MS Thesis

CLIMATE-DRIVEN SOCIOECONOMIC VULNERABILITIES AND HUMAN SECURITY IN PAKISTAN: A CRITICAL APPRAISAL

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(July-2024)

TH-27979 1/2

MS
323
LIC

National security
Security policy
Human security
Human rights

Certification

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In the Name of ALLAH

The Most Beneficent, The Most Merciful

This

Piece of work is

Dedicated to the People

Who

Contributed in My

Education

ACKNOWLEDGEMENT

I bow my head before Allah for giving me confidence in my capabilities and assisting me in completing this research work. He showered upon me, countless blessings throughout my life.

The unparalleled devotion and sacrifices of my parents always moved me to put my best efforts in every sphere of my life. Their prayers remained a great asset to me throughout my life. This humble accomplishment couldn't have been completed without them.

Dr. Asma Rashid – my research supervisor, guided and encouraged me to take on this research work. Her support and encouragement also remained a great source of inspiration for me.

In a nutshell, it was the blessings of Almighty Allah, my parent's prayers, the guidance of my supervisor, and the support of my fellows, that empowered me to accomplish this piece of work efficaciously.

Lubna Altaf

July 2024

ABSTRACT

This study investigates the complex relationship between climate change and human security, with a particular focus on the growing impacts of climate variability on various dimensions of human security in Pakistan. By examining the socio-economic vulnerabilities arising from climate-induced changes, the research seeks to highlight the urgency of the issue. It critically evaluates the effectiveness of existing adaptation and mitigation mechanisms while identifying opportunities to strengthen resilience and improve human security outcomes. Drawing inspiration from successful models such as the United Nations Trust Fund for Human Security's initiatives in Ethiopia, Kenya, and Lesotho—where climate-sensitive agriculture, mobile schooling, and healthcare services have been implemented—the study explores the feasibility of adopting similar strategies in Pakistan, potentially in collaboration with the UNTFHS. The research employs Barry Buzan's Human Security Theory as a framework to analyze the intricate interplay between climate change and human security, providing a comprehensive examination of the socio-economic implications. Furthermore, the framework underscores the critical need for collaborative action to address this pressing challenge. By offering a multifaceted perspective on climate-induced human security issues, this study aims to provide a detailed analysis of the impact on Pakistan's socio-economic landscape. Ultimately, it seeks to propose effective strategies and policies to enhance human security and resilience in the face of climate variability and escalating environmental challenges in the region.

Keywords: Climate Change, Human Security Theory, United Nations Trust Fund for Human Security, Ethiopia, Kenya, Lesotho

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CHAPTER ONE

INTRODUCTION

"The planet Earth can never be at peace unless its people have security in their daily lives"

(Walter, n.d.)

1.1 Background of the Study

Climate change is humanity's most controversial and pressing issue in the current epoch. It is not only transforming the global political landscape, but it also poses a threat to economic and social stability across countries and continents. The least contributors are the most vulnerable, particularly the least developed and developing countries of South Asia and Africa. The impacts and implications of climate change are diverse and distinct. We are living in the age of Anthropocene. Human activities significantly impact natural environmental conditions and aggravate climate-driven crises. Unpredictable weather patterns, harsh monsoons, melting glaciers, scorching heat waves, and natural disasters are disrupting livelihood, destroying infrastructure, hindering economic development, and disturbing the ecosystem. Some effects immediately, for instance, cyclones, disrupt livelihood entirely at once. Others leave long-term impacts of destruction leaving people in miserable conditions for instance, flood causes sudden destruction, but its impacts are long-lasting, it destroys crops, disrupts livelihood and economic activities, destroys infrastructure, and spreads infectious diseases.

In the context of developing countries, Pakistan faces multifaceted challenges that threaten the livelihoods, health, and overall security of its population. Ministry of Planning Development & Special Initiatives published a Post–Disaster Need Assessment Report on Pakistan's Floods in 2022 that underscores these floods harmed 33 million people across the country, with 8 million relocated and half a million living in temporary shelters. One might picture the state of amenities and cleanliness in such situations. Agriculture and livestock are the primary sources of income in the majority of flood-affected areas. Floods destroyed 40% of Sindh's standing cotton crop. Sindh's date harvest was severely impacted, while crop yields of wheat, rice, and spices plummeted dramatically. Already stored stock was swept away and destroyed. Factories have shuttered, leaving thousands unemployed. In addition, the majority of them lost their livestock due to flooding. The food shortage coupled with bad economic conditions and unemployment led to the outbreak of disease spread and malnutrition, mostly among pregnant women and children as the United Nations Population Fund (UNFPA) reported

around 650,000 women were pregnant in flood-hit areas. The unavailability of fresh clean water and sanitation systems increase the vulnerabilities of affected communities. The problem is exacerbated by food shortages and high market pricing. The transportation system has been interrupted, communication channels have been blocked, the energy sector is dysfunctional, health and education departments have closed, companies and mills have shut down, and floods have utterly disturbed people's lives. Thousands have lost their jobs and businesses. From the agriculture sector to the trade and livestock sector every business activity has been disrupted ("Pakistan Floods 2022 Post Disaster Needs Assessment Report," 2022). This demonstrates how humans and the environment are inextricably linked. The study's discussion hinges on the complex integration of human activities, the environment, climate, human security and socioeconomic vulnerabilities.

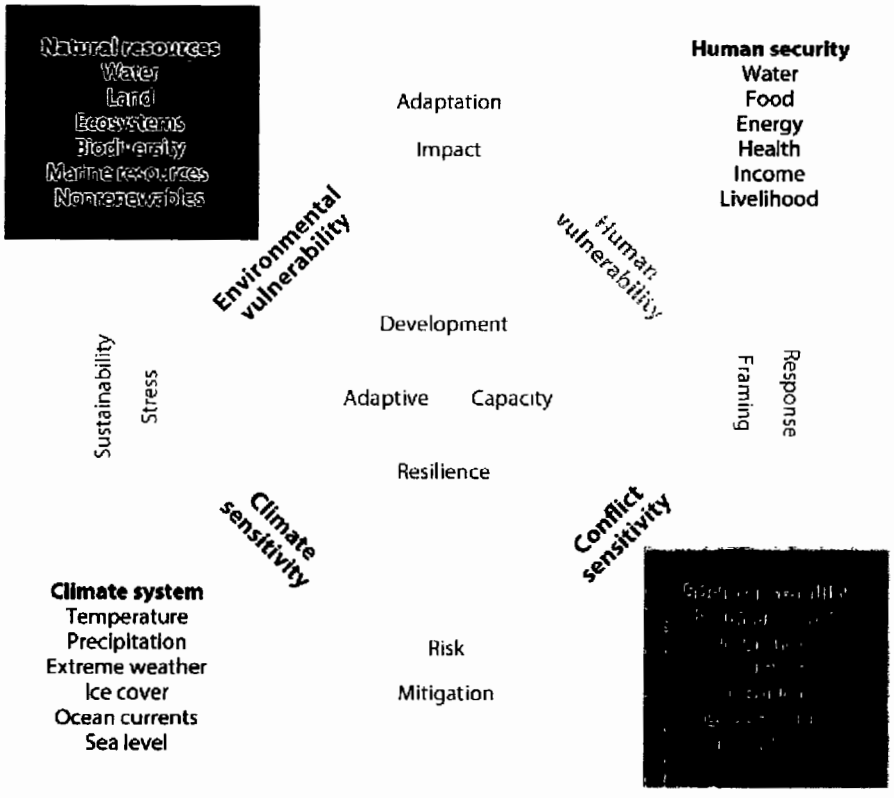


Figure 1: Impact chains and feedback in climate-society interaction

Figure 1, represents this complex integration of Human-Environment relations. The coupling in this network can be elucidated by the vulnerabilities and sensitivities that depict the impact of a change in one variable on another. Climate change has a potential impact on the functioning of the earth system, ecological system and natural resources {like soil, forests, water, air, natural balance of ecological cycles (the biodiversity)}. Similarly, Humans may also have an impact on

the climate system as a result of unsustainable socioeconomic development (rampant urbanization, population growth, intensive agriculture production to fill supply- demand gaps (land degradation), coal-based industrialization, a lack of transparency, lack of shared responsibility, and lack of maintaining a human-nature interaction balancing system. However, depending on the scale of vulnerability, this can have an impact on individual security, for instance, the provision of basic needs (water, food, energy, shelter, health, job and social security). Human reactions to climate change can have an impact on social stability, in extreme cases it may result in climate-induced conflicts and social instability (political events, violence, crime, climate-driven migrations) at climate hot spots. The need of the hour is to figure out practical and realistic solutions to deal with complexity, avoid precarious climate change, and maintain the equilibrium of human-environment relations despite system changes. So, the network of this human dependency on the environment, and environmental vulnerability due to human interventions, as a result climate sensitivities and conflict sensitivity work in an interdependent manner. Maintaining balance among them is the only pragmatic way to deal with the sensitivities. (Scheffran et al. 2012a, 2012b).

