusion (Hempel, 1966). This approach is frequently associated with theory testing, where a theory serves as a conceptual framework for understanding phenomena and provides a lens through which research problems are examined (Bryman, 2012). This method is advantageous as it enables a focused study with well-defined research questions and hypotheses, ensuring streamlined research processes via standardized data collection methods. Such an approach facilitates reliable comparison with other studies and provides a solid foundation for future research endeavors (Punch, 2013). Adopting a deductive strategy, especially in light of existing literature, aids in identifying gaps or inconsistencies in current knowledge.

The research philosophy is Interpretivism which emphasizes the subjective nature of human experiences. Unlike positivism, which seeks objective truths, interpretivism delves into contextual variables and factors, acknowledging the distinctiveness of human beings from physical phenomena (Collins, 2010; Scotland, 2012). The adoption of the interpretive paradigm is crucial in my methodology, as it is aligned to gain an in-depth understanding of the specific contexts and subjective experiences relevant to my research (Alharahsheh & Pius, 2020).

To illustrate the research methodology that is employed in this study, Sandra's research onion model is utilized. Each layer of this model represents key components of the research process (Eva 2023).

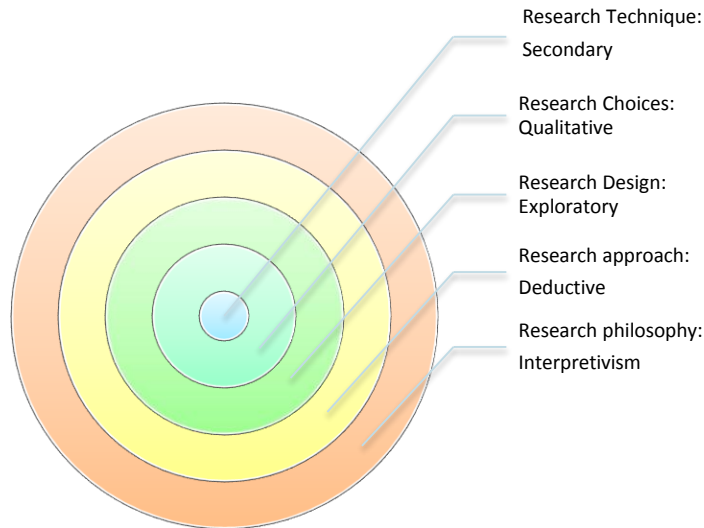


Figure 2: Sandra's Research Onion

1.7 Thesis Outline

The thesis is organized beginning with Chapter 1: Introduction which provides the background analysis of climate change as NTS and the importance of revisiting in Pakistan. It is followed by the next Chapter 2: Literature Review which provides a thorough understanding of the topic. It covers the foundational knowledge of climate change and the role of the IPCC along with the UNFCCC in shaping it. This transcends into the paradigm shift in security studies focusing on the Copenhagen school that provided the securitization theory. The theory is used to build a conceptual framework that makes the foundation of the research. Followed by Chapter 3: Global Climate Change Policies: Best Practices & Lessons for Pakistan. This chapter focuses on the best policy practices of the UK, US and India drawing lessons that can be opted by Pakistan for dealing with climate change as an NTS threat. Next, Chapter 4: Assessing Pakistan's Climate Vulnerabilities and Responses, takes a deep dive into the impacts of climate change on the national security of Pakistan and the measures taken by the government. It also assesses the effectiveness of the policies (2014-2024) for dealing with climate change as NTS. Lastly, Chapter 5: Conclusion and Future Recommendations discusses the key findings and provides important recommendations based on the lessons learnt from the best policy practices of the UK, US and India and the hurdles in effective implementation of policies in Pakistan.

Chapter 2

LITERATURE REVIEW

2.1 Climate Change

Climate change is the long-term alteration in weather patterns and temperature fluctuations. These are caused by natural factors, which are mainly the greenhouse effect and volcanic eruptions, and anthropogenic activities such as the burning of fossils that lead to the emission of greenhouse gases (GHGs), causing an increase in temperature globally due to trapping atmospheric heat (IPCC, 2021). The key emitting sectors are energy, industry, transport, agriculture, and land use (UNEP, 2023). The definition of climate change according to the UNFCCC means:

“A change of climate which is attributed directly or indirectly to human activity that alters the composition of the global atmosphere and which is an addition to natural climate variability observed over comparable periods (United Nations, 1992).”

Climate change is marked by several indicators, which include rising temperatures, sea-level rise, storms, heat waves, floods, droughts, and changing patterns of precipitation (US EPA, 2024). These indicators pose several security threats, with climate-related events causing 1.3 million deaths between 1998 and 2017 and affecting 4.4 billion people, with 91% of these impacts attributed to human activities (CRED & UNISDR, 2018).

2.2 Global Climate Change Agenda

The upcoming sections cover the work of the IPCC and UNFCCC in the fight against climate change.

2.2.1 IPCC

The IPCC was formed in 1988 by the United Nations Environment Programme (UNEP) and World Meteorological Organization (WMO), to drive scientific research on climate change, and support UNFCCC work through periodic assessment reports. These reports have been very important for international climate policy in identifying knowledge gaps and stimulating further research (IPCC, 2007a). The First Assessment Report (FAR) in 1990 indicated that climate change was a global threat requiring international cooperation influencing the establishment of the UNFCCC (IPCC, 1990). The Second Assessment Report (SAR) in 1995 provided crucial data for the Kyoto Protocol (IPCC, 1995). The Third Assessment Report (TAR) in 2001 underscored the critical need for adaptation to the impacts of climate change. After the release of

TAR, the attention of parties was shifted significantly to adaptation prompting them to commit to developing mechanisms for adapting to the adverse effects of climate change. The increasing concern with adaptation strategies and enhancing resilience against climate-related challenges are now addressed by several convention bodies (IPCC, 2001). The Fourth Assessment Report (AR4) in 2007 endorsed the target of limiting warming to 2°C post-Kyoto (IPCC, 2007b), and the Fifth Assessment Report (AR5) in 2014 provided the scientific basis for the Paris Agreement. AR5 redefines "comprehensive security" by focusing on the diverse risks posed by climate change and the necessity of evaluating multiple dimensions of security interactions (Mobjörk et al., 2016).

The report contains a summary of the state of global climate, notable climatic events and international disasters. It also reviews development acknowledging both achievements and emerging challenges at the United Nations and regional multilateral governmental forums. The AR5 describes the climate system as an intricate entity comprising five major components (the atmosphere, hydrosphere, cryosphere, lithosphere, and biosphere (IPCC, 2014). These components interact dynamically, causing the climate system to evolve. This evolution is driven by internal dynamics and external forces, including volcanic eruptions, solar variations, and anthropogenic activities such as fossil fuel combustion and land-use changes (Mobjörk et al., 2016). The recent reports include the Special Report on Climate and Land (SRCLC) (IPCC, 2019a) and the Special Report on the Ocean and Cryosphere (SRCCOC) in 2019 followed by the release of the Sixth Assessment Report (AR6) in 2023 (IPCC, 2023).

2.2.2 UNFCCC

The UNFCCC was established in 1992 at the UN Conference on Environment and Development came into force on 21 March 1994, now ratified by 197 countries. This foundational climate agreement aims to stabilize the levels of GHGs in a manner that will prevent dangerous anthropogenic interference with the climate system, thereby allowing natural adaptation, and ensuring food security and sustainable economic development around the world (UNFCCC, 2015a). The UNFCCC modelled after the Vienna Convention for the Protection of the Ozone Layer acts as a framework to address human impact on global climate with multilateral treaties. The UNFCCC does not enforce specific emission reductions but commits parties to stabilize GHG levels and encourage developed nations to adopt policies aimed at reducing emissions to 1990 levels (United Nations, 1992).

The UNFCCC framework addresses the pressing need for adaptation to climate change by giving guidelines for assessment, preparedness, and implementation of adaptive measures. Adaption efforts were initially overshadowed by mitigation activities but with the publication of

the TAR of the (IPCC, 2001), they gained enough critical importance. The establishment of the Adaptation Committee under the Cancun Adaptation Framework (CAF) represents a significant advancement in the coordination and financing of adaptation initiatives (UNFCCC, 2011). The UNFCCC's financial structure facilitates support for developed nations through mechanisms like the Technology Process and the Paris Committee on Capacity Building (PCCB). Member states are mandated to maintain national GHG inventories and outline their mitigation plans with a special focus on the responsibilities of developed countries due to their historical contributions to global emissions (UNFCCC, 2015b).

2.2.2.1 Kyoto Protocol

It aimed to reduce GHG concentrations to levels that prevent harmful human interference with the climate system (United Nations, 1998). Having entered into force in 2005, it binds 37 developed countries plus the European Union (EU) to reduce GHG emissions to an average of 5% below the level in 1990 during the first commitment period of 2008-2012. The Doha Amendment, adopted in 2012, initiated a second commitment period, mandating further reductions. The second commitment period required an 18% reduction in emissions, with the EU pledging a 20% cut by 2020. GHG inventories, assessing the balance between emissions sources and sinks monitoring these commitments (UNFCCC, 2012). The IPCC's 2006 guidelines offer a detailed methodology for calculating emissions, accounting for factors such as deforestation and land-use changes. These goals were committed by thirty-seven members, among which twenty-eight were from the European Union. As of August 2019, the Doha Amendment had been ratified by 131 states, but it requires ratification by 144 states to come into effect. Within the annual framework of UNFCCC climate change Conferences, negotiations among participating countries facilitate the determination of policy measures for the period following the second commitment period's conclusion in 2020 (UNFCCC, 2012). These conferences finally resulted in the signing of the Paris Agreement in 2015 – which works as a protocol separate from the Kyoto Protocol but functions under the UNFCCC.

2.2.2.2 Paris Agreement

On December 12, the Paris Agreement was adopted to enhance the implementation of the UNFCCC and to strengthen the global response towards the threats of climate change (Ghaleigh, 2020). This landmark agreement addresses various critical aspects of climate change, including greenhouse gas mitigation, climate-friendly policy revisions, and the provision of financial assistance for climate initiatives. Adopted during the 21st Conference of the Parties (COP21) in Le Bourget, France, the agreement was hailed as a pivotal opportunity to safeguard the planet (Whitehouse.Gov, 2015). Representatives from 196 states participated, endorsing the agreement

as the best chance to preserve our environment (UNTC, 2015). The Paris Agreement's primary long-term goal is to maintain the global temperature increase well below 2°C, with efforts to limit it to 1.5°C. The second aim is to significantly reduce the adverse impacts of climate change worldwide and to enhance adaptive capacity to climate change impacts, foster climate security, and promote low greenhouse gas emissions without compromising food production. Thirdly, it emphasizes aligning financial flows with pathways toward low-emission and climate-resilient development (Obergassel et al., 2015). Key commitments of the Paris Agreement include developing plans to mitigate global warming, regularly reporting contributions toward this goal, and setting specific targets with the expectation that each new target will build upon the previous efforts (UNFCCC, 2015c).

2.2.2.3 SDG 13: Climate Action

Since the establishment of the IPCC and UNFCCC, remarkable progress has been made in dealing with climate change. The UN's long-term commitment to global climate action is strongly reflected in Sustainable Development Goals (SDGs) which were adopted by 193 countries under the very ambitious 2030 Agenda. Goal 13 is exclusively committed to urgent actions needed on climate change and highlights education, awareness, and capacity-building for both adaptation and mitigation (United Nations, 2015).

2.3 Paradigm Shift in Security Studies

Influenced by globalization and the increased recognition of NTS threats such as economic instability, climate change, and human security the field of security studies underwent a major paradigm shift post-Cold War. Thomas Kuhn's notion of a "paradigm shift" refers to fundamental changes in the foundational practices of a scientific discipline. In security studies, this transition moved from state-centric, military-focused frameworks to more comprehensive models addressing a wider range of threats and actors (Krause and Williams 1996, Wæver 2012, Durak 2023). This shift arose from the understanding that traditional realist security paradigms were inadequate for contemporary global complexities. These transformations are categorized into three major schools of thought: traditional, critical, and Copenhagen, with the latter introducing securitization theory.

2.3.1 Traditional School

The traditional school, prevalent during the Cold War, focused on state-centric and military security concerns. Grounded in realism, it emphasized the state's role as the primary actor in international relations and underscored the importance of military power and alliances for security. Key scholars like Hans Morgenthau and Kenneth Waltz argued that international politics are driven by the anarchic international system and states' self-interest (Moore &

Morgenthau, 1949; Waltz, 1979) According to Walt 1991, this perspective views security primarily as enhancing military strength to deter or defeat adversaries. Even after the Cold War, traditional security studies remained relevant amid geopolitical shifts, focusing on military security, great power politics, deterrence, arms racing, terrorism, and technological advancements (Buzan & Hansen, 2009a). Critics argue that this approach is narrow, often neglecting NTS threats and broader socio-political factors affecting security.

2.3.2 Critical School

Critical security studies arose in response to the limitations of the traditional school. Scholars like Ken Booth and Richard Wyn Jones criticized the state-centric, militarized view of security, advocating for a broader perspective that includes economic, environmental, and social dimensions (Booth, 1991; Wyn Jones, 1999). Booth's "Theory of World Security" suggests that security should ensure individuals can lead dignified lives, thus proposing a human-centric redefinition of security (Booth, 2007). Wyn Jones also emphasized the inclusion of broader societal factors in security analysis (Wyn Jones, 1999). Central to critical security studies is the belief that security is a socially constructed concept, shaped by political, economic, and cultural discourses. It prioritizes human security and examines how power dynamics and social structures influence threat perceptions and security policies. Critical theorists argue that traditional approaches often overlook the root causes of insecurity, such as inequality and oppression (Durak, 2023), aiming to transform the security agenda towards greater equity and inclusivity (Buzan and Hansen 2009b).

2.3.3 Copenhagen School

Emerging in the 1990s, the Copenhagen School broadened the scope of security studies by introducing key concepts such as regional security complexes. This approach underlines how geographic proximity and common security concerns strengthen regional dynamics with more relevance in the post-Cold War context (Durak, 2023). The concept of securitization by Ole Wæver in 1995 developed at the Conflict and Peace Research Institute (COPRI) laid the foundation for the Copenhagen School (David, 2007). Securitization theory outlined in the work by Buzan et al., 1998, "Security: A New Framework for Analysis" has become a pivotal analytical tool in understanding security policymaking (Gad & Petersen, 2011). The theory argues that threats are not always objective but can be constructed through deliberate acts of framing issues as existential threats, drawing from a speech-act theory developed by John L. Austin and refined by Wæver (Stritzel, 2014).

According to this theory, a securitizing actor presents an issue as an existential threat to a referent object and thereby justifies extraordinary measures beyond normal political processes

(Buzan, Ole, et al., 1998; Wæver, 1995). The focus has shifted from traditional military threats to NTS threats like environmental degradation, migration, and public health crises (Wæver, 2012). Its flexibility makes it applicable to different domains of public policy and international relations (Buzan, Ole, et al., 1998). The securitization process involves three main components: the securitizing actor, the referent object, and the audience. Existential threats are those perceived as critical to the survival of the referent object, typically the state (Buzan & Wæver, 2003). When the audience accepts the framing of an issue as an existential threat, it becomes securitized, permitting extraordinary measures outside conventional political procedures (Buzan & Wæver, 2003).

Securitization theory highlights three key characteristics of security. First, security is intrinsically linked to threats endangering the essential values of a referent object, such as the state or society's ideology, dignity, and identity. Second, security is a "contested concept" (Barnett et al., 2008; United Nations Development Programme (UNDP), 2008) indicating its subjective nature and lack of universal definition, dependent on the perspective of the securitizing actor (Williams, 2003). Third, security is inherently political, allowing states, as primary actors, to choose coercive or non-coercive measures in response to perceived threats.

2.3 Conceptual Framework

According to McDonald, 2008, the theory of securitization must be extended to include non-state actors to gain a better understanding of security in global politics. This inclusive process allows any actor to frame an issue as a security concern, thereby shaping the definition of security (Williams, 2003). The discourse on climate change as a security issue has evolved, with some emphasizing long-term threats by (Barnett et al., 2008; UNDP, 2008) while others focus on the sovereignty and territorial integrity of states (Campbell, 2008; Schwartz & Randall, 2003). Climate security responses range from advocating for sub-national and transnational mitigation efforts (O. Brown & McLeman, 2009a; Spratt, 2008) to recommend adaptive measures to protect state interests (J. Busby, 2008a; Podesta & Ogden, 2008).

Climate change understanding and framing as a security threat has evolved since early arguments focusing on the existential risk to life on Earth arose (L. Brown, 1986; Mabey, 2007; Spratt, 2008). This framing challenges traditional security definitions, elevating climate change to a high-priority issue that gains attention and funding. Early environmental security advocates explored the links between climate change and traditional security concerns like armed conflict (Homer-Dixon, 1999; Myers, 1989). Although recent UN efforts have linked climate change to conflicts like Darfur (Moon, 2007; UNEP, 2007), it was initially considered alongside other environmental issues like shared water resources (Gleick, 1993).

Framing climate change as a security threat can enhance urgency as Wæver, 1995 points out but it often ties the issue to the military and defence of the state that de-securitization might enable more effective and open political debate. The framework by McDonald is based on discourse theory (Hajer, 1995) discourse categorizing climate security discourses by referent objects: human security, people-focused; national security, state-focused; international security, community-focused; and ecological security, ecosystems-focused.

2.3.1 National Security

Climate change poses substantial risks to national security, a concern increasingly highlighted in contemporary discussions. Research has correlated climate change with armed conflicts (Kaplan, 1994) and threats to state sovereignty and institutional stability (Levy, 1995). This discourse is propagated by national security institutions and policymakers, with the United States (US) and Australian Departments of Defense integrating climate change into their security strategies (Department of Defense, 2009; Floyd, 2010). The 2009 Australian Defense White Paper identified climate change as a catalyst for resource conflicts, political instability, and mass migrations (Department of Defense, 2009), while the US Department of Defense recognized it as an "environmental security threat" compromising strategic preparedness (Floyd, 2010). Public policy think tanks including the Center for Naval Analysis and the Brookings Institution refer to climate change as a "threat multiplier" with integration into the US national security policies (Campbell, 2008; CNA, 2007). Similar concerns have been raised in the United Kingdom (UK) and Australia, indicating a global acknowledgement of climate change during 2006-2007 (IISS, 2007). This aims to shape academic discourse by highlighting the strategic implications of climate change (Busby, 2008a; Dupont & Pearman, 2006).

While recognizing the need for mitigation, the national security discourse emphasizes state adaptation to climate change, urging militaries to develop strategies addressing potential climate-induced conflicts (Brzoska, 2009; Podesta & Ogden, 2008). According to (Busby, 2008), advocates prioritise adaptation and disaster risk reduction strategies. The political traction of this discourse elevates climate change as a critical issue, especially in developed countries (Brown & McLeman, 2009b; Harris, 2012; Schoch, 2011).