This proposal presents a comprehensive case study that aims to explore the intricate relationship between climate change and human security in Pakistan. The central objective of this research is to identify the inextricable relationship between Climate change and individual security in the context of growing human security challenges in Pakistan, to understand the socioeconomic vulnerabilities faced by different regions and communities due to climate change, to investigate inter-society inequalities and its socioeconomic implications. and to assess the effectiveness of climate-induced disaster preparedness and response preparedness mechanisms and identify opportunities for improving resilience and human security outcomes by utilizing regional and global models, for instance, with the collaboration of the UNTFHS NATIONS TRUST FUND FOR HUMAN SECURITY (UNTFHS), people of Ethiopia, Kenya and Lesotho has adapted Climate-sensitive agriculture to improve food diversification. In addition, UNTFHS has introduced mobile school services and provided health services in climate-sensitive areas. (UNTFHS,2017)[1].

The study employs the Human Security Theory by Barry Buzan framework to unravel

[1] United Nations TRUST FUND FOR HUMAN SECURITY (UNTFHS) under the United Nations established in 1999. The trust is funding different programs, particularly in LDCs (Least Developed Countries) to build resilience against climate and environment-driven disasters with a particular focus on Human security factors. HTTPs://www.un.org/humansecurity/

the intricate nexus between climate and human security and to dissect the Socio-Economic ramifications comprehensively. Additionally, the framework addresses the pressing need for collaborative efforts in the face of this colossal crisis. This framework offers a multifaceted perspective on the climate-triggered human security challenges and their impact on the Socio-Economic conditions of Pakistan in the contemporary epoch. The research will rely on a qualitative approach, primary and secondary sources are used for data collection. The nature of the research is exploratory and analytical to develop a nuanced understanding of the complex interplay between climate change and human security.

1.2 Statement of the Problem

As the concerns regarding climate change increasingly mounted, it gave birth to concomitant human security challenges, which subsequently threatened the Socio-Economic situations globally. These climate-driven human security problems have become intricately interwoven with Pakistan's already crumbling Socio-Economic conditions. However, to what extent the current climate-triggered human security issues are impacting the country's existing Socio-Economic woes, specifically about most climate-affected areas of Pakistan in the last decade and the urgency of the problem, the major concerns regarding the effectiveness of adaptation, mitigation mechanisms and opportunities for improving resilience and human security outcomes by utilizing regional and global model need to be explored.

1.3 Significance of the Study

The present study is significant in its exploration of the relationship between three intertwined paradigms; climate change, human security and Socio-Economic conditions. In an era of growing climate-induced challenges, the research addresses contemporary societal concerns and offers a deep understanding of how it is threatening human security and subsequently affecting the Socio-Economic realm of developing countries, specifically Pakistan. This study also holds significance in terms of its comprehensive analysis of Pakistan with other developing and least developing countries fighting against climate threats particularly, drawing inspiration from successful models like the United Nations Trust Fund for Human Security's initiatives in Ethiopia, Kenya and Lesotho, where climate-sensitive agriculture, mobile schooling, and healthcare services were implemented, the study explores the potential of similar strategies in Pakistan, potentially in collaboration with UNTFHS, this intervention will assist to derive a comprehensive and versatile conclusion. The present work is significant not only for scholars in the fields of security, climate, and environmental studies

but also, for a broader audience concerned with the rising issue of climate-driven complexities.

1.4 Research Objectives

1. To explore the intricate connection between growing concerns about human security and climate change, within the context of Pakistan.
2. To investigate the effects of climate change-related human security issues on socioeconomic situations, with a focus on Pakistan's most climate-affected regions.
3. To evaluate the problem's urgency, the main issues surrounding its impacts and the prospects for enhancing resilience by investigating regional and global resilience-building models.

1.5 Research Questions

1. What is the nexus between the evolution of climate variations and human security in the context of growing climate-driven challenges in Pakistan?
2. What are the impacts of climate-triggered human security complexities on the country's socioeconomic conditions?
3. How does Pakistan, as a developing country, respond to the urgency of climate-related human security challenges by applying regional and global resilience-building models?

1.6 Delimitation of the Study

The area of the study is delimited to Pakistan in general and the focus will be particularly on climate vulnerable areas. The focus will be on the contemporary period; 2010-2022. Moreover, the context of the research is delimited to the study of Socio-Economic conditions affected by climate-driven human security challenges.

1.7 Operational Definitions of Basic Terms

1.7.1 Cosmopolitanism

Robert Fine, in his book "Cosmopolitanism" argues humanity is facing global risk and it requires global solutions, for that there is a need for a collective effort to address global threats. In the context of climate change, emphasizes the inter-connectedness of humanity and the shared responsibility of individuals and nations to address global challenges (Fine, 2007)

1.7.2 Nihilism/Fundamentalism/Activism

(Pittock,2009) A. Barrie Pittock identifies three broad psychological reactions in his book "Climate Change the Science, Impacts and Solutions" Nihilism Fundamentalism and Activism.

Nihilism; is a psychological reaction, in which people believe that it's a hopeless situation so let's have fun while we can (Pittock,2009)

Fundamentalism; relies on an inflexible set of beliefs or miracles such as God or free market will prevent us (Pittock,2009).

Activism; those who adopt activism believe that we are still able to resolve the problem if we understand the patterns of urgency of the issue and importance of the issue and show commitment to resolve it. The writer is of the view human beings are rational beings and by using ingenuity and commitment man can achieve the unachievable as history witnessed during global wars (Pittock,2009).

1.8 Literature Review

Climate change is an evolving global challenge, with far-reaching impacts on human security and well-being. As a country highly vulnerable to the adverse effects of climate change, Pakistan faces multifaceted challenges that threaten livelihoods, health, and overall security of its population. This proposal presents a comprehensive study that aims to investigate the intricate relationship between climate change and human security in the particular context of Pakistan.

Earlier our climate was stable and predictable. Experts can predict the frequency of rain and intensity of cyclones and hurricanes. Now the climate has supercharged the climate events and the result is every week there is something unprecedented for instance, Drought in Somalia, East Africa experiencing extreme drought (according to the United Nations Report it is the worst drought in the past forty years); volcanic eruptions in Hawaii; earthquakes in Indonesia and Turkey, floods in Turkey, floods in Afghanistan, India, and Congo and 2022 floods in Pakistan, Glacier lack outburst floods,2022 (Tariq,2022) Natural and climate disasters shook the world in 2022. According to 2022 statistics, the United States alone spends 18 billion dollars to counter droughts, heat waves, floods, hail, hurricanes, severe weather, tornado outbreaks, wildfires, and winter storms. The causes behind the crisis are mostly anthropocentric. Man-diverted natural waterways, polluted air, increased deforestation, accelerates unsustainable agriculture, population growth augmented unplanned urbanization that destructs the ecosystems; unawareness, negligence, and rampant developments add fuel to the fire.

Rasul et al. (2011), in their study titled, "Glaciers and Glacial Lakes under Changing Climate in Pakistan" addresses the effects of global warming on glaciers in Pakistan's Himalayas, Karakoram, and Hindukush Mountain ranges. These glaciers provide a significant amount of water to the Indus River System and are critical to the region's water supply.

According to the paper, global warming is causing glaciers to melt at an alarming rate. This not only reduces the amount of ice present but also causes more glacial lakes to emerge. As Glacial Lake Outburst Floods (GLOFs) become increasingly common, these lakes pose a major concern.

Significant increases in temperature and the formation of perilous glacial lakes Pakistan are situated in South Asia and is home to three famous mountain ranges: The Himalayas, the Karakoram, and the Hindukush. Over 5,000 glaciers in the country pour into the Indus River via multiple tributaries. In 2005, a glacier inventory found over 2,500 glacial lakes created by meltwater from these glaciers, with 52 of them classified as potentially dangerous due to the

risk of Glacial Lake Outburst Floods (GLOF). GLOF episodes are devastating, causing major damage to infrastructure, houses, and farms and claiming many lives.

The study underscores a GLOF that occurred in July 2010 when the Booni Gole Glacier in the Hindukush Mountain range caused a flood caused by monsoon rains. Along its passage, this flood caused considerable erosion and destruction to agricultural land and human communities.

Similar phenomena have occurred in the past, such as the Passu Lake outburst, which occurs every 2 to 5 years on average. Satellite photography shows that the development of new lakes and the expansion of existing ones near the Himalayan and Hindukush glaciers is rising over time.

To address these risks, the United Nations Development Programme (UNDP) has launched a study of two glacial lakes in Chitral and Gilgit, utilizing in-situ observations and remote sensing methods in partnership with local glacier monitoring and research organizations. The goal of this research is to create a warning system that can help save the lives of people living in locations most vulnerable to GLOFs. Bhutan's experience with GLOFs might be used as a model, with minor adjustments to meet Pakistan's organizational and societal frameworks.

The research claims Pakistan faces a high risk from GLOFs, which is exacerbated by climate change. Glacial lake generation and the frequency of GLOFs are increasing. Efforts are being made to research and monitor these lakes to build a warning system to safeguard vulnerable communities from these catastrophic disasters.

Flooding is a globally recurrent phenomenon. It can be caused due to various factors including outbreaks of torrential rainfall, melting glaciers, failure of drainage systems and dams, and scorching heat waves. However, various human activities like human-diverted natural waterways and deforestation are also major contributors. According to the Pakistan Meteorological Department, (PMD) received heavy rainfall during the 2022 monsoon, which is 70 % above normal in July 2022 and 102 % above normal in August 2022. Some places receive 14.8 inches of rain in one day which means three times the national average. National Disaster Risk Management (NDMA) declared that May 2022 was the hottest and driest month since 1961. According to Aljazeera, and Lahore temperature was recorded at 40 degrees Celsius or above during May 2022. Therefore, March 2022 was the hottest month in the subcontinent since 1990. German Watch group writes Pakistan is the 8th most affected country due to climate change. Amnesty reports Pakistan has more than seven thousand glaciers and most of them are melting due to the constant rise in global temperature. A recent study of Leeds University noted

that ice from glaciers of the Himalayas melted ten times more than the average melting rate.

First, Pakistan experienced rising temperatures in April and May that set the ground for these torrential rains. The warmer air retains 7% more moisture per degree Celsius which comes down as rain. So, in July 2022 due to some similar kind of phenomenon, the rivers burst their banks, the urban drainage system overflowed, swept everything in its way and the result is, that one-third of the country was under water.

(Post-Disaster Need Assessment Report, 2022) Ministry of Planning and Development and Special Initiative claims, almost 33 million people have been affected by floods, around 8 million have been displaced, half of a million are living in temporary shelters, more than a million homes damaged, 3500 kilometres of road have submerged in water, 129 bridges have damaged till yet and collectively, more than 1208 lost their lives. The NDMA report further estimated the country's total loss is $14,906 million.

(NDMA,2022) statistics underscore Sindh and Baluchistan are the most affected areas. In Sindh alone, more than 89,000 people were displaced. In Sindh, 19 districts were hit hard. The most affected areas of Sindh are Dadu, Jacobabad, kambar Shadad Kot, Khairp Mir (thari-mirwah), Jamshoro, Umerkot, and Badin. The most affected areas in Baluchistan are Jhal Magsi and Jaffaraabad district

Our environment is a combination of two factors: biotic factors (living things) and abiotic factors (non-living things). The major contributors and stakeholders are humans. Everything revolves around human needs and human development for its survival. Biotic factors include humans, plants animals, and other living species. However, abiotic factors include water, land, air, mountains, and resources that living things need for their survival. This process of dependence and interdependence is termed an ecosystem. In the above context, a stable environment requires a stable ecosystem, and, in this cycle, the individual becomes the major actor who is operating the whole process. Unfortunately, at present time both the environment and the individual are at high risk.

Pakistan Floods in 2022 (Post–Disaster Need Assessment Report) published by the Ministry of Planning Development & Special Initiatives writes Floods affected 33 million people around the country,8 million have been displaced and half of a million living in temporary shelters One can imagine the condition of facilities and sanitation at such places. Most of the flood-affected areas depend upon agriculture and livestock for their bread and butter. Therefore, 40 % of the Sindh cotton standing crop was wiped away in floods. Dates harvest in Sindh was affected badly, wheat, rice, and spices crop yields dropped to a drastic

ratio. Already stored stock was also washed away and spoiled. Factories have closed and workers faced unemployment. Adding to this, most of them lost their livestock in floods. The food shortage coupled with bad economic conditions and unemployment led to the outbreak of disease spread and malnutrition, mostly among pregnant women and children United Nations Population Fund (UNFPA) reported, around 650,000 women were pregnant in flood-hit areas. The unavailability of fresh clean water and sanitation systems increase the vulnerabilities of affected communities. Food shortage and the high prices in the market aggravate the crisis. The transport system has been disrupted, communication channels have been blocked, the energy sector is dysfunctional, Health and education departments have closed, factories, and mills have been closed, and floods disrupt the livelihood completely. Thousands of people lost their jobs and business. From the agriculture sector to the trade and livestock sector every business activity is disrupted.

Being an agrarian country, the agriculture sector of Pakistan is the backbone of the revenue of the country. Around 25% of the total land of Pakistan is cultivated, 40% of people work as farm labourers or connected to agriculture jobs, the country enlisted as the seventh largest wheat producer and 10th largest rice producer, and the world's 2 % of the arable land is in Pakistan-with 96% of it's located in Indus plan alone. Along this Pakistan exports many fruits and vegetables. However, a 50-60% reduction in mango harvest has been recorded in 2022, according to Aljazeera reports. Adding to this, Pakistan has become a net importer of wheat after many years. Before the floods Pakistan's economy was not stable however, floods acted as a catalyst and put the country on a long road of reconstruction and rebuilding.

In Sindh, 19 districts were affected due to torrential rains, hundred-million-acre land submerged in the water, and 35,00000 acres of arid land with standing crops destroyed. Shadad Kot, Sindh is famous for its rice crop, according to local conservation to BBC, 4000 Murraba land was cultivated that was almost destroyed. Per acre, the cultivation expenditure was 60,000. Hundreds of rice factories have been closed, in every factory almost 20-25 employees were working, and they lost their jobs. Thousands of tons of rice were stocked to be processed and sent to the market all ruined inside rice stores, Aneel Kumar told BBC. Additionally, rice is a cash crop for Pakistan. Pakistan exports high quality rice every season which is a great source of revenue. November December and January are the peak month of work in factories but since 2022 factories are not fully functional, only 5 % are open and functional.

From right to left of Sukhar Barrage, central Sindh district of Sanghar lies that is known for cotton crop. Khair-pur is between Sukhar Barrage and Sanghar along the National Highway,

it's famous for date production. Thousands of locals are garden owners besides this people from other areas also settled here for business purposes. Khair-Pur is a hub for date's export; from here dates are transported around the country. In the 2022 episode, the harvest spoiled, farmers boiled it and tried to convert it to dry dates but that was also destroyed due to heavy rain. The market seller says the net loss was around 80 crore. Approximately on 6- million-acre land cotton is harvested, where 13 lac farmers are working most of them are women farmers. A local farmer, Sadia Ali, and her six brothers worked in a cotton field; they said that before this in 2011 the flood-hit areas recovered in one year. Therefore, farmers are projecting due to the huge scale of destruction, and lack of help, and funding it would take 2-3 years.

Normally, cotton crops take 90 days to be harvested, if they successfully drained the flood water, they would be able to harvest the crop again. There are many factories for cotton processing in Sanghar, floods disrupt the economic activities in the district. Many factories have been closed and those that are open are not functioning properly, labour is unemployed. The total economic loss in cotton yield is 15 crores, in 2011 the loss amount was 10 crores. From Sanghar water flowed towards Mirpur Khas and Umer Kot. UmerKot natives told BBC, they are bearing expenditure to remove the flood water from the field. Ashok Kumar is a farmer; he said that for a spice crop total expenditure is around 1 lac to 1.5 lac. For one acer, they spend Rs. 30,000 to Rs. 35,000 to purchase seeds, Rs. 30,000 to Rs. 35,000 to purchase fertilizers, and bear oil expenses to run the tractor and other machinery also spend Rs. 30,000 to Rs. 35,000. So, the farmer, who owns 1 acre of land lost its 1 lac to 1.5 lac investment approximately. Why has flood water not flowed away yet even after 6 months have passed? Khair-pur Mir: self-help for survival, affected communities in Khair-pur Mir told BBC that for the last 6 months, no one has come to help rebuild the infrastructure. They are struggling to build mud roads to connect people and to run their economic activities. People are still using boats to travel. Khair-pur was one of the districts that were hit badly because the landlords of the Kot D.G diverted water flow towards Khir-pur Mir to save their crops. Thousands of people are affected, lost their livestock and destructed infrastructure makes them more vulnerable when it's coupled with the ongoing economic crisis. The drainage system of Khair-pur Mir is not functional. Drainage pipes of the Ali-bar stream are blocked, which is a major source of water drainage towards the Karachi Sea. According to the Analysts, In Sindh drainage system needs to be improved and rebuilt, if they have already taken these measures, it would reduce the scale of destruction.

Lake Manchar, one of the largest freshwater lakes, is located west of the Indus River, in Jamshoro and Dadu District, Sindh. In Lake Manchar water came from different streams of

Koh-Khitar. During flood time water flow increases because all the water coming from the Khitar mountains, from Baluchistan province, and the lake's water ideally should empty into river Indus but due to ineffective drainage system water is diverted and engulfed the surrounding communities. Engineers constructed a channel into the lake to redirect the water, saving Sehwan and Bhan Syedabad. The total water coming to Manchar is more than its capacity. The question is why water rises to this level in Manchar Lake. The biggest reason is Drainage Capacity MNV Drainage System is not enough to swallow this level of flow. Interestingly, a canal called the Indus Link Canal was built to swallow extra water to bypass Manchar Lake is also not functional yet. The Chairman of the Federal Flood Commission is of the view; that the major cause of huge-scale destruction in Sindh is the inefficient drainage system.

According to the Meteorological science floods and heat waves are two different but interlinked phenomena. National Aeronautics and Space Administration (NASA) research centre claims Russian wildfires and floods in Pakistan are meteorologically linked. In May 2010, Russia experienced extremely hot weather for four consecutive days in some areas that caused severe wildfires in forests. The temperature some 50 degree Celsius or above was recorded in four days from 24th to 27th May 2010. Analysts say it was 10 degrees Celsius above the normal temperature. The rampant fire broke out and resultantly, some 1500 miles away torrential rainfall flooded Pakistan. Pakistan's Meteorological Department (PMD) reported, the rain was 70% above normal in July and 102 % above in August. The figures can quantify the severity of the floods.