2.3.2 Human Security

The human security concept emerged prominently with the UNDP 1994, Human Development Report, reorienting the agenda of security away from state-centric concerns to individual well-being. This paradigm shift is founded on two main assertions: states often fail to secure their populations and sometimes jeopardize their well-being, and global politics now necessitate addressing diverse security challenges beyond state sovereignty and territorial integrity. The

discourse on human security about climate change is championed by various UN agencies, with the UNDP playing a crucial role. The UNDP's early integration of environmental security into human security emphasized that climate change threatens "human life and dignity" (UNDP, 1994). Advocates argue that security in a human context includes material conditions vulnerable to CC, highlighting the link between development and security (Page & Redclift, 2002). This view brings out the broad implications that climate change has on global security dynamics (Dalby, 2009).

The report "Climate Change and Its Possible Security Implications" further reinforced the human security approach, focusing on individuals and communities (UN, 2009). During the UNGA, prominent members and actors such as the Group of 77 and the Non-Aligned Movement expressed deep concerns about the effort to define climate change within a paradigm of national security at the United Nations Security Council (UNSC) discussions. Harris, 2012 advocates that even as climate change is an issue handled by the UK's Foreign and Commonwealth Office in both domestic and international security discourses, the Department for International Development focuses on vulnerability and poverty alleviation, thus drawing strength from human security discourse. The comprehensive concept of human security provides a robust framework for understanding the intricate relationship between climatic conditions, global inequality structures, and community-based values (O'Brien 2006; Jon Barnett 2003).

2.3.3 International Security

The climate change discourse that links it with international security, spanning the gap between national and human security perspectives, puts much emphasis on the threats climate change poses to global stability and international order. From this perspective, more emphasis is put on internationalism and global cooperation in addressing climate change; a role that international organizations would play toward the provision of security and fostering cooperative mitigation and adaptation efforts. International organizations, including UNEP and the then United Nations Secretary-General Ban Ki-moon have linked conflicts such as Darfur to climate-induced agriculture challenges and poor yields; an emphasis is thus put on enhancing environmental components of the African international aid and development programs advocating for strengthened environmental aspects of international aid and development projects in Africa (UNEP, 2007). Ban Ki-moon stressed the responsibility of developed countries to consider intervention in climate-affected regions (Moon, 2007).

Smith and Vivekananda 2007 listed more than 40 countries at risk because of climate change-induced conflict. They recommended policies for the transition to a low-carbon economy and developing adaptive capacities. Purvis and Busby 2004 from the Brookings Institution termed

climate change as a serious threat to international stability. Also, there were calls for strengthened international organizations to coordinate mitigation strategies and provide for adaptive capacity, more so in developing countries. Central in this discourse is the role that international organizations play as key security agents. (Rasmussen and Birk, 2012) put across the idea that the climate change threat is a global environmental threat uniquely placed to be handled by the UN Security Council. This perspective has been challenged by countries like Brazil, China, India, and Russia, and entities like the Group of 77 and the Non-Aligned Movement, who argue that climate change has been securitized or conceptualized as an international security issue (Harris, 2012). Given the ambiguous nature of international society, the specific threats and referent objects in the international security discourse are less clearly defined. Climate change is considered by Jaspardo and Taylor 2008 to be a transnational security threat, characterized by NTS threats that cross borders and challenge the integrity of states and the quality of life of their inhabitants.

2.3.4 Ecological Security

Ecological security centres on the biosphere, advocating for a fundamental rebalancing of human-environment interactions. It prioritizes the biosphere as its key referent, urging a reexamination of political, economic, and social systems that contribute to environmental degradation and disconnect people from nature (J Barnett 2001; Dalby 2009; Pirages and Cousins 2005). This increasingly articulated discourse by environmental NGOs and critically oriented scholars has gained more prominence. For instance, "Climate Code Red" by Friends of the Earth underscores the need for structural changes to ensure ecological security (Spratt, 2008). Pirages and Cousins 2005 state that security threats arise if there is an imbalance between humans and nature, whether as a function of human factors or natural variability. The ecological security perspective stresses the necessity of maintaining ecological balance rather than preserving the current state, considering ongoing environmental damage. It also acknowledges a moral obligation towards other living beings, as reflected by the Foundation for Ecological Security's focus on biodiversity protection and restoration.

Advocates of ecological security often express reluctance to fully embrace traditional security discourse, creating ambiguity in identifying responsible actors and developing effective political responses. This perspective goes beyond standard mitigation and adaptation strategies, examining the interplay between global climate change, cultural practices, political economy, and international norms (Dalby, 2009). It calls for a reevaluation of our relationship with the environment and challenges existing structures that drive environmental degradation (J Barnett 2001). The following table summarizes the conceptual framework of the climate security

discourse highlighting the threat of climate change to national, human, international and ecological security.

Table 1: Discourses of Climate Security (McDonald, 2013)

Discourse	Referent	Threat	Securitizing Agent	Response
National Security	Nation-State	Conflict, Sovereignty, Economic Interests	State	Adaptation
Human Security	People	Livelihood, Core Values & Practices	States, NGOs, International Communities, Communities themselves	Mitigation
International Security	International Society	Conflict, Global Stability	International Organizations	Adaptation and Mitigation
Ecological Security	Biosphere	Challenges to equilibrium associated with contemporary political, social and economic structures	People	Fundamental Reorientation of Societal Patterns and Behaviors

2.4 Climate Security

Global peace and stability have long been threatened by wars, conflicts, terrorism, epidemics, and socioeconomic crises. Humanity now faces an unprecedented threat from climate change, primarily driven by human activities. Since 2007, climate change has become a critical security issue in global politics, and the UNSC has held numerous debates on the security consequences of climate change (Maertens, 2021). In 2009, the United Nations General Assembly (UNGA) commissioned a report on the subject and various United Nations (UN) agencies, including the United Nations Environment Programme (UNEP) and the United Nations Development Programme (UNDP), have examined these threats, supported by statements from former UNSG Ban Ki-moon (UN, 2009). The fifth IPCC assessment report underscores the need for a comprehensive security approach, emphasizing the complex risks of climate change and the necessity for multidimensional security assessments (IPCC, 2014). The 2019 Global Risk Report

by the World Economic Forum ranked climate-induced extreme weather events and migration failures as the second and third most severe threats, following nuclear war (World Economic Forum, 2019).

The UN has played a pivotal role in diplomatic actions on climate change, influencing frameworks such as the UNFCCC, the Kyoto Protocol, and the Paris Agreement. Regional approaches, like the Asia Pacific Alliance and G8 agreements, have also emerged, emphasizing the need for global cooperation beyond national and regional policies. International efforts to raise climate awareness include thematic discussions by organizations like the EU, African Union, and Arab League, linking climate change to issues such as peace and security (Rajendra Kumar Pachauri et al, 2015). Three significant developments have occurred within the UN framework, including increased United Nations Security Council (UNSC) resolutions incorporating climate risk assessment and management, establishing the climate security process within the UN, and forming an International Specialist Working Group on Climate Protection Threats (Security Council, 2022).

Climate change is a multi-dimensional threat to a state's security, including natural disasters, sea-level rise, and agricultural productivity. These changes can result in a lack of food and water, people being forced to shift their homes, and competition for resources (Field & Barros, 2014). For example, according to IPCC 2018, climate change deepens existing risks and generates new ones, especially for the most affected and disadvantaged groups. Climate-security linkages are anchored in both environmental and security theories. Environmental security was developed in the 1980s and 1990s as a subfield focusing on how environmental changes cause conflicts and threaten national security (T. F. Homer-Dixon 1994). The climate-human security linkage extends this perspective, which is based on the security of states, focuses on the insecurity of people, and underlines that climate change is a risk magnifier that intensifies existing social, economic, and political tensions (Richard Matthew 2014).

It is crucial to comprehend climate-security relations within the framework of global environment changes since these relations reveal the connections between environmental stability and human security. It underscores the importance of coherent policies focusing on climate change and adaptation. This needs a systems approach that looks into the interdependency between ecological systems and human societies to strengthen resilience and minimize the risks for sustainable development (Mearns & Norton, 2009). The Jason advisory group, an elite assembly of independent scientists focused on security issues, identified climate change as a risk multiplier that intensifies existing threats. A 2013 meta-analysis suggested that climate change amplifies stress on natural resources, heightening the likelihood of livelihood

destruction, state fragility, human displacement, and mass casualties (Noel L Gerson and Sherri Goodman 2007). The Pentagon's 2014 Quadrennial Defense Review further emphasized that climate change, combined with global dynamics like urbanization and economic growth in populous countries such as India, China, and Brazil, threatens homes, land, and infrastructure. These pressures increase resource competition and place additional burdens on economies, societies, and governance institutions. climate change acts as a threat multiplier, aggravating stressors like poverty, environmental degradation, political instability, and social tensions, which can facilitate terrorism and other forms of violence (Hamill, 2014).

A North Atlantic Treaty Organization (NATO) study identified climate change as a significant security threat, evidenced by the increasing frequency and severity of weather disasters like the 2004 Sri Lankan Tsunami, Hurricane Katrina in 2005, Cyclone Nargis in 2008, and the 2010 Haiti earthquake (NATO, 2024). The 2016 World Economic Forum's Global Risks Report highlighted climate change and forced migrations as major global economic threats (World Economic Forum, 2016). Similarly, in 2016, U.S. National Intelligence Director James Clapper noted that escalating insecurity, driven by extreme weather, environmental degradation, and resource scarcity, has become the "new normal." A 2017 Swedish Global Challenges Foundation report warned that climate stability is crucial for humanity's survival, with global warming posing an existential threat. This places not only individual states' sovereignty but global stability at risk (Julien & Rhee, 2017).

The 2019 Global Risks Report by the World Economic Forum identifies extreme weather events and the failure to address climate change as the top threats, ranking them just behind nuclear conflict in terms of potential damage (World Economic Forum, 2019). Over the past decade, no region has been spared from climate-related impacts. The concept of "comprehensive security," as published in the 5th assessment report of the IPCC emphasizes the interconnected nature of various security dimensions and their collective influence on state sovereignty. This advocates for holistic security encompassing both military and non-military strategies promoting international cooperation for mutual well-being and sustainable development (IPCC, 2014). The Conference "The Changing Atmosphere: Implications for Global Security," was very important in 1988 in Toronto because it attempted to bring out the severe risks of climate change by making comparisons with the effects caused by nuclear war. The conference underscored the urgent need for low-carbon economic strategies and technological innovations to mitigate climate risks and ensure global security. In July 2019, the High-Level Political Forum (HLPF) reviewed key goals, including SDG 13 highlighting the interconnectedness of climate action with issues of inequality, peace, and justice, and the necessity of integrating climate security into

long-term strategic planning (United Nations, 2019).

Climate change poses immense threat to sustainable development and security in the world, with the diminishing of arable land, water shortages, and declining food and fish stocks leading to potential conflicts over resources (Nguyen et al., 2023). Coastal cities and critical infrastructure are particularly vulnerable to economic damage from rising sea levels, which may lead to territorial disputes and displacement of populations. The economic impacts of climate change would threaten any global development and may deepen the distributional conflicts between the most affected populations and those contributing to climate change. A good example was in 2008, during the food crisis, when food prices skyrocketed due to climatic extremes disrupting food supplies, worsening poverty, and instigating social unrest (K. Abbass et al. 2022). Finally, rising sea levels also exert their force on long-term planning and adaptation, especially with big coastal cities and small island states, which are increasingly witnessing such measures concerning the relocation of vulnerable populations (IPCC, 2019b).

Climate change's impact on water availability is particularly critical in tropical, arid, and semi-arid regions, where declining precipitation and water overuse exacerbate urban water stress and agricultural challenges. The lack of mechanisms within transboundary water agreements to address variable water flows further complicates resource management (Tayia, 2019). Climate change has far-reaching implications for food security. Agricultural production is compromised in regions with uncertain water supplies, increased risk of pathogen attack, and temperatures that exceed crop tolerance levels. Given all these food price increases particularly impact impoverished households and lead to poorer nutritional outcomes (Tuomisto et al., 2017). Sea-level rise presents another challenge, especially for major coastal cities and small island states in the Pacific, Indian Ocean, and Caribbean as far as employment and the economy are concerned. Planning and adaptation strategies will be necessary for the long-lasting effects on employment, economy, and trade (Hernández-Delgado, 2024).

The IPCC identifies Asia as being highly vulnerable to climate change, with extreme weather events that are expected to disrupt biodiversity, accelerate glacier melt, and cause severe coastal flooding, threatening ecosystems and regional stability (IPCC, 2007b). Significant risks will include severe flooding, and increased mortality due to heat, water and food scarcity, especially in regions already prone to malnutrition. The threat of climate change combined with ineffective governance, poses significant risks to peace and security. Natural disasters, resource scarcity, and mass migrations are exacerbated by climate change, increasing competition for resources (Buhaug et al., 2023). In Central Asia, the retreating glaciers of the Tianshan mountain range, a vital water source, are reducing water availability and heightening regional tensions (Zhang et

al., 2022). South Asia and Southeast Asia regions where livelihoods are majorly dependent on agriculture and fisheries are increasingly vulnerable to the intersection of climate change and conflict, yet this area remains under-researched. Climatic variability that decreases the yield from agriculture and fishery increases conflict risks by the compromise of livelihoods and results in a dependence on illicit activities. For instance, reduced fishing opportunities in Indonesia led to theft, while deteriorating economic conditions in Naxalite-affected areas in India have simply escalated local conflicts (Warren & Steenbergen, 2021).

In countries, such as Indonesia, where the conflict is of relatively low intensity and localized, adaptive capacity and seasonal factors will normally reflect the local sentiments. While effective climate adaptation strategies may mitigate resource-based tensions, they can also exacerbate them (Tamrin, 2024). Rainfall fluctuations, for instance, have historically accounted for substantial variations in India's GDP (ADB, 2013). The Indus Basin, shared by India and Pakistan, faces worsening water disputes due to glacier melt and rising demand (Laghari et al., 2012). Such water issues in the water resources conflict situation are most likely to increase, and it also probably poses threats of rekindling historical tensions and destabilizing the region. Prolonged droughts have led to internal conflicts and displacement, affecting millions and straining livelihoods (Zhang et al., 2022). The potential impacts of climate change on economic corridors such as the Silk Road, could also hinder trade and exacerbate regional conflicts (Lou del Bello, 2017). The melting of Arctic ice may open new trade routes but could also intensify geopolitical tensions. The maritime disputes are outstanding examples of how even dormant territorial or resource conflicts can become highlighted due to climate change between Japan and China in the East and South China Seas. With increasing temperatures, water demand in agriculture would simultaneously rise and put additional stress on the already strained water resources, with related food security problems. This complex interplay between climate change, resource management, and regional stability underscores the need for comprehensive strategies to address these challenges.

Population growth, urbanization, and associated pressures on ecosystems increase vulnerability to climate impacts, while global stability issues, such as economic crises, undermine government effectiveness and heighten exposure to climate-related threats. Wealth distribution and governance also play critical roles in shaping climate mitigation strategies and environmental management (J. W. Busby 2007; Schwartz and Randall 2003; O. Brown, Hammill, and Mcleman 2007). Resource conflicts, exacerbated by reduced agricultural land, water shortages, and climate-induced disasters, have profound socioeconomic impacts, destabilizing regions and contributing to food insecurity, particularly in rural areas experiencing civil strife. The

correlation between climate extremes and conflict is well-established; severe weather events, such as droughts, significantly increase the likelihood of local conflicts. Migration from affected rural areas to urban centres can escalate conflict risks. Climate-induced stress on agroecosystems also disrupts crop production and food security, leading to economic and social destabilization (IPCC 2014). The term "climate refugees" is often linked to security concerns, though research indicates that migration is driven by various factors beyond climate alone.

Migration, whether temporary or permanent, can result from sudden disasters or gradual environmental changes. Although migrants often face significant hardships, they do not typically pose a security threat to host countries (Allison et al. 2009). Climate change is a pervasive global issue with profound socio-economic and environmental consequences across all continents. It poses an escalating threat to economies and communities, primarily driven by intensified greenhouse gas emissions from human activities. Projections indicate that global temperatures could rise by over 3°C this century, disproportionately impacting the most vulnerable populations (Hermwille et al. 2017). As climate change transcends national borders, it necessitates coordinated international efforts to mitigate its effects and support low-carbon development globally (World Bank 2014).

2.5 Research Gap

Despite the extensive literature on climate change as an NTS threat, there is a critical gap in research specifically focused on comparative analyses that draw lessons for Pakistan's policy development. Most studies either concentrate on general global trends or individual national contexts, overlooking the unique socio-political challenges faced by Pakistan. This lack of focused comparative analysis leaves a gap in actionable insights that could guide Pakistan in enhancing its climate security strategies by learning from other nations' experiences. Addressing this gap is crucial for formulating effective, context-specific policies in Pakistan.

Chapter 3

GLOBAL CLIMATE CHANGE POLICIES: BEST PRACTICES AND LESSONS FOR PAKISTAN

3.1 Introduction

The technological advancements have profoundly influenced human life, often referred to as the era of "scientific enlightenment", since the 17th century. While these developments have improved labor efficiency and industrial output, they have also adversely impacted the environment. Consistently ranked among the top 10 most at-risk countries on the CRI, Pakistan faces severe threats from rising temperatures, shifting weather patterns, and increasing extreme weather events. Although climate change is a global issue it poses significant challenges to Pakistan's socioeconomic stability and governance (Climate Analytics 2024).

Research has consistently shown a link between climate change, poverty, and human vulnerability, with different communities experiencing varying degrees of impact. If current trends in global warming persist, the planet will face rising sea levels, more frequent extreme weather events, and potentially irreversible damage to ecosystems. For Pakistan, the effects are already evident, with devastating floods in recent years disrupting livelihoods and infrastructure. Both developed and developing nations are susceptible to such climate-induced disasters, but Pakistan's geographic and socio-economic conditions make it particularly vulnerable. The existential threat of climate change necessitates urgent action. Rising global temperatures, currently about 1.5°C above pre-industrial levels, are driving unprecedented shifts in weather patterns, with far-reaching consequences for all aspects of life on Earth. Environmental experts warn that a continued rise in GHG emissions could lead to a 2°C increase in global temperatures, making human survival on Earth increasingly precarious. The accumulation of GHGs such as CO₂ and CH₄ traps heat within the Earth's atmosphere, contributing to a range of climate-related phenomena including extreme rainfall, glacial melting, heatwaves, droughts, and rising sea levels (Kuttippurath, Patel, and Sharma 2024).