Amnesty reports Says, Pakistan has more than seven thousand glaciers and most of them are melting due to the constant rise in global temperature. A recent study by Leeds University noted that ice from glaciers of the Himalayas melting ten times more than the average melting rate.

First, Pakistan experienced rising temperatures in April and May that set the ground for these torrential rains. The warmer air retains 7% more moisture per degree Celsius which comes down as rain. So, in July 2022 due to some similar kind of phenomenon, the river burst its banks, the urban drainage system overflowed, swept everything in its way and the result is, that one-third of the country was under water.

Pakistan faced numerous severe flood shocks since the 1900s including the worst floods of 2010, 2011, and 2022. In 2010, Twenty million people were affected, 1.89 million homes were destructed, four million people were left with food shortages, and 1.4 million hectares of arid

land submerged into water, the total economic cost the country bore at that time was $ 43 billion, (NDMA,2022).

The greatest debate of the epoch is about individual security, not state security. Human security is referred to as the concept of security of an individual or person-centric security approach. Global Human Development Index report highlights seven components of human security: Economic Security, Food Security, Environmental Security, Personal Security, Health Security, Political Security, and Community Security.

Benish (2016), categories human security into main components: Fulfilment of basic needs (food, health, personal security) and protection from sudden disruption in the pattern of life.

The global perspective of Buzan's Human security idea is "It's the responsibility of the government to provide security and peace to its people from both external and internal threats "Barry Buzan's approach to Human security is state-centric, he argues that third-world countries developing countries are facing serious human security threats as per his analysis or search "primarily state is responsible for Human security protection" Paul Evans, adopt state and individual level approach. According to Paul developing countries need to focus on both state security, development and individual should be significant factors in determining security from whom? For what? And in which ways? Edward Newman explains human security as: "Human security challenges are the result of structural issues" He explains the direct correlation of Human security with National security and the prosperity of the state. Newman argues that Human security is not a state-centred approach it is directly linked with security, Welfare, and basic rights (Benish, 2016).

According to the United Nations Trust Fund for Human Security (UNTFHS)[2] studies, for instance, in Uzbekistan, UNTFHS empowers people to build their resilience against environmental devastation, in the form of scant resource depletion. In Kenya, UNTFHS initiates a joint comprehensive plan for sustainable development, by engaging local masses and government to counter drought destruction, providing them with mobile school facilities, and health services, and introducing new business skills and drought-resistance agriculture.

2 UN TRUST FUND FOR HUMAN SECURITY (UNTFHS) under the United Nations established in 1999.The trust is funding different programmes particularly in LDC's (Least Develop Countries) to build resilience against climate and environment- driven disasters with particular focus on Human security factors. https://www.un.org/humansecurity/

LESHOTHO, an agrarian community with 40% living below the poverty line facing climate-induced droughts, UNTFHS, addressed the immediate and imminent impacts of this climate-induce crisis, with collaborative efforts they introduced climate-sensitive agriculture, increased food diversification, improved health services, and help to build national capacity to counter these challenges.[3]

Aral Sea is another example of UNTFHS initiatives. It's the World's fourth-largest lake. Since the lake's water level declined it turned into desert. Resultantly, the native people experienced several challenges including food shortage, water contamination, dust storms spoil the crops, land degradation and salinization. However, the human security initiative for affected communities helps to improve economic, food, health and environmental conditions and assists around 500.000 natives. The mutually reinforcing protection and empowering framework together assisted the local government in ameliorating the infrastructure, water and sanitation services, health services, and energy supply. These efforts help to improve the livelihood of local people, and increase productivity. Using a mutually reinforcing protection and empowerment framework, the Programme has assisted local governments in improving service and infrastructure quality, resulting in improved access to water and sanitation services, basic health care, and electricity supply. Support for local communities to enhance their livelihoods has increased farm productivity and the creation and distribution of local handicrafts. The UN Trust Fund for Human Security (UNTFHS) is funding numerous programs to build resilience against an environmental-induced crisis that is linked to aggravating poverty and increasing insecurities. The human security approach covers social, economic, political, and environmental repercussions that hamper individual and community well-being, and challenge peace, security, and stability.

Above mentioned studies elucidate many causes, impacts, and approaches to counter these threats but it has not been clarified why structural and non-structural losses have been increasing despite receiving a huge amount of aid and human resource assistance voluntarily, the masses are also trying to integrate to build better again. There is a need to further reveal the ground realities and other loopholes that have not been addressed in the existing literature. The reviewed literature advocates a comprehensive approach that incorporates science, creative solutions, and solidarity among the affected communities, state, and international actors. For instance, UNTFHS is funding numerous programs to build resilience against a climate-induced crisis that is linked to aggravating poverty and increasing insecurities in various Leas

3 Human Security: Building Resilience to Climate Threats, UN TRUST FUND FOR HUMAN SECURITY (UNTFHS)

Developed countries. The question arises here, if the least developed countries would cope or build resilience against climate-driven crises then why would not developing countries like Pakistan take such measures, is it an issue of financial aid? Or is it due to the negligence of the administration or management level?

Ideally, the government should have been better prepared this time by building huge resilience capacity, and efficient drainage systems, and by halting construction near riverbeds. But priorities of leadership are not aligned with the urgency. The crisis is a wake-up call to build better resilience and adopt a better approach towards risk disaster management not for only Pakistani leadership but for the World's leadership." We are running out of Time but not out of options to address the climate change". Contemporary prevailing crisis demands a dire need for an approach that integrates needs and vulnerabilities and equips us to engage earlier and prepare better. An approach that is targeted toward those most at risk and focuses on building resilience by utilizing regional and global resilience-building models. An approach that promotes strong compounding across a wide range of stakeholders and bridges the divide between humanitarian and development actors. An approach that promotes integration among masses for collective action towards any colossal crisis and focuses on immediate relief along with adopting countermeasures for imminent repercussions by measuring root causes and predicting its adverse effects. So, to address the urgency of the problem and to adopt an activist approach to address the colossal crisis in making Robert Fine, in his book "Cosmopolitanism" argues humanity is facing global risk and it requires a global solution, for there is a need of collective effort to counter these global threats. In the context of climate change, the interconnectedness of humanity and the shared responsibility of individuals and nations is required to address global challenges (Fine, 2007). The discussion underscores that further research is required in the above-mentioned areas.

1.9 Theoretical Framework

The study employs the Human Security Theory by Barry Buzan framework to unravel the intricate nexus between climate and human security and comprehensively dissect the Socio-Economic ramifications. Additionally, the framework addresses the pressing need for collaborative efforts in the face of this colossal crisis. This framework offers a multifaceted perspective on the climate-triggered human security challenges and their impact on the Socio-Economic conditions of Pakistan in the contemporary epoch.

Security has been the most frequent and hot-debated issue of international relations in all its forms. Traditionally, humans worried to secure their borders and ensure their survival from external threats posed by other powerful states. Industrialization, technological developments, artificial intelligence, and the inception of hybrid warfare transformed the concept of security from the traditional to the human security domain. More people lost their lives as a result of natural and man-made disasters as compared to lives lost in confrontations on borders. The world is heading towards next to the 5th generation warfare, towards the unpredictable and unprecedented world future. We are witnessing a humanitarian crisis in the form of extreme threat of food insecurity, unavailability of fresh water, unprecedented droughts, cyclones, hurricanes, and outbreaks of contagious diseases (more than 95, 0000 approximately people killed due to cancer, not because of terrorism in Pakistan). Around 1730 lost their lives in the 2022 Flood-Hit in Pakistan, according to (the World Bank Report on post-disaster need assessment, 2022)

In a contemporary context, individual security becomes more critical on humanitarian grounds than state security on borders. To secure borders and economic interest's world becomes borderless and individuals become insecure. An industrial country's activities impact another vulnerable community some 1500 miles away. Who is responsible for ensuring the security of an individual? Who is the culprit? How this colossal crisis would be curtailed in making or at least minimizing its intensity?

Different schools of thought tried to explain the phenomenon from different angles. The more appropriate explanation of this complex bonding is given by the Human Security approach of Barry Buzan, the theory provides broader and multifaceted perspectives of climate-induced human security challenges and their impact on socioeconomic conditions of climate-affected areas of Pakistan.

1.9.1 Barry Buzan's Human Security Theory

Buzan provides a different perspective of security that covers both micro and macro levels, it also covers the social dimension of security and elucidates how societies view threats. He initiated debate about different parameters of security and explored the relationship between state security and individual security. According to Buzan, the state is both a source of threat and a source of security for the people. Most of the time people face threats that are the product of unavoidable social, economic and political instability in the state. Buzan believes that the state and individual have a reciprocal relationship: both can threaten the security of each other (Waisová 2003).

The UN's human security agenda is primarily included in the work of the following two agencies: UNDP and UNHCR. The UNHCR derives its definition of human security from the Human Development Report of the United Nations Development Programme. "It understands security first and basic right of the individual, and links the concept of security inseparable to the idea of dignity and human rights to the relief of human misery".