Pakistan's geographic position, with its high-altitude mountain ranges capped with glaciers in the north and the Arabian Sea to the south, makes it particularly susceptible to these impacts. Over the past two decades, Pakistan has experienced approximately 150 extreme weather events, with 14 major floods since 1990. The accelerated melting of glaciers has also heightened the risk of Glacial lake outburst floods (GLOFs), and the catastrophic floods of 2022 caused an estimated \$30 billion in damages, devastating the country's agriculture sector, a critical component of its GDP (Gopal and Wang 2023). Ignoring the severity of climate change only

intensifies its consequences. The planet is in a state of perpetual crisis, facing an existential threat from the changing climate. Water scarcity is a critical issue, particularly in developing nations, exacerbated by deforestation, unregulated urbanization, and untreated industrial waste. These human-induced activities are degrading natural ecosystems, leading to altered climatic patterns, severe droughts, species extinction, famines, floods, and rising global temperatures. Effective management of both groundwater and surface water is vital for societal progress. While our current understanding of climate change provides a foundation for evidence-based solutions, the future of the planet depends on immediate and sustained action (UNEP 2024). Climate catastrophe can be averted through increased funding and the establishment of nationally determined goals. The world's major economies, particularly those responsible for 40% of global warming—such as the US, China, and others—must be held accountable, where Pakistan needs to heed to lessons learnt by their updated policy actions to become more resilient in facing this imminent threat. International mechanisms must enforce carbon taxation and promote energy efficiency as key strategies. Environmental, economic, and social sustainability are interconnected challenges that demand global cooperation (Adnan et al. 2024). Clean growth is not merely an option but an obligation to future generations, ensuring that economic progress aligns with enhanced environmental protection.

In COP28, the commitment to actionable steps in the fight against climate change was widely discussed. As climate impacts intensify globally, especially in developing countries, the urgency to act is necessary. The past thirty years have seen a surge in climate policies across diverse regions. Over 3,500 climate policies have been introduced worldwide, reflecting significant strides in addressing climate change (Kerr 2024). Notably, wealthier nations with more resources have led the way, but emerging economies are increasingly proactive. For instance, between 2010 and 2015, China surpassed the US in climate policy announcements, and India emerged as a leader, unveiling nearly 50 climate policies in the following seven years. This growing body of policy expertise offers invaluable lessons for governments aiming to elevate their climate ambitions. The World Bank's recent report, "Reality Check: Lessons from 25 Case Studies Advancing a Low-Carbon Future," highlights successful climate policy implementation over the past three decades. It examines how countries design and execute policies, navigating complex trade-offs and challenges (World Bank 2023).

The analytical perspective in this chapter seeks to systematically examine the impact of climate change on Pakistan and identify actionable strategies from the major actors including the US, UK and India to inform better policymaking.

3.2 United Kingdom

The UK has recognized the dangers of climate change, dating back to the 1980s under Margaret Thatcher as a significant risk factor for conflict, as highlighted in its 2015 National Security Strategy (NSS). It re-emphasizes the UK's willingness to forge multilateral relations, especially within the realms of the Commonwealth to counter threats of climate alterations globally. A National Strategy Implementation Group (NSIG) has been put in place to mainstream climate change at the national level while climate risk is required to be reported every five years in the UK under the Climate Change Act (Dimsdale and Hayes 2021). The government passed the UK Climate Change Act in 2008 which set a legal target for reducing GHG emissions to 80% levels by 2050 that was later amended to cover the 'net-zero' goal. The Act also founded the Climate Change Committee (CCC) that monitors progress through five-year budgets of carbon through which Britain authorities have been able to keep check and perform well. This legislation acted as a reference to the other countries as well as contributed to the formation of other international treaties such as the Paris Agreement of 2015. The Act underlined the fact of numerous imperatives with which governments have to balance to reduce GHG emissions including the growth of the economy, improvement of people's health and promotion of social justice. The UK's evidence shows that incorporating climate measures with social equity is feasible and should be done more frequently. For instance, emission reduction has been found to give health benefits due to less air pollution hence less health cost and increased production.

The UK's practice proves that it is easier to address these co-benefits at the regional and city levels. Integrated cross-departmental bodies of funds or offices, for example, the Office for Public Health and the Environment that are proposed can increase the climate change policies effectiveness. The UK case shows that when coming to a multiple-benefits framing of climate action, it is necessary to integrate as many different sectors and contexts as possible in policy-making, to not only stop climate deterioration but also improve the quality of life of the whole society (Jennings, Fecht, and Matteis 2019). Some of the lessons drawn from the Act include the role of the CCC and other independent expert institutions in the process of translation of the policy, and political and public support which will contribute to the success of the Act and require long-term vision and short-term horizons (World Bank 2023).

To achieve net zero by 2050, the UK has outlined strategic pillars. The first pillar emphasizes bolstering clean growth and climate adaptation efforts, particularly through supporting UK exporters in seizing opportunities within the global market for low-carbon technologies. The establishment of a £2 billion direct lending facility for clean growth projects marks a significant step, enabling small and medium-sized enterprises to access essential finance and insurance. The second pillar is dedicated to reducing the UK's portfolio greenhouse gas emissions by setting

interim decarbonization targets. The focus is on understanding and minimizing emissions across operations and portfolios, particularly scope 3 emissions, which represent the emissions generated through lending, guarantees, and insurance. In addressing climate-related financial risks, the third pillar extends the UK's longstanding expertise in risk management to encompass the financial risks posed by climate change, including physical and transition risks. Transparency and disclosure form the fourth pillar, with the UK committing to report on its climate-related commitments, thereby enabling stakeholders to monitor progress. The fifth and final pillar that makes the UK a world leader in climate change is that other countries strive to follow a similar path in achieving climate milestones. Some of these include; the UK's leadership in the multilateral negotiations and participation in the Export Finance for Future. They will carry on engaging in policy debates; especially within the OECD, advocating for the promotion of green projects and banning the funding of projects that are linked to fossil fuels. This is perhaps a good place to reflect on some of the main insights the UK policy offers. First, it is possible to mention the need to provide targeted funding, for instance, the £2 billion direct lending facility, is necessary to create the right climate for clean growth and climate change adaptation. Second, having sectoral and periodic targets of decarbonization and, finally, increasing attention to Scope 3 emissions are the essential actions to contribute to the minimization of the overall GHG emissions.

Third, incorporating climate-related risks into financial decision-making ensures that public funds are managed responsibly while supporting the transition to a low-carbon economy. Fourth, transparency in reporting and alignment with international frameworks like the TCFD enhance accountability and stakeholder trust. Finally, international leadership and collaboration are vital for elevating global climate ambitions and ensuring consistent progress towards net zero (UK Export Finance 2021). Despite being a smaller nation, the UK has been a significant contributor to global warming due to its early industrialization. Wealthier countries like the UK have higher per capita emissions and therefore bear greater responsibility for climate action. The UK has used its global influence to drive international climate efforts, including hosting COP26 in 2021 (Black 2021; Greenpeace UK 2024).

3.3 United States

The US has recognized climate change as a critical national security threat. The National Defense Authorization Act of 2008 was a pioneering legislative effort incorporating climate change's security implications. In 2007 and 2014 published reports by the Military Advisory Board of the Center for Naval Analysis identified climate change as a significant risk to national interests. In 2014, Secretary of State John Kerry likened the threat of climate change to that of

terrorism and weapons of mass destruction. The Department of Defense labelled climate change a "threat multiplier," amplifying existing risks (Kakakhel 2016).

Under President Bill Clinton, efforts were made to reduce greenhouse gas (GHG) emissions to 1990 levels by 2000, primarily through the Climate Change Action Plan and the British Thermal Unit (BTU) Tax. Despite these initiatives, industries' resistance led to the BTU tax's abandonment. The US signed the Kyoto Protocol in 1997 but did not ratify it until key developing nations also committed to reducing emissions (US Department of State, 2009). President Bush's administration, skeptical of climate change science, actively discouraged discussions on global warming and altered scientific reports to downplay its significance. Despite proposing a plan to reduce GHG intensity by 18% over ten years, the administration faced accusations of misleading the public and pressuring scientists to conform to its narrative (The White House 2001).

Under the Obama administration, the 2009 Climate Action Plan aimed to reduce greenhouse gas emissions by 17% below 2005 levels by 2020. This plan included initiatives such as promoting clean energy, accelerating energy permits, and reducing Hydrofluorocarbons (HFCs). As a result, emissions of harmful substances decreased, and many states set targets for energy efficiency and renewable energy (US EPA 2024). The plan created approximately 17,000. Climate action was prioritized by establishing the Energy and Climate Change Policy Office and proposing the American Clean Energy and Protection Act, although it failed in the Senate. Emission rules for power plants were introduced and engaged China in an agreement to limit HFCs, aiming to reduce US GHG emissions by 26-28% below 2005 levels by 2025. Despite these efforts, the Clean Power Plan faced substantial opposition and legal challenges, reflecting the ongoing contention in US climate policy. During President Donald Trump's tenure in 2017, an executive order favored the coal industry. Trump's administration revoked six Obama-era orders aimed at reducing climate change and carbon dioxide emissions and called for a reassessment of the Clean Power Plan. The budget proposed cutting one-third of the Environmental Protection Agency's funding. By June 2017, Trump indicated plans to leave the Paris Agreement, and in November 2019, the US formally filed to withdraw (Basseches et al. 2022).

The Biden administration's interim goal of reducing carbon pollution by 50% by 2030 requires cutting emissions at a pace four times faster than under the Obama administration. After the enactment of the Inflation Reduction Act, significant investments have been directed toward reducing emissions across all sectors of the economy and strengthening the Clean Air Act, enabling the EPA to enforce robust pollution standards. The administration has also catalyzed a

manufacturing renaissance, particularly in clean energy sectors. US battery manufacturing investment has nearly tripled, bolstering the nation's leadership in the global clean energy market. The American Climate Corps, launched to train a new generation of workers, further exemplifies this focus on job creation and climate resilience. The America the Beautiful initiative seeks to conserve 30% of US lands and waters by 2030. This initiative is both a strategic response to the climate crisis and an unprecedented conservation effort, reflecting a commitment to preserving the nation's natural resources. Investments in clean energy and sustainable practices are viewed as both a critical environmental strategy and an economic opportunity, driving growth in sectors such as renewable energy, energy-efficient technologies, and climate-smart agriculture (Higgins, Chang, and Lespier 2024). Internationally, the US is leading initiatives like the Global Methane Pledge and strengthening partnerships with countries like South Africa and Indonesia to accelerate clean energy transitions. Efforts to combat deforestation and reduce emissions from the shipping sector are part of a broader strategy to address the climate crisis globally (US Department of State, 2024).

3.4 India

India, the third-largest emitter of greenhouse gases, is often criticized for its emissions but defends itself by pointing to its low per capita and historical emissions. A 2020 World Meteorological Organization study estimated that climate-related extreme weather events have cost India \$87 billion annually. As the most climate-vulnerable country, and water insecurity, and health risks according to HSBC, India faces significant threats to its GDP, along with increased food, and environmental degradation (Kulkarni 2022).

The role of India in global climate negotiations has evolved, reflecting both domestic shifts in understanding climate change and its significance in foreign policy. Over time, India maintained a consistent approach to climate talks, marked by three key periods, the early negotiation years, the 2009 Copenhagen discussions, and the 2015 Paris Agreement. Initially, India played a crucial role in advocating for "common but differentiated responsibilities" in climate action, ensuring that wealthier nations bore greater obligations due to their historical emissions. Throughout the Kyoto Protocol negotiations, India led a coalition of developing countries, emphasizing the need for developed nations to take primary action. During the 2000s, as global discussions moved beyond Kyoto, India faced pressure to assume more significant commitments. This period saw India making strategic pledges, including reducing emissions intensity and capping per capita emissions (Dubash et al. 2018).

The climate change policies of India have effectively integrated development goals with climate action. In 2001 India passed the Energy Conservation Act, that got revised in August 2022. Key

updates include mandates for sourcing energy from non-fossil fuels, implementing the Energy Conservation Building Code (ECBC) for large buildings, and establishing energy standards for ships and vehicles (Sharma 2023). National Action Plan on Climate Change (NAPCC) passed in 2008, balancing global demands with national priorities by framing climate efforts as co-benefits to development, such as energy security through renewable energy. India's 2015 Nationally Determined Contributions (NDCs) set ambitious goals, including a 33-35% reduction in emissions intensity by 2030. These targets were surpassed, leading to revised 2022 NDCs with new goals for a 45% reduction in emissions intensity and a 50% non-fossil fuel energy shift by 2030. This update aligns with India's "Panchamrit" action plan announced at COP26 (Sharma 2023). India aims to promote sustainable living through the "Lifestyle for Environment" (LiFE) initiative, adapts to climate impacts in vulnerable sectors, and mobilizes resources for mitigation and adaptation (Jayaram 2024).

India's government is implementing various fiscal and regulatory measures to boost electric vehicle (EV) manufacturing and adoption. A total of \$7.1 billion has been allocated, with \$5.8 billion for production-linked incentives and \$1.3 billion for user incentives under the FAME-II scheme. This large-scale adoption is likely to significantly decarbonize India's bus services and shift the preference towards electric buses over traditional diesel and Compressed Natural Gas (CNG) options (World Bank 2023). India's rapid solar power expansion exemplifies effective policy implementation. As the fifth-largest solar market, India aims for solar to contribute 30% of its power by 2040. Overcoming institutional challenges, India set ambitious solar targets and engaged the private sector, attracting \$130 billion in investment since 2004. This strategy not only expanded solar capacity but also created new green jobs and established India as a manufacturing hub for solar panels (Centre for Policy Research 2024). In the same way, the use of electric buses in India owing to subsidies also proves the overarching positive effects of low carbon policies including cleansing of the air, improved health impact, and resilience (Kerr 2024).

3.5 Conclusion

This chapter brings to focus essential lessons that can be learned from the Climate policies of the UK, the US, and India for development in Pakistan's policy structure. These countries serve as good examples of how countries make long-term commitments towards change and fully address the issue of climate change, with comprehensive policies. The legalization of targets for climate change mitigation presents a clear result of a comparatively successful UK climate policy of using regional governance to achieve the set national climate goals. The US case underscores the need to align climate actions with security and an economic plan. The initiatives

of India show how the climate change goals and objectives can be linked to development in the area of renewable energy. It is apparent from the above-discussed best practices, that it provides useful recommendations for Pakistan to enhance its climate preparedness and respond to the climate security risks with a better understanding of the issue and available options to work on.

Chapter 4

ASSESSING PAKISTAN'S CLIMATE VULNERABILITIES AND RESPONSES

4.1 Introduction

Located in South Asia, Pakistan is among the countries most impacted by climate change due to the geography of the Indus River Plain and Northern Peaks making it highly susceptible to environmental disasters (Siddiqui 2022). The national security of Pakistan is threatened by climate change which exacerbates the socio-political and economic challenges (Shamsi 2023). Reliant on Himalayan glaciers and monsoon rains the indicators of climate change such as rising temperatures, sea levels, and changes in precipitation result in extreme weather events (Kakakhil 2019). For instance, the 2022 floods alone caused losses amounting to \$30.2 billion making up 4.8% of the GDP of Pakistan (Sheikh 2022). These climatic shifts threaten agricultural production impacting the livelihoods of millions, especially in rural areas dependent on farming. Climate-induced migration is increasing with estimated projections reaching up to 2 million by 2050 (Nisar 2022).

The government of Pakistan has undertaken several measures to counter the impacts of climate change and adapt to its implications. Over the past decade (2014 – 2024) National Climate Change Policy (NCCP) and its Framework for Implementation (2014–2030), the Updated National Climate Change Policy (NCCP) 2021, NDCs 2021, the National Security Policy (NSP) 2022 and the National Adaptation Plan (NAP) 2023 were instrumental. The effectiveness of these measures depends on ongoing evaluation and adaptation efforts to enable resilience in NSP to address the evolving climate landscape and to properly safeguard the natural and human capital of the country.

4.2 Indicators of Climate Change

To be able to assess Pakistan's climate vulnerability and analytically discuss the policy choices it is necessary to identify the indicators that have led practitioners and policymakers to securitize the issue as a threat at the level of national emergency. The average temperature in Pakistan increased by 0.39°C, more than double the global average of 0.18°C from 1981 to 2005. Future Projections suggest a 3-5°C rise by the end of the 21st century (Mahmood and Hassan 2022). This is especially alarming in northern regions where accelerated glacier melt in the Hindu Kush, Karakoram, and Himalayas threatens the water supply for millions dependent on the Indus River for irrigation and consumption (IPCC, 2014). This could disrupt the environmental stability, agriculture, and forest cover, particularly in Punjab, Sindh, and southeastern

Baluchistan (Abbass et al., 2022; Menhas et al., 2016). The following figure shows the rise in the mean temperature of Islamabad from 1991-2020.

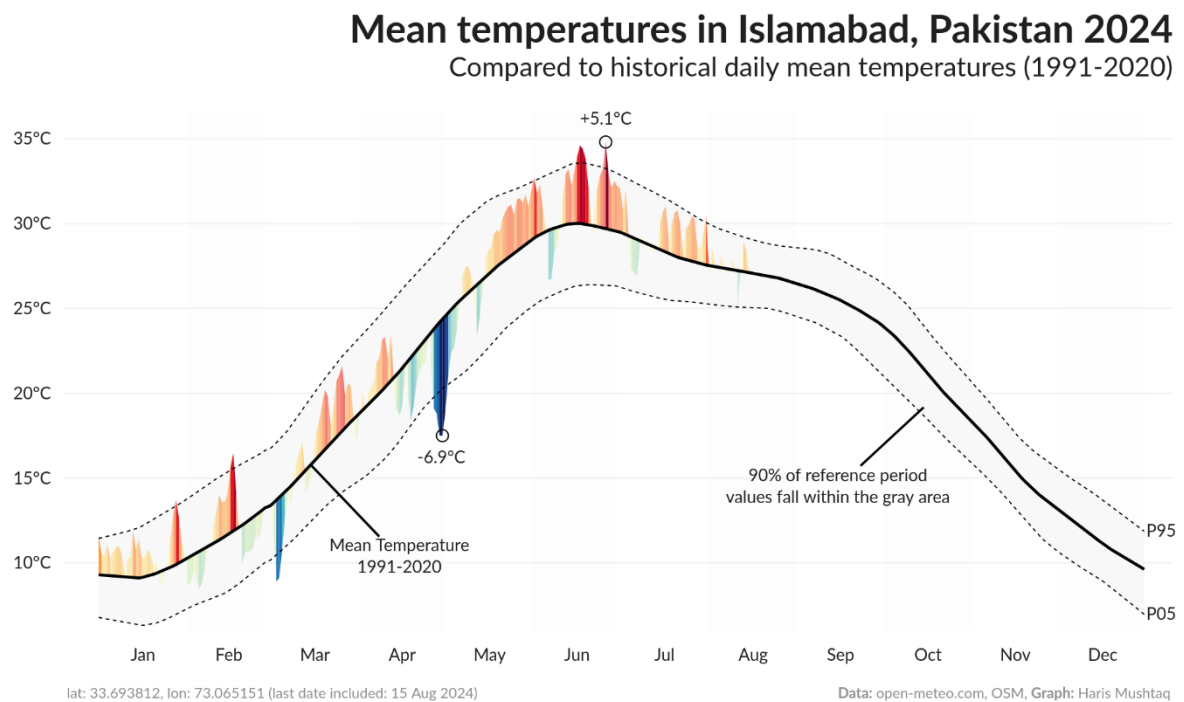


Figure 3: Mean Temperatures in Islamabad, Pakistan July- 2024

The surface temperature of the Arabian Sea has increased from 29°C to 31°C over two years. This is associated with more frequent and intense storms affecting coastal areas and leading to significant land loss. The proximity to sea level is a critical threat to the Indus River Delta and has led to increased salinity harming local ecosystems and a reduction in both freshwater availability and agricultural productivity. This shift affects the agriculture sector which is vital for the livelihoods of many people. Parts of Karachi are already affected, with projections indicating further submersion within the next three to four decades (Khan 2019; Nazar 2016; Tamrin 2024). Pakistan experienced an unprecedented heatwave in March and April 2022. This extreme heat significantly disrupted wheat cultivation and led to a 10% reduction in domestic production. The Supply and demand imbalances resulting in flour shortages towards the end of 2022. Due to this reason, the prices for this important commodity went high and put a burden in terms of economics on the entire population of the country (Bukhari, Haq, and Shakoori 2023). Heatwaves are now more common in Pakistan. The temperature rose to 51°C during the heatwave of 2017 and 50-52°C in 2019 and caused thousands of deaths and extensive agricultural damage (Masood et al. 2015; N. Khan et al. 2019). Among the extreme health risks are heatstroke and other heat-related illnesses (Delworth, Mahlman, and Knutson 1999; Zahoor

2022). Pakistan has experienced a change in the frequency and intensity of precipitation events causing both floods and droughts.