	UN Concept
Security from Whom	Primarily the individual
Security of What Values	Personal safety/Well-being and individual freedom: Freedom from fear and need
Security of What Threats	Direct and indirect violence, especially on economic and environmental factors
Security of What Means	Promoting human development, the goal is sustainable development and a better distribution of resources

Source: Waisová, Š. (2003). Human Security-the contemporary paradigm? Perspectives: Review of International Affairs, (20), 62-65.

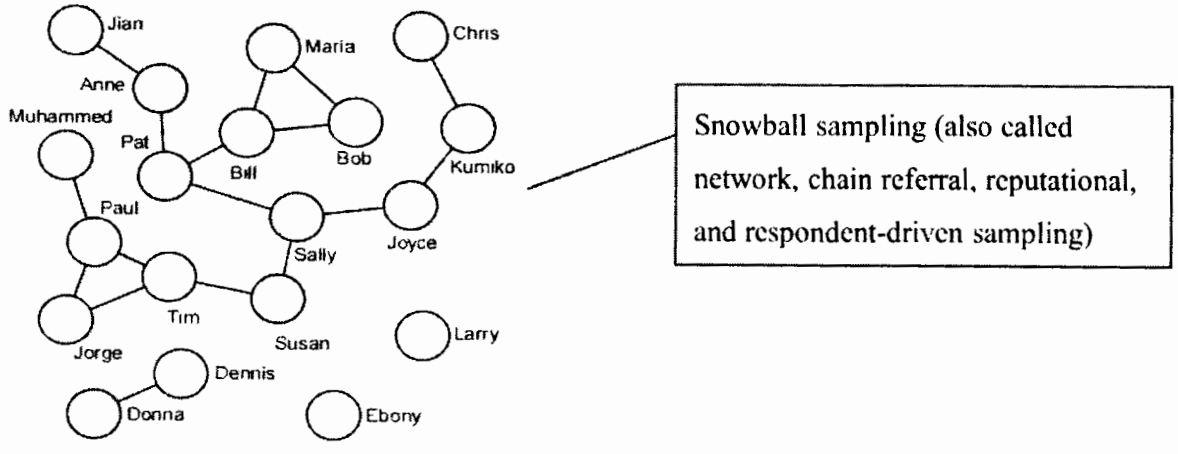
1.10 RESEARCH METHODOLOGY

1.10.1 Research Design

The research will use a qualitative approach to assess the primary and secondary data. The study will extract and explicate the relevant data from the selected sources to gain insight into the phenomenon under study and to draw a possible conclusion. The exploratory and analytical methods will be employed to develop a nuanced understanding of the complex interplay between climate change and human security.

1.10.2 Data Collection

For the data collection, both primary and secondary sources will be used. For primary sources, collect data by conducting interviews with field experts using the snowball technique (also called network, chain referral, reputational, and respondent-driven sampling), and by analysing official documents from governmental institutions like the Ministry of Climate Change (MOCC), and the Pakistan Environmental Protection Agency.



Source: Neuman, W. Lawrence, Social Research Methods: Qualitative and Quantitative Approaches.

Secondary data will be collected from Journal articles, research papers, books, newspaper articles & reports, interview sessions of different field experts (for instance Conversation on Climate Change interview series), BBC & Aljazeera documentaries, review films related to climate change (For instance, an inconvenient truth: A global Warming) and assessment reports presented by International, and National organizations, NGOs, and other

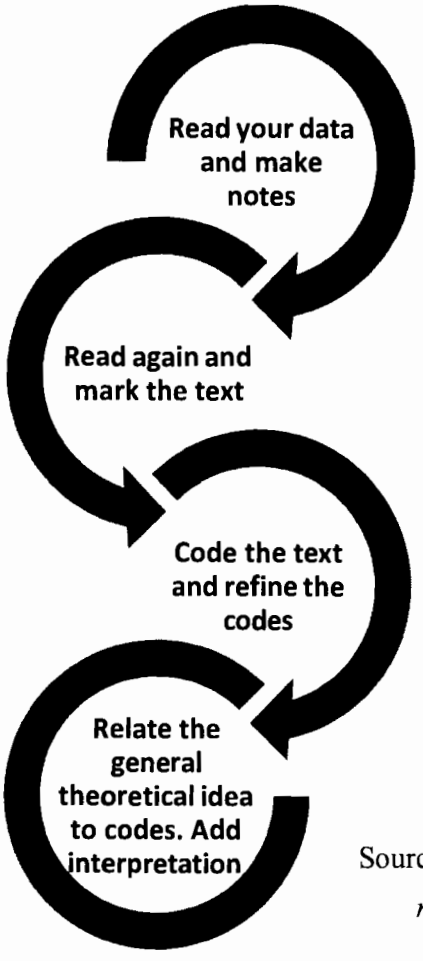
relevant institutions would be used for accumulation of data and better understanding on the title.

1.10.3 Data Analysis

Comparative analysis and thematic analysis technique of qualitative data analysis are used to dissect and organize the data. In the first step, relevant data is collected. Second, data is classified into themes to segregate similar information into groups. Third, develop codes form data and themes. The inductive coding approach (a group-up approach in which one drives codes from data) is used to refine data.

The qualitative Coding technique is used to make sense of huge data into smaller and meaningful chunks. It is a process of taking unstructured data and systematically categorizing excerpts to find themes and patterns for analysis.

Based on Alan Bryman's four stages of analysis, Graham R Gibbs presents a model of qualitative analysis (Bryman, 2016)



Source: Bryman, A. (2016). *Social research methods*. Oxford University Press.

Themes

Following are the proposed themes to dissect and organize the data.

Climate Change and Human Security

Under theme 1, detailed discussion and analysis has done on climate change and reframe this discussion into security framework.

Socio-Economic Dimension of Human Security

This theme explores the socio-economic dynamics of human security in order to narrow down the discussion of the vast topic of security. The focus is on socio-economic conditions of Pakistan and impacts of climate changes on it. It offers critical analysis of different climate events in variant parts of country particularly the most affected areas like Sindh and Baluchistan.

Climate Change, LDC's and Developing States

Climate change has impacted the global sustainability and especially severely the rural communities in the developing and least developed states. Respective theme focuses Pakistan being the notable example of developing nation and compare with other least developed states of Africa including Ethiopia, Kenya and Lesotho.

Climate Policies and Initiatives

The theme investigates climate policies and initiatives at national, regional and international level. Particularly, focuses on adaptation, mitigation and resilience building polices adopted by Pakistan their loop holes in the implementation phase and explores challenges faced at local, national and international level.

Regional and International Climate Initiatives

This part explores various policies and initiatives taken at regional and international level with special focus on Pakistan's global and regional climate initiatives including COP-28 landmark achievement and other regional efforts like the Economic Cooperation Organization (ECC) , South Asian Cooperative Environment programme (SACEP), South Asian Association Cooperation (SAARC), the United Nations Economic and Social Commission for Asia and the Pacific (UNESCAP), and the United Nations Environment Programme.

A detailed comparative analysis of the climate policies of Pakistan, Ethiopia, Kenya and Lesotho provide insightful examples of how developing countries can approach climate change through strategic policies, highlighting their successes and challenges that Pakistan can learn from.

CHAPTER TWO

CLIMATE CHANGE: RE-FRAMING THE CLIMATE CHANGE DISCUSSION

Chapter two presents a detailed discussion of what climate change is and re-frames this discussion into a security framework. Section one distinguishes between climate and weather science, and elucidates factors affecting the climate system by highlighting anthropogenic and natural climate variability. Section two provides evidence that climate change is real, why it matters, why present warming happens, and generate event-based discussion on climate change, the earth system and their inextricable link with human societies and ecosystems. Section three explores unpredictable weather extremes as risk multipliers, and re-frames the climate change discussion in the context of the security framework by highlighting uncertainty is inevitable, but the risk is certain.

Climate change refers to the average state of the atmosphere, land surface, ocean and ecosystem that dwell in these conditions. The climate also influences the average wind direction, strength, cloud cover, the temperature of the sea surface, Ocean currents that affect the sea surface temperature and so on (Neelin,2010). Contrary, Weather is what we experience at the moment the day-to-day atmospheric conditions. However, Climate not only refers to the average condition of the temperature, atmosphere and precipitation but it also calculates the average weather-related changes of any particular area. For instance, the climate of Antarctica is the average condition of weather patterns of that continent from 1900-1930, and it will be different from average patterns of 1940 -1960 and 1970-1990 and so on. These conditions are climate variability[4].For example, the long-term warm Climate enjoyed by the dinosaur age then the ice-age[5] replaced the patterns and El Nino and La Nina effect[6] in the Pacific Ocean changes its temperature every few years (Neelin,2010).

2.1 Factors Affecting the Climate System

There are variant factors that brought evolutionary changes in the natural patterns of the Earth's system. These natural changes occurred in thousands and millions of years. However, global geological survey reports that current climate changes are rapid, rampant and unpredictable. Two types of factors are affecting the climate system; natural factors and anthropogenic factors. Natural factors include; distance from the sea, variations in the strength of the sun, Changes in the earth's movements, Oceanic current, The dynamics of land (Topography of the land), Direction of the winds, Distance from the equator, and the El Nino and La Nina effect.