The country's mean precipitation has risen by 25% over the last century. Annual rainfall has declined in some areas with the extended dry season whereas others face irregular and intense monsoon seasons that lead to flooding (UNEP 2023). These shifts in rainfall patterns are disrupting traditional farming practices leading to decreased food production and food insecurity. For instance, Baluchistan has faced severe droughts that have severely impacted its agriculture-based economy (Cook, Mankin, and Anchukaitis 2018; Dudley et al. 2022; Xu et al. 2019). The following figure shows the projected changes in precipitation for 2025-2050 compared to 1986-2024.

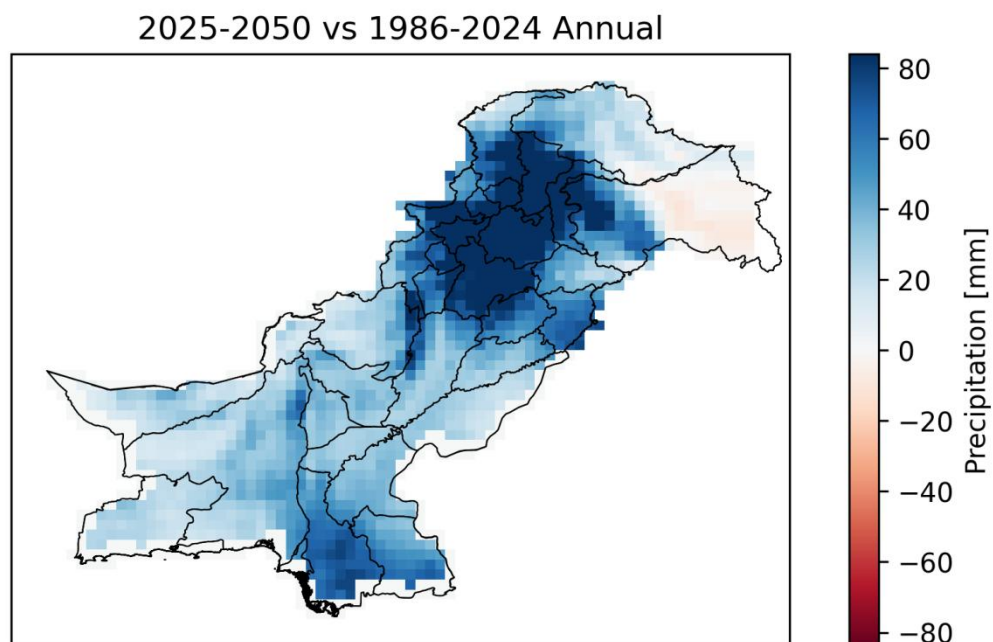


Figure 4: Projected change in pr. for 2025-2050 compared to 1986-2024

In South Asia, Pakistan is among the top flood-prone countries. GLOFs are prevalent in the northern areas, while flash floods frequently impact the plains. Coastal regions in the south including major cities like Karachi and Hyderabad are vulnerable to flooding associated with cyclones (Javed 2022; Jones 2022; Sezen et al. 2020). Since 2000 major flooding events have occurred almost annually. 2010 floods were particularly devastating displacing over 20 million people and causing substantial economic damage followed by the catastrophic floods of 2022. In June 2023, Cyclone Biparjoy, the longest-lasting cyclone in the Arabian Sea brought storms and heavy rains to Sindh, compounding the devastation from the previous year's floods (Sheikh 2022). The provinces of Baluchistan and Sindh have seen significant drought conditions. In

2018, the combination of low rainfall and prolonged water shortages resulted in severe droughts, prompting the Sindh government to declare large portions of southern Sindh as "calamity areas" by September (BTI 2024).

These challenges in Pakistan include rising temperatures, increased monsoons, and an increased prevalence of drought which have resulted in scarcity of water and poor yields of crops. The focus should, therefore, be made on adaptive measures that could enable the state to manage these indicators, especially within vulnerable areas.

4.3 Impact of Climate Change

Although the impacts of Climate Change are diverse and multidimensional, the most significant of all is the economic threat to Pakistan with implications for its development pathway. ESCAP 2022 indicates an annual GDP loss of up to 9.1% under extreme scenarios. This economic impact includes damage to infrastructure and property, loss of lives, and interruptions in economic activities in the affected areas. Such disruptions not only affect the short-term economic goals but also delay long-term development by depleting the already present resources and reducing productivity (ADB 2013).

The pressure on the water resources in Pakistan intensifies the problems of climate change in terms of economics. The country mainly depends on the Indus River system which is supplied by the glaciers in the Himalayas. The accelerated glacier melting is compromising the availability of freshwater for both irrigation and drinking purposes for both rural and urban populations (Archer et al. 2010; Immerzeel, Beek, and Bierkens 2010). The challenge of water scarcity is exacerbated by the unequal distribution of water resources with only 2% being fresh from which 70% is stored in glaciers (Briscoe 1999). Pakistan is losing its freshwater resources with accelerated glacier melt in the region known as the "Third Pole" leading to increased conversion of freshwater reserves into saline seawater (Siddiqui 2019). This impact poses a significant threat to the agriculture sector as well as the living standard and economic stability of Pakistan as evidenced by the 2010 floods that led to over \$9.6 billion in GDP losses (Zahra 2016). Vulnerability is heightened by increased reliance on the Indus Basin supplying approximately 80% of water. The Indus Water Treaty designed to manage cross-border water disputes, has struggled to keep pace due to upstream water projects by India and control over the river flows (Ahmad 2012; Fiaz Hussain Shah 2021).

Estimates indicate that up to 60% of households could face food insecurity by 2050 as a result of these issues. Indicators such as the Prevalence of Undernourishment (PoU) and levels of food insecurity highlight this growing challenge. PoU has remained around 20% since 2007, and the number of undernourished individuals surged to 40 million by 2018 which was driven by

population growth and recurrent droughts (FAO 2022). The 2022 floods impacted agricultural production, causing significant losses in key crops and pushing millions of people deeper into poverty (Bronstert 2003; Jones 2022; Saavedra and Sherburne-Benz 2022). Water management issues, particularly with the Indus Basin Irrigation System (IBIS), face immense strain from unregulated groundwater use and erratic rainfall patterns, worsening conflicts over water resources (Davies and Young 2021). The country faces the possibility of absolute water scarcity by 2025, with groundwater resources sustainable only until 2030. This situation is aggravated by unregulated groundwater use and inadequate monitoring, which diminish the effectiveness of the IBIS. The erratic rainfall, shifting precipitation patterns, and increased extreme weather events further jeopardize the availability and quality of water resources, leading to conflicts over water distribution, particularly between Punjab and neighboring provinces (Abbas and Cheema 2022). Pakistan's ecosystem degradation and biodiversity loss underscore the critical state of its natural resources. The country's economic stability heavily relies on its substantial renewable natural capital, including rangelands, forests, fertile soils, and fisheries, which collectively contribute approximately 13-15% to per capita wealth (World Bank Group 2021). These resources are increasingly strained by factors such as agricultural expansion, urban development, overuse, pollution, and climate change. Rangelands and forests, covering 65% of Pakistan's land and contributing over 50% to agricultural GDP, are subjected to severe overgrazing and overharvesting operating at 40% of their potential capacity (FAO 2016). The soils of the Indus Irrigation Scheme are deteriorating, with about 30% of irrigated lands affected by salinity and waterlogging. The fishery sector crucial for coastal communities and employing around 400,000 people struggles with overexploitation and management challenges (Patil 2018).

Water security and quality are critical for economic stability, yet Pakistan's water management remains ineffective. Groundwater resources important for rural and national supplies, face depletion and contamination from both anthropogenic and geogenic sources, impacting public health significantly (Lytton et al. 2021). Air quality issues exacerbate the situation, with Pakistan ranked second globally in air pollution, reducing life expectancy by an average of 4.3 years (IQAir 2024). The National Clean Air Policy highlights the urgency of addressing these problems (Mehmood et al., 2023; Siddiqui, 2023). High plastic consumption and increasing solid waste generation contribute to pollution (Mukheed and Khan 2020). Industrial activities and traffic emissions degrade air quality, with significant health and economic repercussions (Ali et al., 2024; Sánchez-Triana et al., 2014). The government has initiated measures such as the Clean Green Pakistan (CGP) movement and established air quality monitoring stations to address these issues (Zahoor, 2022).

The catastrophic floods of 2010 and 2022 depicted a very gloomy future with a severe impact on the health of individuals. The 2010 flood claimed 1,600 lives, and the 2022 mega flood killed over 1,700 people, affected 33 million, and left 8 million people displaced (Kundzewicz et al., 2010; Pakistan Today, 2022). These floods reveal a troubling trend of recurrence exacerbating existing vulnerabilities. Prior droughts like those of 1969, 1974, 1987, 2002, and 2013-2015 have been linked to chronic malnutrition. The Tharparkar area experienced multiple deaths among children in 2014 due to decreased rainfall (Salik et al., 2020; WHO, 2019). The simple effects of the heatwave in 2015 resulted in over 1,200 deaths in Karachi a city with temperatures touching 49°C (USAID, 2017). The following figures show the projected temperature changes for 2025-2050 compared to 1986-2024.

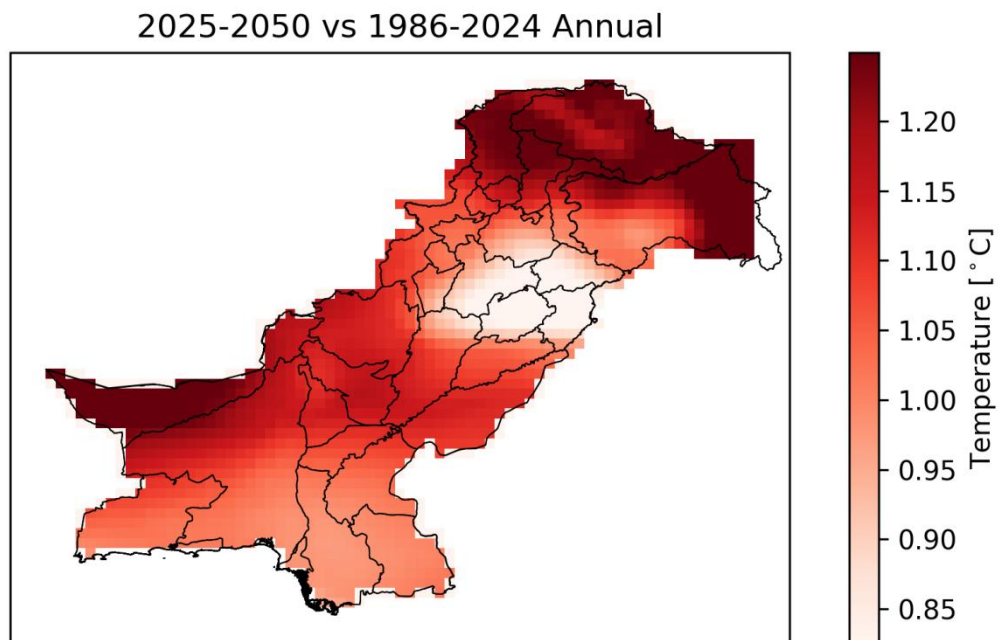


Figure 5: Projected temp. Changes for 2025-2050 compared to 1986-2024

Such climate-induced crises not only strain the healthcare system but also bring to light the interaction between climate and socio-economic risks. Global warming results that are related to temperature rise and changes in precipitation patterns have the impact of raising the number of vector-borne diseases like malaria and dengue fever, which is a threat to public health (Githeko et al., 2000). Globally flood and water logging lead to the outbreak of waterborne diseases including cholera and dysentery leading to increased morbidity and putting pressure on health centers that are already stretched (Haines et al., 2006). These problems are aggravated by air pollution that shortens life expectancy by 4 years at least or results in 114,000 premature deaths from Particulate matter 2 (IQAir, 2024). Diseases transmitted through vectors and waterborne

diseases especially where there is little investment in infrastructure; inadequate Water, Sanitation and Hygiene (WASH) services in rural areas increase health risk (IHME, 2023). Over the past two decades, Pakistan has experienced over 150 natural disasters. The 2022 floods alone caused economic losses of more than \$30 billion (Burke et al., 2023) and displaced 8 million people. This indicates the severe effects of climate change despite Pakistan's minimal contribution of 0.88% to global greenhouse gas emissions (Ali et al., 2022). Pakistan is the fifth most populous country and confronts a complex crisis, including energy shortages, political instability, external debt, and escalating natural disasters linked to climate change (World Bank, 2024b). Its low ranking of 150 out of 181 on the Notre Dame Global Adaptation Initiative (ND-GAIN) index highlights reflects exacerbated challenges, with approximately 62% of the population dependent on climate-sensitive agriculture (Gopal & Wang, 2023). A. Khan 2022 warns of a grim future, suggesting that declines in essential resources could lead to widespread chaos, asserting that "We are living in dangerous times where the future has never been so uncertain and the climate never so threatening to pose an existential threat."

The complexity of climate-related hazards has been underscored by recent disasters, which highlight the growing difficulty in managing and make resilience a difficult task to achieve (IPCC, 2022). Severe flooding and heatwaves intensify and amplify the already present vulnerabilities. Effective management of these multifaceted challenges requires modernized early warning systems, enhanced coordination, and a strong commitment to building resilience. The vulnerability of Pakistan is exacerbated by external shocks such as the COVID-19 pandemic, the energy crisis, rising inflation, and economic issues. These factors reveal that Pakistan's susceptibility to climate risks is as much a consequence of political and economic instability as of natural factors. Governance challenges further complicate disaster impacts and recovery efforts, highlighting the need for holistic and adaptable strategies to address interconnected crises and enhance systemic resilience (Khayam & Ahmad, 2020).

The socio-economic development of Pakistan is directly connected with its environmental situation. Climate change exacerbates poverty and inequality that adversely affects vulnerable populations such as smallholder farmers, women, and children (Abbas 2009). These groups face increased vulnerability and poor coping capacity, which has amplified food insecurity and water scarcity and therefore compelled more people to move from rural to urban centers (Maretti et al., 2019; Semenza & Ebi, 2019). This migration strains urban infrastructure, exacerbating poverty and social conflict as cities struggle to accommodate growing populations. Climate-induced migration such as the catastrophic floods of 2010 and subsequent floods in Sindh, Punjab, and Baluchistan, which displaced over 29 million people (Nisar, 2022) highlights

the pressing need for effective adaptation strategies. Internal displacement due to floods, droughts, and cyclones significantly impacts livelihoods and increases vulnerability among agrarian communities (Salik et al., 2020).

Population movement from the rural areas to the urban areas is considered a survival measure due to low crop production and water shortages. This inflow aggravates urbanization pressures, for example, poor accommodation, high unemployment rates, and pressure on facilities. Karachi and Lahore have experienced a relatively large influx of migrants from rural areas due to economic and environmental factors (Siyal et al., 2018). Climate change affects cross-border migration, particularly from Afghanistan, where environmental degradation and conflict increase refugee movements complicating humanitarian efforts and bilateral relations (Hashmi, 2023; Mueller et al., 2014). In Karachi, Pakistan's largest city, the competition for increasingly scarce resources has intensified due to climate change and urban pressures. Rising salinity in the Indus Delta, coupled with reductions in mangrove forests resulted in approximately 80% of the 5 million inhabitants along the Delta banks (Nisar, 2022). This displacement has led many to migrate to Karachi, straining the city's already limited resources. Rapid urban expansion, which increased by 25% between 2001 and 2013, has been accompanied by inefficient sprawl, inadequate infrastructure, and insufficient investment (Javed, 2022). Karachi faces heightened vulnerability to natural disasters and severe water scarcity, threatening its status as Pakistan's economic hub (Guriro, 2016; Jaffery, 2018; Saifi & McKirdy, 2015). The impact of climate change in Pakistan poses a severe economic threat, with GDP losses projected to reach up to 9.1% annually under extreme scenarios, disrupting both short-term and long-term development goals. Key issues such as water scarcity, ecosystem degradation, and climate-induced migration further exacerbate vulnerabilities, straining resources and heightening socio-economic instability.

4.4 Non-Traditional Security and Climate Vulnerabilities

NTS threats include a wide array of challenges including climate change, resource depletion, pandemics, natural disasters, and irregular migration. These threats surpass the transnational boundaries and necessitate comprehensive political, economic, and social responses beyond traditional military responses. Pakistan faces numerous NTS challenges that hinder its economic development, political stability, and human well-being. Climate change particularly poses a severe threat to Pakistan exacerbating environmental degradation and disrupting key sectors such as agriculture. This vulnerability in combination with recurrent natural disasters such as floods and drought similarly affect Pakistan's Human Development Index (HDI) and places it lower than other comparable SA countries including India and Bangladesh with similar security

threats and issues. All these NTS threats need to be addressed for the state to move forward and the policymakers in the country need to take quick action to protect development and shield it against future threats. The Rapid population growth and urbanization in them increase the pressure on the environment, economy and society to meet the growing basic needs of food, water and shelter but all this is obtained at great risk and often with shortage. The potential risks are compounded by climate change which is considered a profound security threat as well as food and water insecurity and the projection of future intrastate ‘water wars’ (Hassan et al., 2024). These threats require an equally comprehensive approach that needs cooperation between countries and regions, technological advancement, and dynamic policies.

According to the publication, pragmatic planning to enhance the climate situation in Pakistan needs an urgent strategy involving climate-sensitive agriculture, renewable energy, and water resources management. Financial assistance and sharing of knowledge are the ways through which the international community can help improve Pakistan’s adaptive capacities owing to the global nature of threat. The effects of the phenomenon on the stability, security and development of Pakistan require international collaborative measures at regional and global levels. This highlights the necessity of strategic adaptation processes and the changes in the policies to address the new vivid threat to national security, which has been identified as climate change (Akhtar & Jan, 2023).

National security vulnerabilities, Pakistan’s exposure to climate change is one of the most profound illustrations of the new security threats, which blend environmental precocity with a country’s security issues. The environmental security threat that affects the country include; climate change through extreme weather that directly threatens security. Not only do these calamities result in physical and material losses across the affected areas, but they also trigger the socio-economic challenges hitherto existing in the society. Precipitation and drought frequencies, therefore, have a major very negative impact on rural especially agricultural economies and the availability of food and water. Climate change and its effect on the main productive asset of agriculture lead to the degradation of the soils, affecting the production of food crops, and spontaneous migration from rural areas to the urban centers. With population growth and people wanting to improve their standard of living shifting to urban areas, cities such as Karachi are sure to feel the ever-increasing pressure on infrastructure and services. This influx aggravates existing issues like overcrowding, congested infrastructures, dire employment of public amenities and social and economic inequalities. Thus, the latter leads to higher pollution levels in urban areas, growth of slums, and wear and tear of the nation’s resources worsening national security. These two vulnerabilities reinforce each other and underpin the necessity of

developing integrated short and long-term approaches to climate change, targeting the protection of national security (Anwar et al., 2023).

The relationship of climate change with nontraditional security threats in Pakistan concerning cross-border conflicts and internal crises is explainable. A reduction in the Himalayan and Karakoram glaciers that supply water to the Indus River system endangers water security. There are conflicts between the supply of water from the upstream areas and the demand for water from the downstream areas as well as conflict with neighboring countries such as India over the sharing of water resources. Disputes of such nature are often likely to degenerate into conflicts thus putting a lot of pressure on the diplomatic relations between the regional countries and at the same time worsening the situation in the region. Consequently, climate change's impact on natural resources leads to internal displacement or migration and consequently poses added pressure on socio-political unstable contexts (Hussain, 2024). Population displacement as a result of floods, droughts, or declining standards of living in homes increases socio-political instability as well as security threats. Climate change migration, internal and cross border complicates humanitarian processes and also affects the security in countries and even on a regional basis. Global warming aggravates or triggers other risks, thus interacting with environmental, socio-economic, and security challenges. These risks can be met only through a comprehensive approach that will involve climate change mitigation measures on the one hand and national security measures on the other hand to enhance resilience.

4.5 Measures Taken by Government

The government has realized that there is a dire need to mitigate the effects of climate change in Pakistan. Some of the most important engagements are within the frameworks of the UNFCCC, Kyoto Protocol and most recently Paris Agreement where Pakistan is an active part of negotiation on matters concerning loss and damage as well as adaptation. It has also participated in climate diplomacy demanding finance and climate justice to the susceptible countries. Lack of a 'strong climate policy framework', Pakistan's strategy stresses the imperativeness of clean energy growth and financial systems underlining climate change. Foreign relations have been sought by the government to look for other sources of energy that can be largely needed in the country to curb the importation of energy and improve energy security (Bhatti & Farhat, 2023). Unfortunately, Pakistan has severe climate change issues, thus the government has had to pursue several policy measures and programs meant to address the impacts of climate change. Of these, the most important ones are the NCCP and the Framework for Implementation of Climate Change Policy (2014–2030). Prioritized sectors are agriculture, and water and this document also describes strategic priorities for adaptation and mitigation of climate impact.

The NCCP provided plans for disaster management, water storage enhancement, growth of environmental organizations, and enhancing consciousness among people. It incorporated the fact that climate policies need to fit the national framework, understand the burden of Pakistan and stress the need for international assistance (Tasleem Chaudhry, 2022). Some authors pointed out that the NCCP's approach is very specific and does not contemplate the coordination of a wider and more diverse range of carbon storage methods used throughout the world. The implementation has been minimal, with little more than international participation and a few conferences. In consequence, the understanding stresses the necessity of increasing the range of carbon sequestration options and involving such factors as different sectors, as well as indigenous knowledge in climate strategy, to mitigate the growing climate-induced security threats facing Pakistan (Kahlon & Talal, 2020). In the energy sector, Pakistan has started many programs to go for sustainable energy options. The Renewable Energy Policy (2019) aimed at the generation of 60% of the electricity from renewable sources by the year 2030. Equally in place is the Electric Vehicle Policy (2019) which seeks to achieve the reduction of GHG through the promotion of electric vehicles. Some of the challenges include finance and a weak institutional capacity to facilitate these policies (Rubab et al., 2023).

The National Climate Change Policy of Pakistan has been titled the 'Updated National Climate Change Policy 2021' and its purpose is to ensure that climate change integration is achieved across sectors vulnerable to climate change impact in the country. The policy gives preference to adaptation to climate change as it is one of the most pressing requirements of Pakistan. The NCCP 2021 also refers to international frameworks such as the Paris Agreement, the Sustainable Development Goals and the Sendai Framework for Disaster Risk Reduction. From the point of view of the IPCC, the report covers broad strategies of adaptation across a broad range of sectors such as water, agriculture, forestry, coastal zones and biological diversity. Another priority of the policy is focused on disaster response and readiness; human and institutional capacity development; institutional development and coordination and international cooperation. The following are the main strategic objectives of the NCCP 2021, namely, enhancing the resilience of the nation's economy within the context of climate change, ensuring climate change policy is aligned with the country's policies and emphasis on poverty and gender-sensitive adaptation. It supports provisions for climate adaptive structures, increase in agricultural yields and shift to low carbon economy. It also aims to improve coordination frameworks, capacity development of stakeholders and increase tree plantations and conservation (Government of Pakistan, 2021). The Ten Billion Tree Tsunami Program (TBTTP) is another reforestation mantra, which has been embraced with more than 350 million trees planted by 2021. This project, combined with the

other under the umbrella of the Eco-System Restoration Initiative (ESRI), aims to promote environmental sustainability and possible prevention against extreme weather conditions. The government has launched its CGP campaign working on sanitation, water and environmentalism. The CGP also comprises a citizen participation program whereby the citizens can play their part in conserving the environment. However, even despite these the climate policy of Pakistan at the implementation level is not very consistent as it continues to face political instabilities and economic crises (Rubab et al., 2023).

From the Country's obligations under the Paris Accord, the updated Nationally Determined Contributions (NDCs) for 2021 have Pakistan pledging to climate change through 50% Green House Gas (GHG) emissions down by 2030. The major approaches are raising renewable electricity to 60%, converting 30% of the car fleet to electric vehicles before 2030 and phasing out imported coal. A great deal is expected from the so-called nature-based solutions, including the program "Ten Billion Tree Tsunami". The financial effects of these changes cannot be bypassed great they estimate the economic costs at around \$101 billion by 2030 and another \$65 billion by 2040. These costs include renewable energy projects, development of hydropower, transmission lines, and non-renewable energy such as coal phase-out. Adaptation costs of the Pakistan climate change are expected to cost between seven to fourteen billion US dollars per annum up to the year 2050 (Rubab, Shahbaz, and Ali Raza Tariq 2023; M. of C. C. Government of Pakistan 2018b). These call for the enhanced participation of public-private partnerships as well as for international climate finance including the Green Climate Fund (GCF), the Global Environment Facility (GEF) and others.

The NDCs highlight that for the implementation of these commitments, it is crucial to enhance the so-called enabling environment, that is, policies, regulations and institutions. They bring out the need to seek funding and put in place effective Monitoring Reporting and Verification (MRV) systems. The NDCs have urged for capacity development especially awareness among the stakeholders to ensure the accomplishment of these targets. Subnational governments after the passage of Pakistan's 18th constitutional amendment have core responsibility in the execution of national policies inclusive of the NDCs. The MoCC is aware that the provinces require roadmaps that entail a monitoring and evaluation framework to ensure that their actions reflect the content of the NDCs. This involves mapping commitments at the sub-national level and an evaluation of capacities and policy instruments to ensure that National policy frameworks enable the implementation of the NDCs. These measures entail large-scale engagement in stakeholder consultations to achieve political will and commitment at all tiers of government (Government of Pakistan, 2021). The following graph shows the budget spent on the adaptation

and mitigation projects by the GoP.

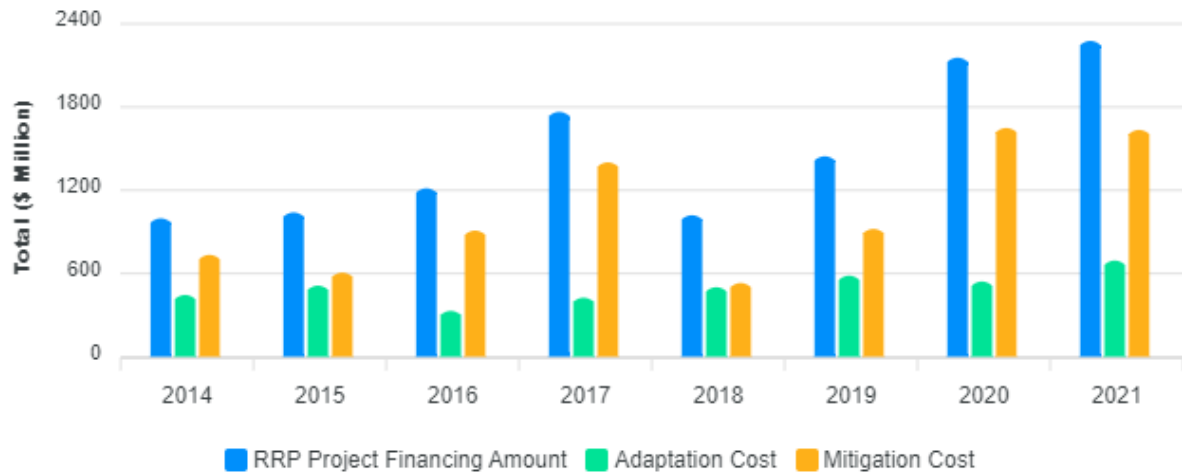


Figure 6: Financial funding for adaptation and mitigation projects 2014-2021

After seven years of development, Pakistan released its public NSP in January 2022, a 54-page document that focuses on economic security and a citizen-centric approach, integrating geo-economics and geo-strategy. The NSP highlights the interdependence between economic, traditional, and human security, emphasizing the need for sustainable growth and development to address Pakistan’s security challenges. Within human security, the NSP addresses the growing youth population, urban migration, and the pressing need for healthcare reform, affordable quality health services, and health insurance programs, particularly in light of the COVID-19 pandemic. Climate change is recognized as a significant threat, with ongoing efforts such as the establishment of a Climate Change Ministry, policy formulation, and tree plantation campaigns.

The policy is anchored on efficient water use and climate change measures, sustainable agriculture, food supply and food quality among others. The NSP emphasizes human rights and gender equality and intends to create a safe environment for women and trans-persons and to combat gender-based violence. Nevertheless, the given shortcomings are also the drawbacks of the NSP as a program that does not pay enough attention to the issues of non-traditional security (NTS) threats, political instabilities, economic challenges, for example, the problem of brain drain, and the refugee crisis that also have a great impact on the security of the state. More prominent is the fact that the NSP fails to outline an extensive approach to tackle the whole range of NTS threats confronting Pakistan and confines itself to the issues of economic and human security only (Abbas & Cheema, 2022).

National Adaptation Plan (NAP) 2023 is a policy guide that seeks to increase the climate change vulnerability of the nation. It puts great emphasis on the ‘whole of society’ cooperation and gender sensitivity of adaptation measures as well as their coherence. As a plan of action to respond to climate change vulnerabilities, aligned with the United Nations Sustainable Development Goals (SDGs), it also supports other development goals that are in the country’s cannons that need to be achieved in the short-run (Government of Pakistan & Ministry of Climate Change & Environmental Coordination, 2023). Fiscally, the plan is based on the Medium Term Budgetary Framework (MTBF) while, in terms of international cooperation there is a focus on the GCF and the National Disaster Risk Management Fund (NDRMF). Therefore, effective and efficient management of resources is simple to say that it can only be successful under a transparent and accountable system. Major implementation barriers are disclosure of funds distribution, genuine involvement of the community, and effective use of previous experience. A main limitation of the plan is that there is no provision for the forestry sector, which is important in terms of carbon capture. While the NAP 2023 plan is a positive way towards a climate change-resilient future, these key challenges have to be met and solved so that the plan works effectively.

4.6 Complexity of Pakistan’s System and Policy Limitations

While systematically analyzing Pakistan’s policy structure and building a comparative analysis with three major states, the UK, the US and India, it is incurred that there exists a set of limitations in Pakistan’s governance structure that hinders the achievement of goals and turns the objectives from mitigation to adaptation and resilience over time. Two primary factors identified are overpopulation and water issues which are explained in detail as follows.

4.6.1 Over-Population

The rapid increase in population, coupled with resource consumption, is placing immense pressure on the environment globally. While fluctuations in temperature alone do not directly cause climate change, the primary catalyst is human activity. The accelerated pace of industrialization, population growth, and pollution is driving climate change, with rising global temperatures and increasing CO₂ levels disrupting ecosystems. The resulting environmental crises, such as floods, cyclones, and famines, are evident across the globe. For instance, CO₂ emissions, which were around 6 billion tonnes in 1950, surged to over 35 billion tonnes by 1990, underscoring the intensifying impact of human activities (Hunter et al., 2021). Urbanization is expected to escalate in the coming decades, with projections indicating that by 2050, 70% of the global population will reside in metropolitan areas. Notably, more than one-third of the world’s population will be concentrated in China and India. The UN estimates that Pakistan’s population

will reach 368 million by the end of the year 2050, exacerbating the challenges of overpopulation, particularly in coastal regions where nearly 38% of the global population lives. Overpopulation significantly contributes to water scarcity, as increased human activity and urban expansion strain water resources (World Bank, 2024a).

SA region, particularly Pakistan, faces compounded difficulties as a less developed region with a large, rapidly growing population heavily dependent on agriculture. Overpopulation directly affects agricultural productivity, while access to clean water diminishes as demand outpaces supply. Climate change further aggravates water insecurity, leading to increased consumption and contamination of potable water sources. Pakistan, already vulnerable to climate-induced disasters, experiences intensified flooding due to population growth, urbanization, and the expansion of residential areas. The increased human settlement in flood-prone areas has exacerbated the damage caused by floods. Managing flood risks will become increasingly challenging as rising sea levels, extreme precipitation, and urban development converge. Global warming is expected to exacerbate flooding, potentially affecting up to 1.2% of the world's population in the coming decades. These alarming figures are indicators for authorities to pay heed to the issue and find plausible options to procure ways of resilience at the national level (World Population Review, 2024).

4.6.2 Water Issue

Water is an essential yet frequently undervalued resource, particularly in the context of climate change and its far-reaching impacts. Although the Earth is predominantly covered by water, only a small fraction of it is accessible as freshwater, much of which is locked in glaciers, ice sheets, or buried deep underground. Climate change has severely disrupted the availability and quality of freshwater, manifesting in alterations to food security, air quality, and socioeconomic structures. Over the past few decades, global warming has led to the expansion of alpine lakes and the depletion of freshwater sources, primarily driven by unsustainable human activities. The current extractive food systems are contributing between 21% and 37% of GHG emissions, further exacerbating environmental degradation. In Pakistan, groundwater serves as a vital resource for drinking and irrigation, yet its quality is deteriorating due to overexploitation. This is particularly evident in regions such as Punjab, where industrialization, mining, agricultural practices, and urbanization have significantly compromised groundwater supplies, especially in areas like Sargodha. Conventionally, only one in four people in Pakistan has access to safe drinking water – a reality that emblemizes a present-day global water crisis whereby 785 million people have insufficient access to water. Because of the unavailability or poor quality of water due to a decline in ecosystems such as forests and water inadequacy, sanitation, cholera, and

dysentery result (Fiaz Hussain Shah, 2021). These problems are most acute where health and socio-economic status are low, and that is more accentuated in rural areas of low-income countries. With the increase in population and hence demand for water and the level of water contamination reaching alarming levels, the issue of water management and conservation assumes an important role. Global warming further worsens this crisis by amplifying seasonal and regional variations in the water cycle, making access to clean water a public health challenge globally. The TP, often called the “Third Pole” or “Asian Water Tower,” supplies more than ten major rivers in Asia, influencing water resources for over a billion people in downstream regions. The complex relationship between climate change and river flow is especially evident in Asia's mountainous regions, which provide water, food, and energy to nearly 3 billion people. Reservoirs play a crucial role in adjusting natural water flow to meet human needs. Rapid urbanization and development have led to numerous environmental challenges, particularly concerning water sources in metropolitan landscapes. Water scarcity and reliance on fossil fuels have exacerbated the environmental crisis, with water purification accounting for an estimated 5% of GHG emissions (Ishaque et al., 2022).

By 2050, global water demand is projected to increase by 20–30%. The use of fossil fuels, responsible for up to 89% of global warming, further underscores the need for sustainable energy sources. Industries such as marble production require large quantities of water, causing significant disruptions to ecosystems and aquatic life due to inadequate treatment processes. The growing focus on water contamination highlights the increasing freshwater scarcity in Pakistan. IMF data shows that Pakistan faces the third-worst water crisis globally. Per capita water availability in Pakistan has plummeted from 5,260 m³ in 1951 to 1,000 m³ in 2016, with UNDP projections suggesting it may fall to 500 m³ by 2025, signaling absolute water scarcity. Factors exacerbating the impacts of climate change include population growth, outdated infrastructure, and poor water management drive this crisis. Potential solutions include improving governance, water recycling, new dam construction, and advanced irrigation technology, alongside reduced household water consumption. However, Pakistan's water storage capacity remains critically low, with only 14.46 million acres feet (MAF) stored out of 144 MAF annually received, worsening flood risks. Poor governance and political instability obstruct dam construction, with projects like the Kala Bagh Dam remaining stalled due to political resistance and land disputes. Dam failures, often caused by faulty spillways, defective foundations, and leakage issues, further exacerbate the situation, underscoring the need for improved management practices (Water Security Challenges and Conservation Strategy for Pakistan, 2020).

Collaboration among provinces, lawmakers, and civil society is crucial for addressing water

challenges, resolving inter-provincial disputes, and ensuring equitable distribution of water resources. Building dams is vital for capturing rainwater and flood runoff, yet progress remains hindered by social and political barriers, requiring concerted efforts to overcome these obstacles. Reservoirs are vital for water management, flood control, and hydroelectric power generation, especially as precipitation patterns become more unpredictable. Yet, human activity is intensifying water shortages globally, affecting regions like SA, ME, and N-Africa. The construction of reservoirs and dams during the latter half of the 20th century addressed some of these challenges, and further development is essential in the coming decades. While dam construction presents environmental and social risks, such as displacement and ecological disruption, it remains a necessary measure for flood protection and sustainable water management in Pakistan (Tasleem Chaudhry & Javed, 2019). The challenge is balancing these competing needs with sustainable development and ensuring that new infrastructure is built with long-term resilience in mind. Prior research partially aligns with earlier findings that connect climate variability to conflict, particularly through its impact on water resources and agricultural yield. The economic importance of international rivers is evident in their role in urban and agricultural activities. Transboundary water pollution poses a significant environmental and geopolitical threat, contributing to conflict within river basins. However, the relationship between climate change and conflict in South Asia remains underexplored. Strengthening diplomatic ties with India could address Pakistan's concerns over dam construction and violations of the Indus Water Treaty.