The sun is a major source of energy that plays an imperative role in shaping Earth's Climate system. The solar rays warm the atmosphere & drive the global wind patterns, along this cloud formation, rainfall patterns & variations in the global temperature are all linked with the sun. Solar energy plays a key role in the photosynthesis process & influences the process of cooling the atmosphere by managing carbon dioxide level. The sun is playing a critical role in

4 Climate variability occurs when a region's climatic parameters deviate from its long-term average. A location's climate changes each year throughout a certain period. Some years' experience below-normal rainfall, while others have average or above-average rainfall.

5 The term "ice age" refers to a geologic epoch when large ice sheets covered continents. Large-scale glaciation may change continents' surface features over millions of years.

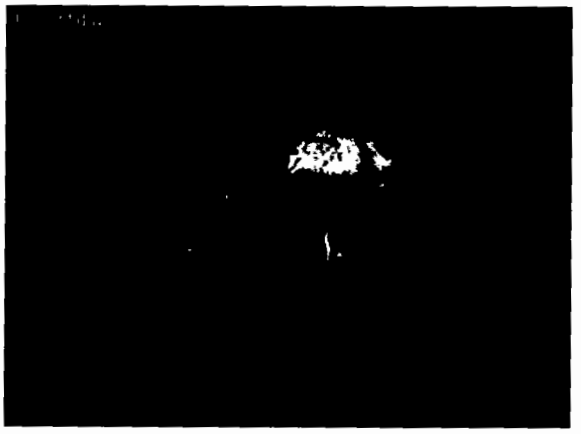
6 El Niño occurrences induce global average surface temperature rise lasting about a year, while La Niña events cause short-term cooling.

shaping Earth's climate but the change is evolutionary it took hundreds and thousands of years as compared to the warming Earth is experiencing in recent epochs (Sutter, 2023).

Milutin Milankovitch, a Serbian physicist and astronomer, was the first to recognize the impact of the Earth-sun system on our planet's climate. In the 1920s, he recognized numerous natural cycles in Earth's orbit that could be responsible for large temperature variations. (Sutter, 2023).

Besides sun radiations and movements Earth's moves have also impact on changing climate. There are three types of Earth's movements around the sun's orbit: Eccentricity, axial tilt, and precession and these movements influence the climate patterns -as per Milankovitch's theory. The period between this type of natural transition can be tens and thousands of years (axial tilt and precession) or more than hundreds of thousands of years (eccentricity)

Ocean currents control the variations of temperature around the globe. The oceans have more capacity to absorb heat than the atmosphere, so as sea surface temperature accelerates it brings change in the ocean circulation patterns that transport warm and cold water around the globe.The direction of these currents can change which is why there is a difference in different areas temperatures. As oceans absorb huge amounts of heat, even minor current variations can have a significant impact on global climate[7].



Source: Ocean currents present day. BGS © UKRI.

Source: Ocean currents during the Cretaceous. BGS © UKRI.

The topography of Earth also affects the climate for instance the hilly area temperature varies as compared to plain areas and hilly areas receive more rainfall due to high altitude. The higher places are cooler than low-lying areas because air becomes thinner and absorbs less heat.

7 "What causes the Earth's Climate change?", British Geological survey

This is the reason for snow at the top of the mountains around the year in mountainous areas. Pakistan is blessed with diverse kinds of land relief including the Northern and Western parts of the highlands (Northern mountains, western bordering highlands, koah-e-kithar and Suleiman mountains, sub-Himalayas and Siwaliks mountain ranges); Plateaus (Balochistan plateau (located in the Balochistan province) and Potohar plateau (located in the North of the salt range,Punjab); Deosai plains (Deosai is considered as the highest plateau in the world, and the Indus River plain areas and desert areas (mostly the southeastern part of the country) are the main land reliefs of Pakistan. Due to this diverse topography, Pakistan is blessed with different kinds of climates in different areas of the country (Topography of Pakistan, 2024)[8]

The distance from the equator influences the climate of a specific area. At the poles, solar energy reaches the Earth's surface at a lower angle than at the Equator. This shows that the climate is cooler at the poles. The poles also suffer the greatest disparity in summer and winter day lengths: in the summer, the sun does not set at the poles, and in the winter, there is absolute darkness. At the equator, however, the length of the day varies little.

The new dynamic of climate is the impact of human activities on its environment that is moulding climate conditions of every continent ocean and ecosystem. This is referred to as the era of anthropocentric climate change which is entirely different and rampant from natural climate changes such as the EL Nino effect. The human-induced climate variations included ozone depletion, global temperature rise, acid rain and many others (Neelin,2010).

Earth's Climate system is a combination of oceans, land surface, atmosphere cryosphere and hydrosphere that is very complex and continuously evolving. To understand the variability in this system from place to place and over time it is imperative to explore the integration between these components and the interaction of people with their environment and ecosystems.

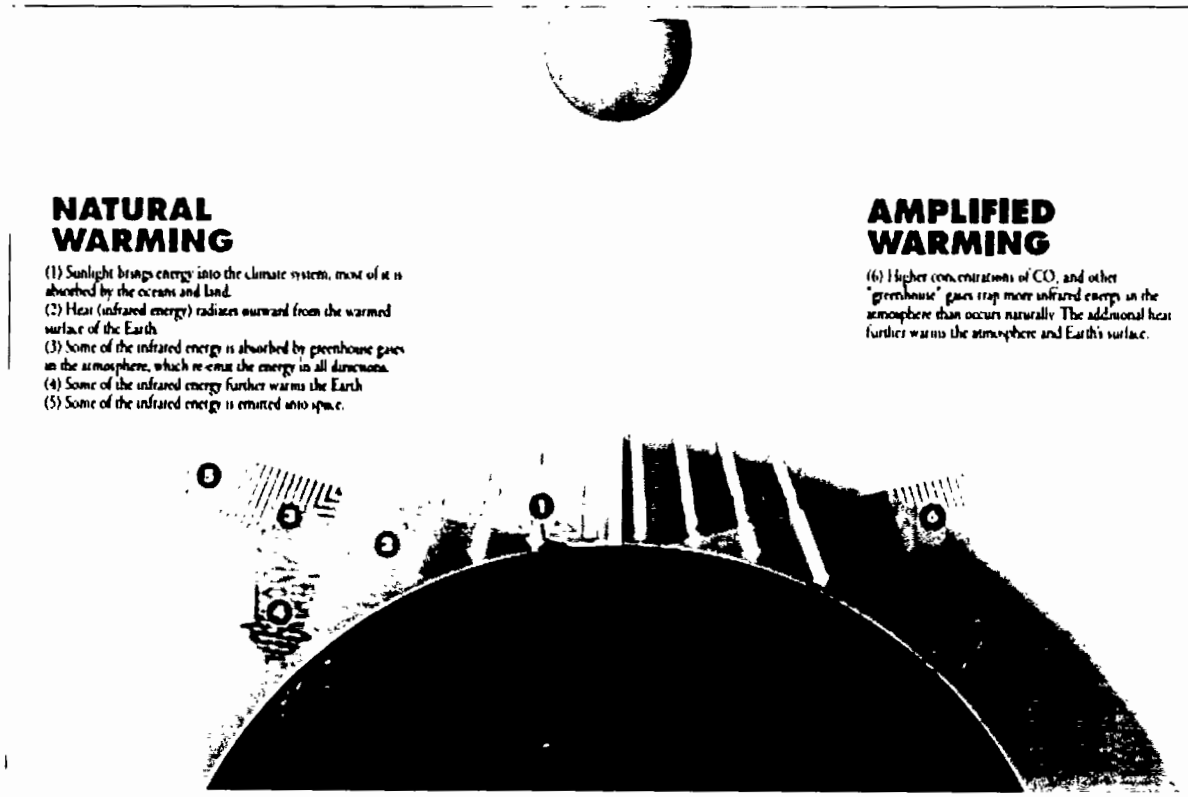
2.2 Earth is Warming: Anthropocene or Natural Greenhouse Effect

Earth's atmosphere is composed of 21 % oxygen (O),78 % nitrogen (N), 0.9 argon (Ar), very low amounts of greenhouse gases like methane (CH4), Nitrous Oxide (N2O), carbon dioxide (CO2), water vapour, neon and 0.1 per cent of other gases. A few of them are becoming a cause of undesirable warming of the earth's surface, GHGs. There are two types of warming: natural warming the other one is amplified warming. The greenhouse effect is a natural warming

8 https://pakistanalmanac.com/topography/

mechanism. Carbon dioxide (CO2) and other gases are always present in the atmosphere. These gases provide a warming effect that is comparable to that found inside a greenhouse, hence the term "greenhouse effect.

Naturally, there is a balanced concentration of greenhouse gases present in the atmosphere. However, due to the tendency to absorb and re-radiate infrared energy these gases trap heat near earth's surface and making it warmer (Figure 2).