4.7 Conclusion

Pakistan, while being highly vulnerable to climate change impacts, struggles with inadequate policy implementation, weak governance, and limited financial resources. These factors hinder the country's ability to effectively address environmental degradation, water scarcity, and increasing climate-induced disasters. Drawing lessons from global climate policies, the chapter suggests that Pakistan must prioritize sustainable development, particularly in the agriculture and energy sectors. By adopting carbon pricing mechanisms, investing in green infrastructure, and enhancing disaster resilience, Pakistan can mitigate the impacts of climate change while promoting economic growth. However, these measures require stronger political will, better governance frameworks, and increased international cooperation. This section of research concludes that Pakistan's climate policies must evolve from reactive responses to proactive, long-term strategies that integrate climate resilience into national development plans. Success in this endeavor will depend on the government's ability to implement policies effectively and build the capacity of local institutions to respond to the complex, evolving challenges posed by

climate change.

Chapter 5

KEY FINDINGS AND CONCLUSION

Climate change led by global warming is a prime component of the NTS threats, especially in countries like Pakistan, where socio-economic and climatic factors are inextricably linked to national security issues. In Chapter 4 a detailed analysis of the policy choices of Pakistan is analyzed along with the factors that limit Pakistan from achieving the best outcomes in policy implementation. These factors summarize the testing of the research hypothesis addressed in this research that ‘climate change increasingly redefines Pakistan's Non-Traditional Security (NTS) through socioeconomic and environmental vulnerabilities.’ where overpopulation and issues of water management are primary instruments of system limitation. This conclusion tries to answer questions on lessons obtained from the global climate policies, an augmentation of socio-economic and environmental risks in Pakistan, and the effectiveness of Pakistan’s climate policies for addressing the security threats caused by climate change.

To find insights into how Pakistan can meet the challenges of climate-induced security threats, this research explores climate change strategies in Chapter 3. This chapter brings to light, three principal research study findings. Firstly, when analyzing other countries’ perceptions towards climate change, it is possible to identify that the UK approach is informative for others even though this country’s CCA was adopted in 2008. This legislation also shows how specific, mandatory targets are needed for decreasing GHGs. Applying a similar structure layout might help Pakistan to have a clear framework to operationalize the climate objectives. Local authorities may be compelled to act by legal standards and thus perform climate actions with efficiency and consistency. If Pakistan could set legally binding targets on the mitigation and adaptation to climate change, it would supplement its efforts on climate, similar to how the legally binding targets have positively influenced the climate actions of the UK. It is necessary to stress the necessity of synergetic climate actions with other strategic priorities including policies in the field of national security and economy. It also clearly demonstrated how climate policies need to be aligned and incorporated within the National Security systems of nations. The US has properly responded to the security threats connected to climate change – resource wars and migration – by linking climate actions to national security needs. Pakistan therefore can take good advantage of this approach and make sure it formulates climate change policies with equal concern to the security implications of the climate-induced threats. This alignment can improve climate targets in dealing with security challenges and embracing a broad

perspective on a state's security. India's experience shows some more lessons, especially in the case of linking climate change policies with development ones. India has made impressive strides in efforts to reduce emissions and promote the use of renewable energy and sustainable lifestyle. If the Pakistani leadership were to align climate policies with economic and development objectives, then the climate threats and issues could be turned into opportunities. Pakistan needs to develop climate policies that are compatible with other development goals of the country, in this way, sustainability and the ability to adapt to the changes can be achieved. Should such integration be achieved, it would go a long way in strengthening economic stabilization and guaranteeing that climate policies do not get hindered or limited by development goals.

The environmental degradation vulnerabilities of Pakistan concerning climate change are in chapter 4 of this research which briefly answers the research question and integrates more factual information as well as analyzes the collected data. Statistics reveal that climate change has worsened socio-economic and environmental risks in Pakistan to the extent that a better and improved climate strategy is required. The ever-rising cases of catastrophes for instance floods and undue heat that have been devastating are some of the effects of weather instability on the country. For example, floods in that area in early 2010 and mid-2022 were catastrophic to many areas and displaced a large number of people besides having huge economic impacts. It is not just that such occurrences lead to direct physical destruction but also that they worsen the existing social-economic risks. Loss of infrastructure and disruption of income sources are some of the long-term problems, which means that long-term solutions must be sustainable and flexible. As an important and scarce resource, water has played a major factor in Pakistan's problem, especially with resource depletion and constraints on agricultural production. Global warming causing a shift in precipitation patterns puts under stress the quantity and quality of the water supply that is important in farming and other domestic use. The discharge of the Indus River system which depends largely on the melt waters from the glaciers is under pressure because of the shrinking glaciers. Following are some of the effects of the depletion of water resources; This concerns food security and economic stability; An important sector of the Pakistan economy agriculture sector is highly sensitive to climate change. Climate change affecting agricultural production results in food scarcity and fluctuations in the economy and the societies' difficulties in socio-economic aspects. Climate change is a phenomenon that is intertwined in the socio-economic realm like no other. As a result of climate change, displacement and migration of people impact both country and urban regions. When people move to urban areas because of low agricultural productivity people create more pressure on the

infrastructure and services. This merely contributes to worsening previous issues such as shelter, health and socio-economic inequality in the urban areas. This exacerbates pollution and slum growth and puts a strain on resources, worsening national security threats. Combating these overlaid vulnerabilities cannot be a singular process where climate risk reduction is only worked out in policy and development plans.

Moving towards the analysis of the effectiveness of Pakistan's strategies towards climate change, from 2014 to 2024 the research has extracted the following concerns and drawbacks. More so despite the realization of climate change as an important topic, the development of climate policies has not been comprehensive. Disaster management, water storage and buildup of environmental institutions have been highlighted in the NCCP and Its Framework for Implementation 2014-2030. Nonetheless, the operationalization of these policies has not gone beyond international participation and meetings owing to different factors i.e., the system's inefficacy and governance. This relatively limited effectiveness only underlines the necessity of synchronizing and unifying efforts to combat climate change. Among them, the main problem is the weak linkage between climate policies and other NTS threats. These include political instability and cross-border tensions, issues that climate change has intensified but for which Pakistan's climate strategies offer no sufficient solutions. Policies existing in the present deal with some individual areas of challenge in climate change while ignoring the security perspective of climate-related calamities including the issue of overpopulation and the water shortage issue coupled with the Indus water treaty with India. There is a need to consider a set of approaches that would focus on the multiple sectors of NTS threats, considering the diverse consequences of climate change. Lack of funds or, in other words, inadequate budgetary allocations are also big barriers to implementing climate policies. Some of these challenges include; high costs incurred during climate adaptation and climate mitigation measures, lack of resources and financial capital and overall poor institutional capacity. While the target to reduce GHGs, and the share of renewable energy is strong for Pakistan; its financial implications are significant. Many more estimates are used for the different projects of renewable energy and adaptation measures, which points towards the importance of strong financial frameworks and capacity developments. There is therefore need to engage the private sector through public-private partnerships, as well as engagement of international climate finance to overcome the financial barriers to the implementation of such initiatives.

This study has attempted to extensively substantiate that policies are there but implementation is at a low level from individual to national in Pakistan. In meeting the research gap, this piece of research opens several avenues to new scholars where there is a need to revise the previous

policies or strategies and embark on the formulation of effective action plans based on lessons learnt from comparatively successful climate change policies of the UK, UK and India. This will enable us to have even higher levels of transparency while addressing even more climatic-based risks. Revisiting the hypothesis one can notice that the hypothesis of this research includes climate change as, an independent variable, which posits that Pakistan's NTS is redefined through Socio-Economic and Environmental Vulnerabilities in support of which the findings of this research stand. Climate change aggravates existing risks and creates linkages between climate, environment, socio-economy and security concerns. Finding out how climate change affects NTS in Pakistan involves the understanding that arose from the international climate policies, the augmentation of socio-economic and environmental vulnerabilities, and the performance of Pakistan's climatic policies on the nature and degree of NTS threat. Underlying issues of climate change in Pakistan are linked to its water scarcity, political Leadership and geography. There is not enough water infrastructure equipment, for instance, the dams, which makes the country more vulnerable to natural calamities, like floods. Lack of proper leadership and management, political instability and inter-provincial conflict make natural resource management a complicated process. Further, the transboundary water disputes especially India's construction of the Dam escalated the pressure on the water security of Pakistan under the Indus Water Treaty. It therefore requires a poly-perspectival analysis, solving internal problems of the state's governance and development of water infrastructures, as well as diplomatic activities to find suitable solutions to transboundary water conflicts. Addressing these systemic constraints therefore remains paramount to enhance the climate change policy application in Pakistan alongside addressing the looming water insecurity associated with climate variability. Lack of timely interventions results in the worsening of the water shortage situation in Pakistan which in turn remains a looming threat to the political stability and sustainable growth of the country in the context of climate change.

BIBLIOGRAPHY

- Abbas, Q. S., & Cheema, M. (2022). Non-Traditional Security Narrative and National Security Policy of Pakistan: Limitations and Policy Recommendations. *University of Wah Journal of Social Sciences*, 5(2), 65–75. <https://uwjss.org.pk/index.php/ojs3/article/view/44>
- Abbass, K., Qasim, M. Z., Song, H., Murshed, M., Mahmood, H., & Younis, I. (2022). A review of the global climate change impacts, adaptation, and sustainable mitigation measures. *Environmental Science and Pollution Research* 2022 29:28, 29(28), 42539–42559. <https://doi.org/10.1007/S11356-022-19718-6>
- Abbass, Z. (2009). Climate change, poverty and environmental crisis in the disaster prone areas of Pakistan.
- ADB. (2013). The Economics of Climate Change in South Asia: Adaptation and Impact Assessment. https://www.adb.org/sites/default/files/publication/39302/casa-update-3-economics-climate-change_2.pdf
- Adger, W. N. (2006). Vulnerability. *Global Environmental Change*, 16(3), 268–281.
- Adnan, M., Xiao, B., Bibi, S., Xiao, P., Zhao, P., & Wang, H. (2024). Addressing current climate issues in Pakistan: An opportunity for a sustainable future. *Environmental Challenges*, 15, 100887. <https://doi.org/10.1016/J.ENVC.2024.100887>
- Ahmad, S. (2012). Water Insecurity: A Threat for Pakistan and India. https://www.files.ethz.ch/isn/154066/Ahmad_Indus.pdf
- Akhtar, N., & Jan, I. (2023). Climate Change: Rising Security (Non-Traditional) Threat to Pakistan. *Journal of Development and Social Sciences*, 4(3). [https://doi.org/10.47205/jdss.2023\(4-iii\)91](https://doi.org/10.47205/jdss.2023(4-iii)91)
- Alharahsheh, H. H., & Pius, A. (2020). A Review of key paradigms: positivism VS interpretivism. *Global Academic Journal of Humanities and Social Sciences*, 2(3), 39–43. <https://doi.org/10.36348/gajhss.2020.v02i03.001>
- Ali, S., Brohi, A. A., Kakepoto, H., & Shah, N. (2024). A Thematic Analysis Based Study Of Environmental Degradation As A Non-Traditional Security Challenge & Governance Response In Pakistan. *Kurdish Studies*, 12(4), 438–454. <https://doi.org/10.53555/ks.v12i4.2972>
- Ali, S., Shah, A. A., Ghimire, A., & Tariq, M. A. U. R. (2022). Investigation the nexus between CO2 emissions, agricultural land, crop, and livestock production in Pakistan. *Frontiers in Environmental Science*, 10. <https://doi.org/10.3389/fenvs.2022.1014660>
- Ali, S., & Shah, N. (2023). ENVIRONMENTAL DEGRADATION: A HUMAN SECURITY CONUNDRUM FOR PAKISTAN. *Strategic Thought*, 5(1), 97–114. <https://strategicthought.ndu.edu.pk/site/article/view/90>
- Allison, E. H., Perry, A. L., Badjeck, M. C., Neil Adger, W., Brown, K., Conway, D., Halls, A.

- S., Pilling, G. M., Reynolds, J. D., Andrew, N. L., & Dulvy, N. K. (2009). Vulnerability of national economies to the impacts of climate change on fisheries. *Fish and Fisheries*, 10(2), 173–196. <https://doi.org/10.1111/j.1467-2979.2008.00310.x>
- Anwar, A., Mumtaz, T., & Mateen, M. (2023). Evolution of Security Paradigms in Pakistan: Assessing Contemporary Challenges to National Security. *Asian Innovative Journal of Social Sciences and Humanities*, 7(4), 73–93.
- Archer, D. R., Forsythe, N., Fowler, H. J., & Shah, S. M. (2010). Sustainability of water resources management in the Indus Basin under changing climatic and socio economic conditions. *Hydrology and Earth System Sciences*, 14(8), 1669–1680.
- Barnett, J. (2000). Destabilizing the environment-conflict thesis. *Review of International Studies*, 26, 271–288.
- Barnett, J. (2001). *The meaning of environmental security: Ecological politics and policy in the new security era*. Zed Books.
- Barnett, J. (2003). Security and climate change. *Global Environmental Change*, 13, 7–17. [https://doi.org/10.1016/S0959-3780\(02\)00080-8](https://doi.org/10.1016/S0959-3780(02)00080-8)
- Barnett, J., Matthew, R. A., & O'Brien, K. (2008). Global Environmental Change and Human Security. In *Globalization and Environmental Challenges* (pp. 355–361). Springer Berlin Heidelberg. https://doi.org/10.1007/978-3-540-75977-5_24
- Basseches, J. A., Bromley-Trujillo, R., Boykoff, M. T., Culhane, T., Hall, G., Healy, N., Hess, D. J., Hsu, D., Krause, R. M., Prechel, H., Roberts, J. T., & Stephens, J. C. (2022). Climate policy conflict in the U.S. states: a critical review and way forward. *Climatic Change*, 170(3–4). <https://doi.org/10.1007/s10584-022-03319-w>
- Bhatti, T. T., & Farhat, L. (2023). Enhancing Climate Security in Pakistan: A Bottom-Up Strategy. In *Focus*. <https://irs.org.pk/Focus/FJuly23.pdf>
- Black, R. (2021). How is the UK tackling climate change? What laws are in place, and how are targets being met? Energy & Climate Intelligence Unit. <https://eciu.net/analysis/briefings/uk-energy-policies-and-prices/how-is-the-uk-tackling-climate-change>
- Booth, K. (1991). Security and Emancipation. *Source: Review of International Studies*, 17(4), 313–326. <https://www.jstor.org/stable/20097269>
- Booth, K. (2007). *Theory of World Security*. Cambridge University Press.
- Briscoe, J. (1999). The financing of hydropower, irrigation and water supply infrastructure in developing countries. In *International Journal of Water Resources Development* (Vol. 15, Issue 4, pp. 459–491). Carfax Publishing Co. <https://doi.org/10.1080/07900629948718>
- Bronstert, A. (2003). Floods and climate change: Interactions and impacts. In *Risk Analysis* (Vol. 23, Issue 3, pp. 545–557). <https://doi.org/10.1111/1539-6924.00335>

- Brooks, N. (2003). Vulnerability, risk and adaptation: A conceptual framework.
- Brown, L. (1986). Redefining national security. *Challenge*, 29, 25–32.
- Brown, O., Hammill, A., & Mcleman, R. (2007). Climate change as the “new” security threat: implications for Africa. In *International Affairs* (Vol. 83, Issue 6). <http://news.bbc.co.uk/2/hi/science/nature/3381425>.
- Brown, O., & McLeman, R. (2009a). A recurring anarchy? The emergence of climate change as a threat to international peace and security. *Conflict, Security & Development*, 9(3), 289–305. <https://doi.org/10.1080/14678800903142680>
- Bryman, A. (2012). *Social Research Methods*. Oxford University Press.
- Brzoska, M. (2009). The securitization of climate change and the power of conceptions of security. *Sicherheit & Frieden*, 27(3), 137–145. <https://doi.org/10.5771/0175-274x-2009-3-137>
- BTI. (2024). Pakistan Country Report 2024. <https://bti-project.org/en/reports/country-report/PAK>
- Buhaug, H., Benjaminsen, T. A., Gilmore, E. A., & Hendrix, C. S. (2023). Climate-driven risks to peace over the 21st century. *Climate Risk Management*, 39. <https://doi.org/10.1016/j.crm.2022.100471>
- Bukhari, H., Haq, I., & Shakoori, A. R. (2023). Wheat crisis. *Business Recorder*. <https://www.brecorder.com/news/40221321>
- Burke, S., Saccoccia, L., Schmeier, S., Faizee, M., & Chertock, M. (2023). How floods in Pakistan threaten global security. *World Resources Institute*. <https://www.preventionweb.net/quick/76478>
- Busby, J. (2008a). Who cares about the weather? Climate change and US national security. *Security Studies*, 17, 468e504.
- Busby, J. (2008b). Who cares about the weather?: Climate change and U.S. national security. *Security Studies*, 17(3), 468–504. <https://doi.org/10.1080/09636410802319529>
- Busby, J. W. (2007). *Climate Change and National Security An Agenda for Action*.
- Buzan, Barry., & Wæver, O. (2003). *Regions and powers : the structure of international security*. Cambridge University Press.
- Buzan, B., & Hansen, L. (2009a). International Security Studies post-Cold War: the traditionalists. In *The Evolution of International Security Studies* (pp. 156–184). Cambridge University Press. <https://doi.org/10.1017/CBO9780511817762.001>
- Buzan, B., & Hansen, L. (2009b). Widening and deepening security. In *The Evolution of International Security Studies* (pp. 187–225). Cambridge University Press. <https://doi.org/10.1017/CBO9780511817762.001>

- Buzan, B., Ole, W., & de Wilde, J. (1998). *Security: A New Framework for Analysis*. Lynne Rienner Publishers.
- Campbell, K. M. (2008). *Climatic Cataclysm: The Foreign Policy and National Security Implications of Climate Change*. Brookings Institute.
- Centre for Policy Research. (2024). *Policy Challenges 2019-2024: Charting a New Course for India and Navigating Policy Challenges in the 21st Century*. <https://cprindia.org/wp-content/uploads/2022/03/Policy-Challenges-2019-2024.pdf>
- Climate Analytics. (2024). *Climate Impact Explorer - Pakistan* . https://climate-impact-explorer.climateanalytics.org/impacts/?region=PAK&indicator=tasAdjust&scenario=h_cpoI&warmingLevel=1.5&temporalAveraging=annual&spatialWeighting=area&compareYear=2030
- CNA. (2007). *National security and the threat of climate change* . CNA. <http://securityandclimate.cna.org/report/>
- Collins, H. (2010). *Creative Research: The Theory and Practice of Research for the Creative Industries*. AVA Publications.
- Cook, B. I., Mankin, J. S., & Anchukaitis, K. J. (2018). *Climate Change and Drought: From Past to Future*. In *Current Climate Change Reports* (Vol. 4, Issue 2, pp. 164–179). Springer. <https://doi.org/10.1007/s40641-018-0093-2>
- CRED, & UNISDR. (2018). *Economic Losses, Poverty & Disasters: 1998-2017*. https://www.unisdr.org/2016/iddr/IDDR2018_Economic%20Losses.pdf
- Dalby, S. (1999). *Threats from the south? Geopolitics, equity, and environmental security*. In D. Deudney & R. Matthew (Eds.), *Contested grounds: Security and conflict in the new environmental politics*. State University of New York Press.
- Dalby, S. (2002). *Environmental security*. University of Minnesota Press.
- Dalby, S. (2009). *Security and environmental change*. Polity.
- David, M. (2007). *Critical Security Studies: A Schismatic History*. In A. Collins (Ed.), *Contemporary Security Studies*. Oxford University Press.
- Davies, S., & Young, W. (2021). *Unlocking economic growth under a changing climate: Agricultural water reforms in Pakistan*. In Muhammad Arif Watto, Michael Mitchell, & Safdar Bashir (Eds.), *Water Resources of Pakistan: Issues and Impacts* (pp. 109–131).
- Delworth, T. L., Mahlman, J. D., & Knutson, T. R. (1999). *Changes in Heat Index Associated with CO₂-Induced Global Warming*. *Climatic Change*, 43, 369–386. <https://doi.org/10.1023/A:1005463917086>
- Department of Defence, A. (2009). *Defence white paper: Defending Australia in the Asia-Pacific century*. www.defence.gov.au/whitepaper/docs/defence_white_paper_2009.pdf.

- Dimsdale, T., & Hayes, L. (2021). What climate change means for national and international security: Background Paper for the UK Commonwealth Parliamentary Association. <https://www.uk-cpa.org/media/4379/climate-security-paper-oct-2021.pdf>
- Dissanayake, E., & Dissanayake, E. (2023). Research Onion: A Systematic Approach for Designing Research Methodology. ResearchGate. <https://doi.org/10.13140/RG.2.2.24466.12489>
- Dubash, N. K., Khosla, R., Kelkar, U., & Lele, S. (2018). India and Climate Change: Evolving Ideas and Increasing Policy Engagement. *Annual Review of Environment and Resources* . <https://doi.org/10.1146/annurev-environ>
- Dudley, A. L., Meza, I., Naumann, G., & Hagenlocher, M. (2022). Do global risk assessments leave countries behind? How the selection of countries influences outcomes of drought risk assessments. *Climate Risk Management*, 37. <https://doi.org/10.1016/j.crm.2022.100454>
- Dupont, Alan., & Pearman, G. I. (2006). Heating up the planet : climate change and security. In *The Lowy Institute*. Lowy Institute for International Policy. <https://www.lowyinstitute.org/publications/heating-planet-climate-change-security>
- Durak, G. (2023). Contribution of Copenhagen School to the Security Studies. *ODÜ Sosyal Bilimler Araştırmaları Dergisi (ODÜSOBİAD)*. <https://doi.org/10.48146/odusobiad.1265851>
- Dyer, G. (2008). *Climate wars*. Random House.
- ESCAP. (2022). Asia-Pacific Riskscape @ 1.5°C: Subregional Pathways for Adaptation and Resilience. <https://www.unescap.org/sites/default/d8files/2022-05/Asia%20Pacific%20Disaster%20Report%202022%20for%20ESCAP%20Subregions%20Summary%20for%20Policymakers.pdf>
- FAO. (2016). *Rangelands of Pakistan: Current status, threats and potential*. <https://www.fao.org/publications/card/ru/c/af354e5b-3aab-4be5-8742-f95430e90f79>.
- FAO. (2022). *Pakistan Overview of Food Security and Nutrition - 2020*. <https://fscluster.org/pakistan/document/pakistan-overview-food-security-and>
- Fiaz Hussain Shah, B. (2021). *Telescoping Indus Waters Treaty through the Lens of Climate Change*.
- Field, C. B., & Barros, V. R. (2014). IPCC, 2014: *Climate Change 2014: Impacts, Adaptation, and Vulnerability. Part A: Global and Sectoral Aspects. Contribution of Working Group II to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change*.
- Floyd, R. (2010). *Security and the environment*. Cambridge University Press. <https://doi.org/doi.org/10.1017/CBO9780511730146>
- Folke, C. (2006). Resilience: The emergence of a perspective for social–ecological systems analyses. *Global Environmental Change*, 16(3), 253–267.

- Gad, U. P., & Petersen, K. L. (2011). Concepts of politics in securitization studies. *Dialogue*, 42(4), 315–328. <https://www.jstor.org/stable/26301791>
- Ghaleigh, N. S. (2020). Paris Agreement, Article 2: Aims Objectives and Principles. *SSRN Electronic Journal*.
- Githeko, A. K., Lindsay, S. W., Confalonieri, U. E., & Patz, J. A. (2000). Climate change and vector-borne diseases: a regional analysis. *Bulletin of the World Health Organization*, 78(9), 1136–1147.
- Gleditsch, N., & Nordas, R. (2007). Climate change and conflict. *Political Geography*, 26, 627–638.
- Gleick, P. (1993). Water and conflict: freshwater resources and international security. *International Security*, 18, 79–112.
- Gopal, M., & Wang, B. (2023). Climate Action Brief: Pakistan. <https://asiasociety.org/policy-institute/aspi-climate-action-brief-pakistan>
- Government of Pakistan. (2021). Pakistan Updated Nationally Determined Contributions 2021. <https://mocc.gov.pk/SiteImage/Policy/PakistanUpdatedNDC2021-compressed.pdf>
- Government of Pakistan, & Ministry of Climate Change. (2021). National Climate Change Policy. <https://mocc.gov.pk/SiteImage/Policy/NCCP%20Report.pdf>
- Government of Pakistan, & Ministry of Climate Change & Environmental Coordination. (2023). National Adaptation Plan Pakistan 2023. <https://mocc.gov.pk/SiteImage/Policy/NAP%20Digital-compressed.pdf>
- Government of Pakistan, M. of C. C. (2018). PAKISTAN’S SECOND NATIONAL COMMUNICATION ON CLIMATE CHANGE TO UNITED NATIONS FRAMEWORK CONVENTION ON CLIMATE CHANGE (UNFCCC).
- Greenpeace UK. (2024). What is the UK doing about climate change? <https://www.greenpeace.org.uk/challenges/climate-change/what-is-the-uk-doing-about-climate-change/>
- Guriro, A. (2016). Karachi’s catastrophic pollution of the sea. *Dialogue Earth*. <https://dialogue.earth/en/pollution/karachi-water-pollution/>
- Haines, A., Kovats, R. S., Campbell-Lendrum, D., & Corvalán, C. (2006). Climate change and human health: impacts, vulnerability and public health. *Public Health*, 120(7), 585–596.
- Hajer, M. (1995). The politics of environmental discourse: Ecological modernization and the policy process. Oxford University Press. <https://doi.org/10.1093/019829333X.001.0001>
- Hamill, P. (2014). QDR – The National Security Challenge of Climate Change. <https://www.americansecurityproject.org/qdr-the-national-security-challenge-of-climate-change/>

- Harris, K. (2012). Climate change in UK security policy: Implications for development assistance.
- Hashmi, R. S. (2023). Climate Change and Climate Induced Migration in Pakistan: A Threat to Human Security (The Study of RajanPur and Taunsa Sharif after Flood 2022). *Annals of Human and Social Sciences*, 4(4), 378–394.
- Hassan, T., Ali, E., Hussain, H., Ul Haq, A., Ali, E., & Ismail, M. (2024). Climate change: non-traditional security threats for Pakistan. *The International Journal of Learner Diversity and Identities*, 31(1).
- Hempel, C. G. (1966). *Philosophy of Natural Sciences*. Upper Saddle River, NJ: Prentice Hall.
- Hermwille, L., Obergassel, W., Ott, H. E., & Beuermann, C. (2017). UNFCCC before and after Paris—what’s necessary for an effective climate regime? *Climate Policy*, 17(2), 150–170. <https://doi.org/10.1080/14693062.2015.1115231>
- Hernández-Delgado, E. A. (2024). Coastal Restoration Challenges and Strategies for Small Island Developing States in the Face of Sea Level Rise and Climate Change. *Coasts*, 4(2), 235–286. <https://doi.org/10.3390/coasts4020014>
- Higgins, T., Chang, R., & Lespier, D. (2024). The Biden Administration Has Taken More Climate Action Than Any Other in History. <https://www.americanprogress.org/article/the-biden-administration-has-taken-more-climate-action-than-any-other-in-history/>
- Homer-Dixon, T. F. (1994). Environmental Scarcities and Violent Conflict: Evidence from Cases. *International Security*, 19(1), 5–40. <https://www.jstor.org/stable/2539147>
- Hunter, L. M., Koning, S., Fussell, E., King, B., Rishworth, A., Merdjanoff, A., Muttarak, R., Riosmena, F., Simon, D. H., Skop, E., & Van Den Hoek, J. (2021). Scales and sensitivities in climate vulnerability, displacement, and health. In *Population and Environment* (Vol. 43, Issue 1, pp. 61–81). Springer Science and Business Media B.V. <https://doi.org/10.1007/s11111-021-00377-7>
- Hussain, A. S. (2024). PAKISTAN’S PARADIGM SHIFT FROM TRADITIONAL TO NON-TRADITIONAL SECURITY: AN ANALYSIS. *Journal of Contemporary Studies* , 12(2), 53–68. <https://jcs.ndu.edu.pk/site/article/view/260>
- IHME. (2023). Pakistan Profile .
- IISS. (2007). Strategic survey 2007.
- Immerzeel, W. W., Beek, L. P. Van, & Bierkens, M. F. (2010). Climate change will affect the Asian water towers. *Science*, 328(5984), 1382–1385.
- IPCC. (1990). *Climate Change: The IPCC Scientific Assessment* (1990). https://archive.ipcc.ch/ipccreports/far/wg_I/ipcc_far_wg_I_full_report.pdf
- IPCC. (1995). *IPCC Second Assessment Climate Change 1995*.

<https://archive.ipcc.ch/pdf/climate-changes-1995/ipcc-2nd-assessment/2nd-assessment-en.pdf>

- IPCC. (2001). Third Assessment Report. <https://www.ipcc.ch/assessment-report/ar3/>
- IPCC. (2007a). Climate Change 2007: Synthesis Report. Contribution of Working Groups I, II and III to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change. https://www.ipcc.ch/site/assets/uploads/2018/02/ar4_syr_full_report.pdf
- IPCC. (2007b). Fourth Assessment Report. <https://www.ipcc.ch/assessment-report/ar4/>
- IPCC. (2014). Climate Change 2014: Impacts, Adaptation, and Vulnerability. Part B: Regional Aspects. Contribution of Working Group II to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change .
https://www.ipcc.ch/site/assets/uploads/2018/02/WGIIAR5-FrontMatterA_FINAL.pdf.
- IPCC. (2014). Fifth Assessment Report . <https://www.ipcc.ch/assessment-report/ar5/>
- IPCC. (2018). Global Warming of 1.5° C. An IPCC Special Report on the impacts of global warming of 1.5° C above pre- industrial levels and related global greenhouse gas emission pathways, in the context of strengthening the global response to the threat of climate change, sustainable development, and efforts to eradicate poverty.
- IPCC. (2019a). Climate Change and Land. <https://www.ipcc.ch/srccl/>
- IPCC. (2019b). Special Report: Special Report on the Ocean and Cryosphere in a Changing Climate.
- IPCC. (2021). Climate change widespread, rapid, and intensifying.
<https://www.ipcc.ch/2021/08/09/ar6-wg1-20210809-pr/>
- IPCC. (2022). Summary for Policymakers Headline Statements, Climate Change 2022: Impacts, Adaptation, and Vulnerability, Contribution of Working Group II to the Sixth Assessment Report of the Intergovernmental Panel on Climate Change (IPCC).
<https://www.ipcc.ch/report/ar6/wg2/>
- IPCC. (2023). Sixth Assessment Report. <https://www.ipcc.ch/assessment-report/ar6/>
- IQAir. (2024). World's most polluted countries & regions: 2018-2023.
- Ishaque, W., Tanvir, R., & Mukhtar, M. (2022). Climate Change and Water Crises in Pakistan: Implications on Water Quality and Health Risks. Journal of Environmental and Public Health, 2022. <https://doi.org/10.1155/2022/5484561>
- Jaffery, R. (2018). Impact of Climate Change on Karachi May be One of Pakistan's Biggest Threats. Inter Press Service News Agency . https://www.ipsnews.net/2018/02/impact-climate-change-karachi-may-one-pakistans-biggest-threats/?utm_source=rss&utm_medium=rss&utm_campaign=impact-climate-change-karachi-may-one-pakistans-biggest-threats

- Jasparro, C., & Taylor, J. (2008). Climate change and regional vulnerability to transnational security threats. *Geopolitics*, 13, 232–256.
- Javed, T. (2022). Climate-Induced Floods in Balochistan and Concerned Authorities. Center for Strategic and Contemporary Research (CSCR). <https://cscr.pk/explore/themes/energy-environment/climate-induced-floods-in-balochistan-and-concerned-authorities/>
- Jayaram, D. (2024). Shifting discourses of climate security in India: domestic and international dimensions. *Third World Quarterly*. <https://doi.org/10.1080/01436597.2024.2314003>
- Jennings, N., Fecht, D., & Matteis, S. De. (2019). Co-benefits of climate change mitigation in the UK: What issues are the UK public concerned about and how can action on climate change help to address them? <https://www.imperial.ac.uk/media/imperial-college/grantham-institute/public/publications/briefing-papers/Co-benefits-of-climate-change-mitigation-in-the-UK.pdf>
- Jones, B. (2022). How melting glaciers fueled Pakistan’s fatal floods. VOX. <https://www.vox.com/science-and-health/2022/8/30/23327341/pakistan-flooding-monsoon-melting-glaciers-climate-change>
- Julien, L., & Rhee, B. (2017). *Global Catastrophic Risks 2017*.
- Kahlon, T.-U.-M., & Talal, S. A. (2020). CLIMATE SECURITY OF PAKISTAN: DISSECTING THE CARBON DILEMMA. *Margalla Papers*, I, 97–111.
- Kakakhel, S. (2016). Climate Change Impacts and Security Implications for Pakistan. In Institute of Strategic Studies, Islamabad. https://issi.org.pk/wp-content/uploads/2016/11/IP-Shafqat_Kakakhail_No.28_2016.pdf
- Kakakhil, S. (2019). Climate Change as a National security imperative for Pakistan. <https://sdpi.org/sdpiweb/publications/files/Climate-Change-as-a-National-security-imperative-for-pakistan-by-Shafqat-Kakakhil.pdf>
- Kaplan, R. (1994). The coming anarchy. *Atlantic Monthly*, 273, 44–76.
- Kerr, T. (2024). India is making strides on climate policy that others could follow. *World Economic Forum* . <https://www.weforum.org/agenda/2024/02/climate-policy-india/#:~:text=In%20perhaps%20the%20boldest%20climate,the%20challenges%20of%20climate%20change.>
- Khan, A. (2022). Cost to the climate. *Dawn* . <https://www.dawn.com/news/1724613>
- Khan, M. (2019). In Pakistan, Climate Change is the Primary Threat to National Security. *South Asian Voices* . <https://southasianvoices.org/in-pakistan-climate-change-is-the-new-primary-threat-to-national-security/>
- Khayam, U. M., & Ahmad, I. (2020). Decentralization of Environment in Pakistan: Issues in Governance. *Policy Perspectives*, 17(2), 101–116. <https://doi.org/10.13169/polipers.17.2.0101>

- Krause, K., & Williams, M. C. (1996). Broadening the Agenda of Security Studies: Politics and Methods. *Review*, 40(2), 229–254.
- Kulkarni, V. (2022). Analysing India's climate policy and the route post-COP27. ORF. <https://www.orfonline.org/expert-speak/analysing-indias-climate-policy-and-the-route-post-cop27>
- Kundzewicz, Z. W., Hirabayashi, Y., & Kanae, S. (2010). River Floods in the Changing Climate-Observations and Projections. *Water Resources Management*, 24(11), 2633–2646. <https://doi.org/10.1007/s11269-009-9571-6>
- Kuttippurath, J., Patel, V. K., & Sharma, B. R. (2024). Observed changes in the climate and snow dynamics of the Third Pole. *Npj Climate and Atmospheric Science*, 7(1). <https://doi.org/10.1038/s41612-024-00710-5>
- Laghari, A. N., Vanham, D., & Rauch, W. (2012). The Indus basin in the framework of current and future water resources management. *Hydrology and Earth System Sciences*, 16(4), 1063–1083. <https://doi.org/10.5194/hess-16-1063-2012>
- Le Billon, P. (2001). The political ecology of war: natural resources and armed conflicts. *Political Geography*, 20, 561–584.
- Levy, M. (1995). Is the environment a national security issue? *International Security*, 20, 35–62.
- Lou del Bello. (2017). How will China's ambitious new Silk Road impact climate change? *The New Humanitarian*. <https://www.thenewhumanitarian.org/analysis/2017/10/31/how-will-china-s-ambitious-new-silk-road-impact-climate-change>
- Lytton, L., Ali, A., Garthwaite, B., Punthakey, J. F., & Saeed, B. (2021). Groundwater in Pakistan's Indus Basin Present and Future Prospects. <https://www.iqair.com/world-most-polluted-countries?srsltid=AfmBOopDJ917MRkY92jgZO32k04RKt1UgeapKwUw3cZTDIzR9EPiOv8H>
- Mabey, N. (2007). Delivering climate security: International security responses to a climate changed world. RUSI.
- Maertens, L. (2021). Climatizing the UN Security Council. *Int Polit*, 58, 640–660.
- Mahmood, S., & Hassan, Q. (2022). Climate change: its impacts on Pakistan. *International Research Journal of Social Sciences and Humanities*, 1(2), 20–32.
- Maretti, M., Tontodimamma, A., & Biermann, P. (2019). Environmental and climate migrations: an overview of scientific literature using a bibliometric analysis. *International Review of Sociology*, 29(2), 142–158. <https://doi.org/10.1080/03906701.2019.1641270>
- Masood, I., Majid, Z., Sohail, S., Zia, A., & Raza, S. (2015). The deadly heat wave of Pakistan, June 2015. *International Journal of Occupational and Environmental Medicine*, 6(4), 247–248. <https://doi.org/10.15171/ijoem.2015.672>