Source: The National Academy of Science
Figure 2: The Greenhouse Effect

1. sunlight hits the earth absorbed and converted into heat, **2.** The surface emits heat to the atmosphere, **3.** where some of it is absorbed by GHGs, **4.** rest is re-emitted to the surface, **5.** The gases not trapped by GHGs reflect the space, **6.** Human activities (Figure 2) increase the GHGs concentration increase the amount of heat in the atmosphere and amplify the warming effect.

Figure 3 shows that GHGs have increased significantly after the Industrial Revolution as a result of diverse human activities and behaviour. Anthropogenic CO2 emissions are the result of the use of fossil fuels for different combustion purposes from running train engines to

industrial engines, agricultural use and construction purposes; every ten years an area of the size of Britain disappears under the jungle of concrete; for their daily use converted natural resources to finished products like rubber, paper; by using nitrogen fertilizers trying to increase crop yield to fulfil growing food demand; and other performing other industrial activities to produce finish products for human ease like refrigerates, air conditioners and electronics that produced GHG's. These activities are accelerating the amount of CO2 and other harmful gases in the atmosphere and in result enhancing the effect of warming.

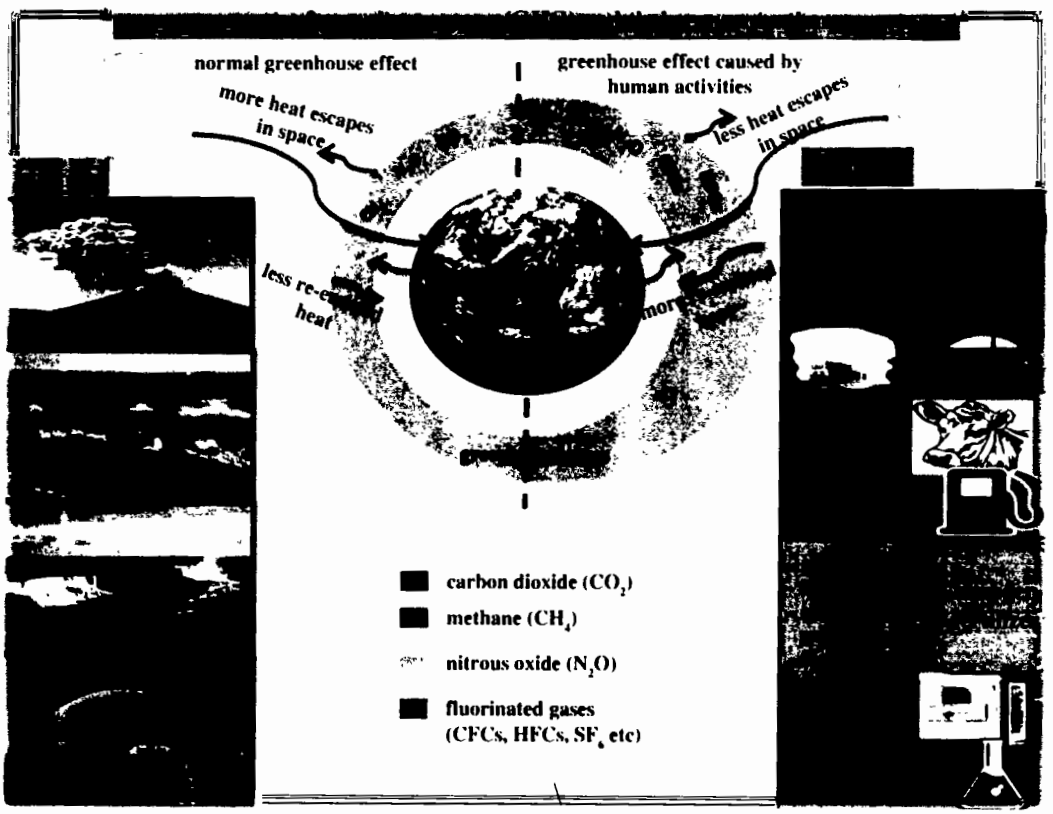


Figure 3: Sources of Greenhouse gases and concentration

Source: Gautam, Yogendra & Sharma, Kavita & Tyagi, Shrestha & Ambedkar, Anit & Chaudhary, Manika & Singh, Beer. (2021)

Our environment is a combination of two factors: biotic factors (living things) and abiotic factors (non-living things) (Figure 4). The major contributors and stakeholders are humans. Everything revolves around human needs and human development for its survival. Biotic factors include humans, plants animals, and other living species. However, abiotic factors

include water, land, air, mountains, and resources that living things need for their survival. This process of dependence and interdependence is termed an ecosystem makes a reciprocal relationship among both. Humans are dependent on a- biotic factors of environment like water, land, mountains, ecosystem, biodiversity, marine resources and non-renewable resources and the growing population aggravating this demand and pressure on resources in result its disturbing the natural equilibrium between them. In the above context, a stable environment requires a stable ecosystem, and, in this cycle, the humans become the major actor who are operating the whole process. Unfortunately, at present time both the environment and humans are at high risk.

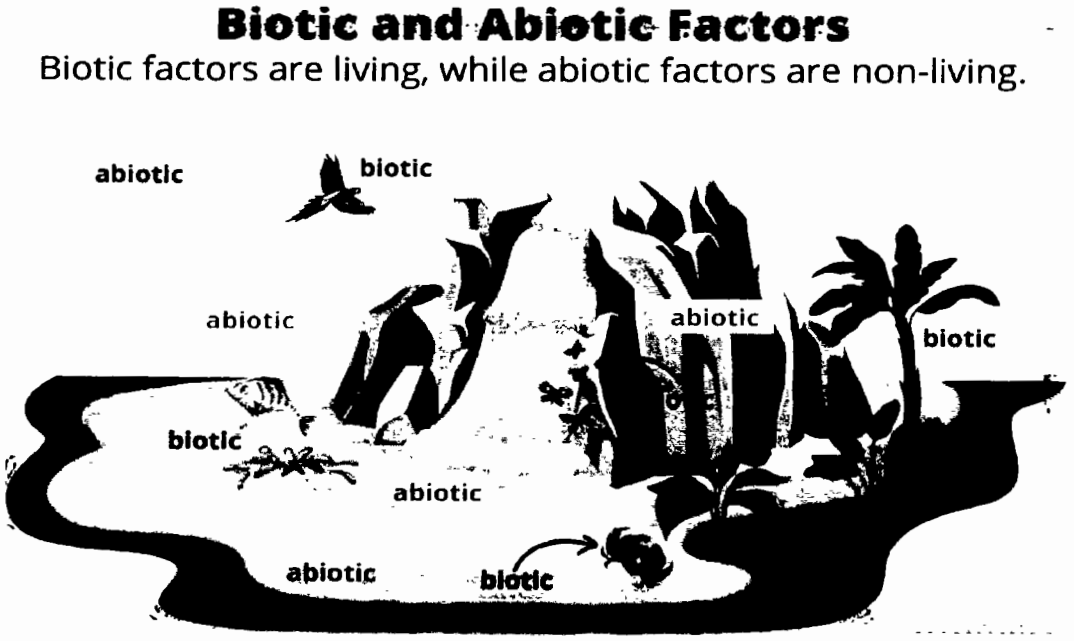


Figure 4: Biotic and A-Biotic factors

2.3 The Earth System, Climate Change, Ecosystem and Human Societies

Our Earth System (Figure: 5) is composed of two major factors: the biosphere and the geosphere. The geosphere is subdivided into four subcategories: lithosphere (Solid Earth), atmosphere (gaseous envelope), hydrosphere (water bodies) and cryosphere (frozen water bodies).

Each of the subdivisions has further categorization: for instance, the rivers, oceans, lakes and other water bodies are elements of the hydrosphere. Similarly, biosphere (living organisms) consists of around 100 phyla arranged into five kingdoms of life forms. There are 20 million

to 100 million species in the biosphere category, with humans being only one of them. However, this single species has an inextricable link to the earth system and has a significant impact on it, and its activities have serious consequences for the rest of the earth system's kingdoms and subdivisions so it's like a complex web and the major culprit is human and anthropogenic activities in the system. When human activities create disturbance in the system rest of the elements also disturb the equilibrium for instance, changes in the atmosphere caused by human activities have a major influence on the biosphere and hydrosphere, which offer a nourishing environment for societies to exist.

These anthropogenic activities accelerate the ratio of GHGs in the atmosphere consequently it drives climate changes, ocean acidification and challenges the viability and resilience of natural ecosystems and the existence of human societies that depend upon them. Disruption in the natural ecosystem jeopardizes biodiversity and has major repercussions for food production worldwide.

Extreme and unpredictable climate variations can lead to irreversible changes in the ecosystems and that's why it's difficult to observe abrupt changes in the ecosystem that may disturb the whole cycle of the natural food chain, bio-diversities etc. However, these ecological communities need a long-time span to respond to the change and build resilience against it. Lglesias and Whitlock[9] used palaeonvironmental records of pollen and charcoal data to explore the relationship between vegetation- wildfires and the climate of temperate forests in the Northern and southern hemispheres and its impact on the forest species composition. The resilience of forest habitats towards changes in the environment depends upon the climate, soil composition and condition, and historical legacies. Unpredictable climate changes and extreme events like scorching heatwaves, and forest fires when combined with biophysical feedback it can transform the composition of long-lived ecosystems in response to that event (Iglesias & Whitlock, 2020).