- Matthew, R. (2014). Integrating climate change into peacebuilding. *Climatic Change*, 123, 83–93.
- Mazo, J. (2010). *Climate conflict*. Routledge.
- McDonald, M. (2008). Securitization and the construction of security. *European Journal of International Relations*, 14(4), 563–587. <https://doi.org/10.1177/1354066108097553>
- Mearns, R., & Norton, A. (2009). Social dimensions of climate change: Equity and vulnerability in a warming world.
- Mehmood, Z., Hasnain, A., Luqman, M., Muhammad, S., Dhital, N. B., John, A., Iqbal, M., Ejaz, A., Tufail, M., Harma, Yang, H. H., & Awan, M. U. F. (2023). Assessment of Air Pollution Tolerance and Physicochemical Alterations of *Alstonia scholaris* (L.) R.Br. along Roadsides of Lahore, Pakistan. *Aerosol and Air Quality Research*, 23(7). <https://doi.org/10.4209/aaqr.230038>
- Menhas, R., Umer, S., & Shabbir, G. (2016). Climate Change and its Impact on Food and Nutrition Security in Pakistan. *Iran J Public Health*, 45(4), 549–550. <http://ijph.tums.ac.ir>
- Mobjörk, D. M., Gustafsson, M.-T., Sonnsjö, H., Baalen, S. van, Dellmuth, L. M., & Bremberg, N. (2016). Climate-Related Security Risks: Towards an Integrated Approach. SIPRI.
- Moon, B. (2007, June 16). A climate culprit in Darfur. *Washington Post*. <https://www.un.org/sg/en/content/sg/articles/2007-06-16/climate-culprit-darfur>
- Moore, B., & Morgenthau, H. J. (1949). Politics Among Nations: The Struggle for Power and Peace. *American Sociological Review*, 14(2). <https://doi.org/10.2307/2086875>
- Mueller, V., Gray, C., & Kosec, K. (2014). Heat stress increases long-term human migration in rural Pakistan. *Nature Climate Change*, 4(3), 182–185.
- Mukheed, M., & Khan, A. (2020). Plastic Pollution in Pakistan: Environmental and Health Implications. *J Pollut Eff Cont*, 8(4), 251–258. <https://doi.org/10.35248/2375-4397.20.8.251>
- Myers, N. (1989). Environment and security. *Foreign Policy*, 74, 23–41.
- NATO. (2024). Environment, Climate Change and Security. https://www.nato.int/cps/en/natohq/topics_91048.htm
- Nazar, S. (2016). Pakistan's Big Threat Isn't Terrorism—It's Climate Change. *Foreign Policy*. <https://foreignpolicy.com/2016/03/04/pakistans-big-threat-isnt-terrorism-its-climate-change/#>
- Nguyen, T. T., Grote, U., Neubacher, F., Rahut, D. B., Do, M. H., & Paudel, G. P. (2023). Security risks from climate change and environmental degradation: implications for sustainable land use transformation in the Global South. *Current Opinion in Environmental Sustainability*, 63, 101322. <https://doi.org/10.1016/J.COSUST.2023.101322>

- Nisar, N. (2022). Climate-Induced Migration in Pakistan. Centre for Strategic and Contemporary Research (CSCR). <https://cscr.pk/explore/themes/energy-environment/climate-induced-migration-in-pakistan/>
- Noel L Gerson and, & Sherri Goodman. (2007). National Security and the Threat of Climate Change. https://www.cna.org/archive/CNA_Files/pdf/national%20security%20and%20the%20threat%20of%20climate%20change.pdf
- Obergassel, W., Christof Arens, Lukas Hermwille, Nicolas Kreibich, Florian Mersmann, Hermann E. Ott, & Hanna Wang-Helmreic. (2015). Phoenix from the ashes: an analysis of the Paris Agreement to the United Nations Framework Convention on Climate Change; part 1. ELM, 27(6), 243–262. <https://d-nb.info/1106329775/34>
- O'brien, K. (2006). Climate Change, Equity and Human Security. <https://www.researchgate.net/publication/254736532>
- Page, E., & Redclift, M. (2002). Human security and the environment. Edward Elgar.
- Pakistan Today. (2022). Recent floods damaged several sites for afforestation under BTAP. <https://www.pakistantoday.com.pk/2022/11/20/recent-floods-damaged-several-sites-for-afforestation-under-btap/>
- Patil, P. (2018). Revitalizing Pakistan's Fisheries: Options for Sustainable Development. https://www.academia.edu/45570521/Revitalizing_Pakistans_Fisheries_Options_for_Sustainable_Development
- Pirages, D., & Cousins, K. (2005). From resource scarcity to ecological security. Mass: MIT Press.
- Podesta, J., & Ogden, P. (2008). The security implications of climate change. . . The Washington Quarterly, 31, 115e138.
- Punch, K. F. (2013). Introduction to social research: quantitative and qualitative approaches. Sage .
- Purvis, N., & Busby, J. (2004). The security implications of climate change for the UN system.
- Rajendra Kumar Pachauri et al. (2015). Climate Change 2014 : Synthesis Report : Contribution of Working Groups I, II and III to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change.
- Rasmussen, K., & Birk, T. (n.d.). Climate change, tipping elements and security. In National security and human health implications of climate change. Springer.
- Rubab, M., Shahbaz, M., & Ali Raza Tariq, M. (2023). ENVIRONMENTAL SECURITY CHALLENGE AND PAKISTAN'S EFFORTS TO MITIGATE CLIMATE CHANGE: AN ANALYSIS. International Journal of Contemporary Issues in Social Sciences , 2(4), 1298–1305. <https://ijciss.org/index.php/ijciss/article/view/245>

- Saavedra, J., & Sherburne-Benz, L. (2022). Pakistan's Floods are Deepening its Learning Crisis. World Bank End Poverty in South Asia. <https://blogs.worldbank.org/en/endpovertyinsouthasia/pakistans-floods-are-deepening-its-learning-crisis>
- Saifi, S., & McKirdy, E. (2015). Pakistan heat wave: Death toll passes 800 in Karachi, Sindh Province. CNN. <https://edition.cnn.com/2015/06/24/asia/pakistan-heat-wave/index.html>
- Salik, K. M., Shabbir, M., & Naeem, K. (2020). Climate-induced displacement and migration in Pakistan: Insights from Muzaffargarh and Tharparkar Districts.
- Sánchez-Triana, E., Enriquez, S., Afzal, J., Nakagawa, A., & Khan, S. (2014). Cleaning Pakistan's air: policy options to address the cost of outdoor air pollution (English). <http://documents.worldbank.org/curated/en/701891468285328404/Cleaning-Pakistans-air-policy-options-to-address-the-cost-of-outdoor-air-pollution>
- Schoch, C. (2011). Rethinking climate change as a security threat. <http://www.iied.org/pubs/display.php?o=17101IIED>
- Schwartz, P., & Randall, D. (2003). An Abrupt Climate Change Scenario and Its Implications for United States National Security Imagining the Unthinkable.
- Scotland, J. (2012). Exploring the philosophical underpinnings of research: Relating ontology and epistemology to the methodology and methods of the scientific, interpretive, and critical research paradigms. *English Language Teaching*, 5(9), 9–16. <https://doi.org/10.5539/elt.v5n9p9>
- Security Council. (2022). The UN Security Council and Climate Change: Tracking the Agenda after the 2021 Veto. https://www.securitycouncilreport.org/atf/cf/%7B65BFCF9B-6D27-4E9C-8CD3-CF6E4FF96FF9%7D/unsc_climatechange_2022.pdf
- Semenza, J. C., & Ebi, K. L. (2019). Climate change impact on migration, travel, travel destinations and the tourism industry. In *Journal of Travel Medicine* (Vol. 26, Issue 5). Oxford University Press. <https://doi.org/10.1093/jtm/taz026>
- Sezen, C., Šraj, M., Medved, A., & Bezak, N. (2020). Investigation of rain-on-snow floods under climate change. *Applied Sciences* (Switzerland), 10(4). <https://doi.org/10.3390/app10041242>
- Shamsi, Z. U. H. (2023). SIGNIFICANCE OF NON-TRADITIONAL DIMENSIONS OF SECURITY: UNDERSTANDING PAKISTAN'S PREDICAMENTS. *International Journal of Contemporary Issues in Social Sciences*, 2(4), 1123–1132. <https://ijciss.org/index.php/ijciss/article/view/227>
- Sharma, S. (2023). India's Climate Change Policy: Challenges and Recommendations. *Indian School of Public Policy*. <https://www.ispp.org.in/indias-climate-change-policy-challenges-and-recommendations/>
- Sheikh, A. T. (2022). Reducing climate costs. *Dawn*. <https://www.dawn.com/news/1721419>

- Siddiqui, J. (2022). Pakistan's Climate Challenges Pose a National Security Emergency. United States Institute of Peace (USIP). <https://www.usip.org/publications/2022/07/pakistans-climate-challenges-pose-national-security-emergency>
- Siddiqui, L. (2019). The melting glaciers of Pakistan. Daily Times Pakistan. <https://dailytimes.com.pk/377810/melting-glaciers-of-pakistan/>
- Siddiqui, Z. U. A. (2023). Pakistan's first-ever climate change plan unveiled. The Express Tribune: Pakistan.
- Siyal, G. E. A., Khalid, I., & Qaisrani, A. (2018). Internal migration and urbanization: a case study from semi-arid regions of Pakistan. Sustainable Development Policy Institute.
- Smit, B., & Wandel, J. (2006). Adaptation, adaptive capacity and vulnerability. *Global Environmental Change*, 16(3), 282–292.
- Smith, D., & Vivekananda, J. (2007). A climate of conflict: The links between climate change, peace and war. https://www.preventionweb.net/files/7948_AClimateOfConflict1.pdf
- Spratt, D. & S. P. (2008). *Climate Code Red: the Case for Emergency Action*. Scribe Books.
- Stritzel, H. (2014). Securitization Theory and the Copenhagen School. In *Security in Translation: Securitization Theory and the Localization of Threat* (pp. 11–37). Palgrave Macmillan. https://doi.org/10.1057/9781137307576_2
- Tamrin, S. (2024). Community Adaptation Strategies To Climate Change: Towards Sustainable Social Development. <https://www.researchgate.net/publication/378860625>
- Tasleem Chaudhry, K. (2022). Environmental Policy Analysis of Pakistan: A Theoretical Perspective. *Journal of Development and Social Sciences*, 3(IV). [https://doi.org/10.47205/jdss.2022\(3-iv\)48](https://doi.org/10.47205/jdss.2022(3-iv)48)
- Tasleem Chaudhry, K., & Javed, U. (2019). CLIMATE CHANGE AND WATER SECURITY: FOCUS ON PAKISTAN. *ISSRA Papers*, 11(II), 57–70. <https://issrapapers.ndu.edu.pk/site/article/view/22>
- Tayia, A. (2019). Transboundary Water Conflict Resolution Mechanisms: Substitutes or Complements. *Water* 2019, Vol. 11, Page 1337, 11(7), 1337. <https://doi.org/10.3390/W11071337>
- The White House. (2001). President Bush Discusses Global Climate Change. <https://georgewbush-whitehouse.archives.gov/news/releases/2001/06/20010611-2.html>
- Tuomisto, H. L., Scheelbeek, P. F. D., Chalabi, Z., Green, R., Smith, R. D., Haines, A., & Dangour, A. D. (2017). Effects of environmental change on population nutrition and health: A comprehensive framework with a focus on fruits and vegetables. *Wellcome Open Research*, 2, 21. <https://doi.org/10.12688/wellcomeopenres.11190.1>
- UK Export Finance. (2021). *Climate Change Strategy 2021-2024*.

https://assets.publishing.service.gov.uk/media/6148b3ffe90e070438c9463d/UKEF_Climate_Change_Strategy_2021.pdf

UNDP. (1994). Human Development Report 1994: New Dimensions of Human Security.

UNEP. (2007). Sudan: Post-conflict environmental assessment.

UNEP. (2023). The Sectoral Solution to Climate Change.
<https://www.unep.org/interactive/sectoral-solution-climate-change/>

UNEP. (2024). Interactive Country Fiches, “What are the key values and trends?” Climate Change. <https://dicf.unepgrid.ch/pakistan/climate-change>

UNFCCC. (2011). Cancun Agreements . <https://unfccc.int/tools/cancun/adaptation/index.html>

UNFCCC. (2012). The Doha Amendment. <https://unfccc.int/process/the-kyoto-protocol/the-doha-amendment>

UNFCCC. (2015a). Climate – Get the Big Picture, A Guide to the UNFCCC and its Processes.
<https://unfccc.int/news/climate-get-the-big-picture-a-guide-to-the-unfccc-and-its-processes>

UNFCCC. (2015b). Nationally Determined Contributions (NDCs). <https://unfccc.int/process-and-meetings/the-paris-agreement/nationally-determined-contributions-ndcs#NDC-Synthesis-Report>

UNFCCC. (2015c). The Paris Agreement .
https://unfccc.int/sites/default/files/resource/parisagreement_publication.pdf

United Nations. (1992). United Nations Framework Convention on Climate Change.
https://unfccc.int/files/essential_background/background_publications_htmlpdf/application/pdf/conveng.pdf

United Nations. (1998). Report of The Conference of the Parties on its Third Session, Held At Kyoto From 1 To 11 December 1997. <https://unfccc.int/process-and-meetings/conferences/past-conferences/kyoto-climate-change-conference-december-1997/cop-3/cop-3-reports>

United Nations. (2015). Goal 13: Take urgent action to combat climate change and its impacts.
<https://www.un.org/sustainabledevelopment/climate-change/>

United Nations. (2019). High-Level Political Forum on Sustainable Development.
<https://www.un.org/development/desa/indigenouspeoples/focus-areas/post-2015-agenda/the-sustainable-development-goals-sdgs-and-indigenous/high-level-political-forum-on-sustainable-development/hlpf-2019.html>

United Nations Development Programme (UNDP). (2008). Human Development Report 2007/8: Fighting climate change: Human solidarity in a divided world.
<https://hdr.undp.org/content/human-development-report-20078>

UN, S.-G. (2009). Climate change and its possible security implications: Report of the

- Secretary-General. <https://digitallibrary.un.org/record/667264?ln=en&v=pdf#files>
- UNTC. (2015). Paris Agreement. https://treaties.un.org/Pages/ViewDetails.aspx?src=TREATY&mtdsg_no=XXVII-7-d&chapter=27&clang=en
- USAID. (2017). CLIMATE CHANGE RISK PROFILE PAKISTAN. https://www.climatelinks.org/sites/default/files/asset/document/2017_USAID_Climate%20Change%20Risk%20Profile_Pakistan.pdf
- U.S. Department of State. (2009). Background Material on President Clinton’s Climate Change Proposal: October 22, 1997. https://1997-2001.state.gov/global/global_issues/climate/background.html
- U.S. Department of State. (2024). The Climate Crisis: Working Together for Future Generations .
- US EPA. (2024). Climate Change Indicators: Weather and Climate. <https://www.epa.gov/climate-indicators/weather-climate>
- Wæver, O. (1995). Securitization and Desecuritization. In *On Security* (pp. 46–86). Columbia University Press. https://dl1.cuni.cz/pluginfile.php/872615/mod_resource/content/1/Waever.pdf
- Wæver, O. (2012). Aberystwyth, Paris, Copenhagen: the Europeanness of new “schools” of security theory in an American field. In *Thinking International Relations Differently* (Vol. 1, pp. 48–71). Routledge.
- Walt, S. M. (1991). The Renaissance of Security Studies. *International Studies Quarterly*, 35(2), 211–239. <https://doi.org/10.2307/2600471>
- Waltz, K. N. (1979). *Theory of International Politics*. Addison-Wesley.
- Warner, J., & Boas, I. (2019). Securitization of climate change: How invoking global dangers for instrumental ends can backfire. *Environment and Planning C: Politics and Space*, 37(8), 1471–1488. <https://doi.org/10.1177/2399654419834018>
- Warren, C., & Steenbergen, D. J. (2021). Fisheries decline, local livelihoods and conflicted governance: An Indonesian case. *Ocean and Coastal Management*, 202. <https://doi.org/10.1016/j.ocecoaman.2020.105498>
- Water security challenges and conservation strategy for Pakistan. (2020). www.cgss.com.pk
- WGBU. (2007). World in Transition: climate change as a security risk summary for policy-makers. https://www.wbgu.de/fileadmin/user_upload/wbgu/publikationen/hauptgutachten/hg2007/pdf/wbgu_jg2007_kurz_engl.pdf
- Whitehouse.Gov. (2015). Remarks by President Obama at the First Session of COP21 . <https://obamawhitehouse.archives.gov/the-press-office/2015/11/30/remarks-president-obama-first-session-cop21>

- WHO. (2019). World Malaria Report 2019.
<https://www.who.int/publications/i/item/9789241565721>
- Williams, M. C. (2003). Words, Images, Enemies: Securitization and International Politics. *International Studies Quarterly*, 47(4), 511–531. <https://doi.org/10.1046/j.0020-8833.2003.00277.x>
- World Bank. (2014). Climate change affects the poorest in developing countries.
<https://www.worldbank.org/en/news/feature/2014/03/03/climate-change-affects-poorest-developing-countries>
- World Bank. (2023). Reality Check: Lessons from 25 Policies Advancing a Low-Carbon Future.
<https://openknowledge.worldbank.org/handle/10986/40262>
- World Bank. (2024a). Rural Population (% of total population) – Pakistan.
<https://data.worldbank.org/indicator/SP.RUR.TOTL.ZS?locations=PK>
- World Bank. (2024b). The World Bank in Pakistan.
<https://www.worldbank.org/en/country/pakistan/overview>
- World Bank Group. (2021). The Changing Wealth of Nations.
<https://www.worldbank.org/en/publication/changing-wealth-of-nations/about#:~:text=This%20new%202021%20edition%20of,the%20environmental%20dimension%20of%20sustainability.>
- World Economic Forum. (2016). The Global Risks Report 2016.
<https://www.weforum.org/publications/the-global-risks-report-2016/>
- World Economic Forum. (2019). The Global Risks Report 2019.
<https://www.weforum.org/publications/the-global-risks-report-2019/>
- World Economic Forum. (2024). Global Risks Report 2024. World Economic Forum.
<https://www.weforum.org/publications/global-risks-report-2024/>
- World Population Review. (2024). Pakistan Population 2024.
<https://worldpopulationreview.com/countries/pakistan-population>
- Wyn Jones, R. (1999). Security, Strategy, and Critical Theory. Lynne Rienner Publishers.
- Xu, C., McDowell, N. G., Fisher, R. A., Wei, L., Sevanto, S., Christoffersen, B. O., Weng, E., & Middleton, R. S. (2019). Increasing impacts of extreme droughts on vegetation productivity under climate change. In *Nature Climate Change* (Vol. 9, Issue 12, pp. 948–953). Nature Research. <https://doi.org/10.1038/s41558-019-0630-6>
- Zahoor, M. (2022). ENVIRONMENTAL INSECURITY IN PAKISTAN: CONTEMPORARY CHALLENGES AND RESPONSES. *American International Journal of Humanities, Arts and Social Sciences*, 4(1), 1–6. <https://doi.org/10.46545/aijhass.v4i1.254>
- Zahra, S. (2016). Impact of Global Climate Change on Economy of Pakistan: How to Ensure Sustainable Food and Energy Production. *Advances in Plants & Agriculture Research*, 5(2), 508–513. <https://doi.org/10.15406/apar.2016.05.00177>

Zhai, L., & Jae-Eun Lee. (2024). Investigating Vulnerability, Adaptation, and Resilience: A Comprehensive Review within the Context of Climate Change. *Atmosphere*, 15(4), 474.

Zhang, Q., Chen, Y., Li, Z., Xiang, Y., Li, Y., & Sun, C. (2022). Recent Changes in Glaciers in the Northern Tien Shan, Central Asia. *Remote Sensing*, 14(12).
<https://doi.org/10.3390/rs14122878>

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Thesis submitted by Maryam Akhtar, Supervised by Dr. Muhammad Makki (1).docx

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