9 Iglesias and Whitlock use palaeoenvironmental records of pollen and charcoal from temperate forests in the Northern and Southern Hemispheres to study how fire affects forest tree species composition. They investigate the paradigm shift from a stationary, balance-of-nature approach to a more dynamical understanding of ecological change, which has its roots in palaeoecology, a field that studies long-term interactions between species and their environment.

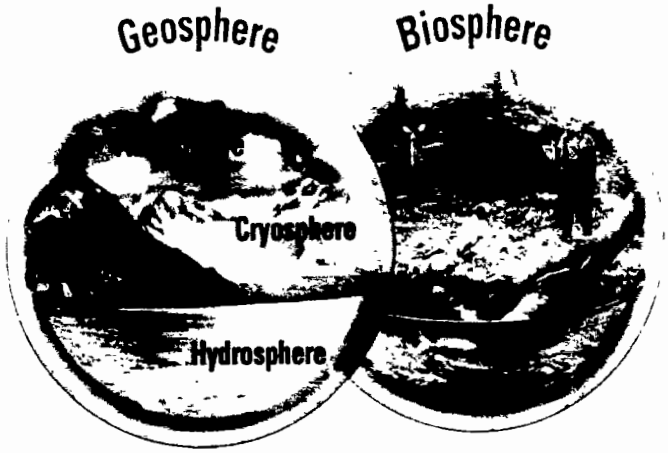


Figure 5:The Earth System

Source: The Earth's Dynamic Cryosphere and the Earth System by Richard S. Williams, Jr.

2.4 Climate Change and Unpredictable Weather Extremes: Risk Multipliers

Climate change has had a significant impact on global sustainability, particularly on rural people in developing nations, with Pakistan serving as a notable example. Over the last decade, the Indus River system has seen large-scale floods, causing substantial damage. In addition to floods, the country has seen periodic droughts and heatwaves, which have exacerbated the issues posed by climate change. Climate change has had a substantial influence on Pakistan, causing changing weather patterns and destructive floods that have affected the country's ecology and economy.

Pakistan is in a tropical region with heated environmental conditions. It has been among the top ten countries most affected by climate change in the past 20 years. Climate change in Pakistan has been attributed to a severe drought in Cholistan and Tharparkar from 1998-2002. Other factors include an intense heat wave in Karachi in 2015, back-to-back floods since 2010, severe winds in Islamabad in June 2016, increased landslides and Glacial Lake Outburst Floods (GLOFs) in the country's northern regions, and increased cyclonic activity. This review aims to analyses how big climatic fluctuations affect cattle productivity and health, taking into account the statistics mentioned above (Jamil et al.2022). Research indicates over 7000 glaciers present in the northern area of Pakistan. Due to rising temperature these are melting at faster rate, that would increase the episodes of glacial lake outbursts. However, over 3000 glacial lakes have formed in Gilgit-Baltistan (GB) and Khyber Pakhtunkhwa (KP) alone, and 33 of them are at high risk of glacial lake outburst floods (GLOF) (Maqbool,2022)

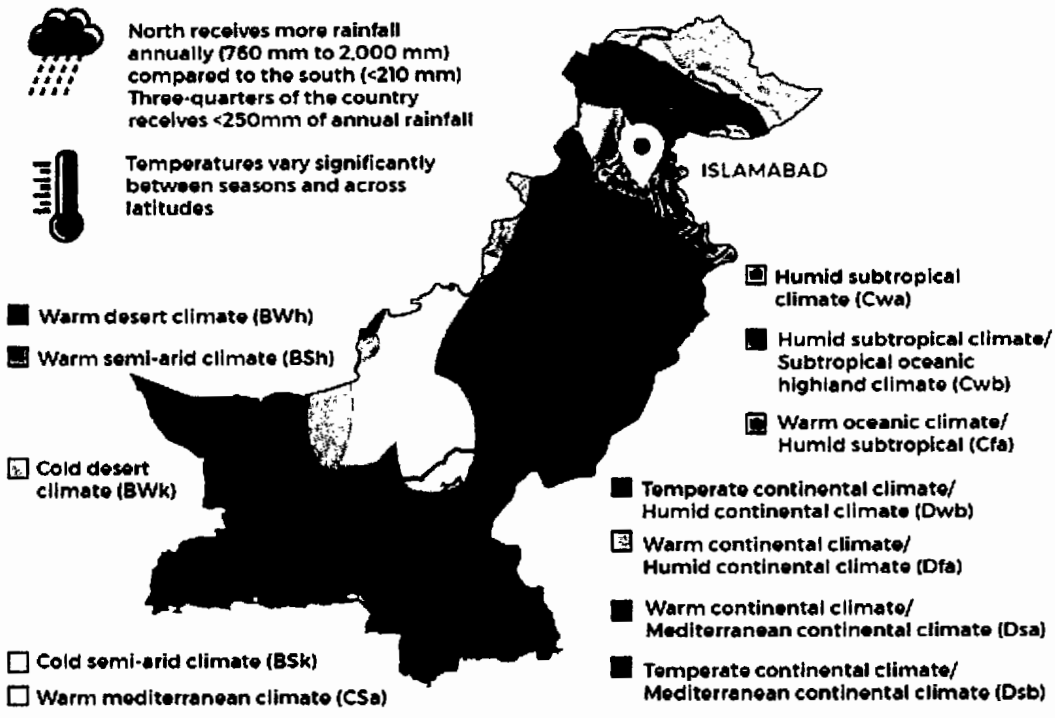


Figure 6: CLIMATE CHANGE IMPACTS ON HEALTH AND LIVELIHOODS: PAKISTAN ASSESSMENT

These climatic changes affect Pakistan's water supplies by influencing glacier behavior, rainfall patterns, greenhouse gas emissions, and the frequency of extreme events such as floods and droughts. Severe flooding happened in the years 1950, 1956, 1957, 1973, 1976, 1978, 1988, 1992, 2010, 2011, and 2012. Between 1998 and 2004, Pakistan saw the worst droughts in its history. Pakistan has a surface water potential of 140-million-acre feet and an underground water resource of 56 MAF. It is among the most water-stressed countries in the world. The per capita yearly water availability has decreased from 5140 m3 in 1950 to 1000 m3 today. It is rapidly approaching water scarcity (Hussain & Mumtaz 2014).

Climate change is not only affecting natural resources, ecology and the earth system but also making affected communities more vulnerable socially and economically and acting as a catalyst to an already crumbling country's economic situation. It's also impacting agriculture sector in the country and food security by increasing temperatures and affecting water availability. The 2010 floods in Pakistan devastated 2.1 million hectares of cropland, resulting in decreased food production and 50% higher wheat prices compared to pre-flood value (Cheema et al., 2015). The Global Change Impact Study Centre (GCISC) predicts that wheat crop yields will decrease by 3.4 to 12.5 per cent in semi-arid irrigated areas like Faisalabad and Sheikhupura, and 3.8 to 14.5 per cent in arid areas like Hyderabad, Badin, Bahawalpur, and

Multan by the end of this century. Rising global temperatures are projected to reduce rice crop yields by 12-22% in most rice-growing countries by the end of the century (Maqbool, 2022).

Climate-induced human displacement is another risk multiplier. Low-lying coastal cities in Pakistan may be impacted by coastal climatic variability, resulting in large population displacement. In recent years, more residents have fled Pakistan's coastline region due to rising sea levels and saltwater contamination. Pakistan's coastal belt, particularly Thatta and Badin, has seen over 40,000 people migrate to Karachi due to catastrophic events such as storms, seawater intrusion, and water shortages (Sattar, 2013). According to Oxfame, (2019), almost all communities of Badin, Sajiwal, and Thatta districts have migrated to Karachi.

CHAPTER THREE

HUMAN SECURITY: REFRAMING THE CLIMATE DISCUSSION INTO SECURITY FRAMEWORK

Chapter three presents a detailed account of a paradigm shift in the concept of security from a state-centric to an individual-centric approach. Traced back to the United Nations Development Programme report,1994. The former Minister of Finance of Pakistan, and a consulting economist Mahbub-ul-Haq, contributed to developing the Human Development Index (HDI) and the Humane Governance Index (HGI). Haq's viewpoint is articulated in his 1994 paper "New Imperatives of Human Security". In further part elucidates Haq's five step programme for global human security betterment. Section two elucidates the nexus between climate change, development and security by providing evidence on the economic and livelihood dimensions of human security in the above context.

The concept of security revolves around the discussion of safety and freedom, both traditionally for the state and today for the individual. How safe are we? How free are we to conduct our affairs? This debate has remained the core agenda of international relations. The questions are not new but it has piqued the curiosity of policy makers, scholars, and philosophers by the end of cold war period. The security discourse shifted from state centric to individual centric (Bajpai, 2000). In 1990's a great debate began among different group of thinkers about the new kind of insecurities (Waisova,2003). Literature produced after the cold war provides evidence that governments, Non-Governmental Organizations (NGOs), international organizations, the public, media and academia have opportunities to question and explore safety and freedom have unprecedented opportunities to expand the scope of safety and freedom (Bajpai, 2000).

The concept of human security may be traced back to the reports of independent commissions given by famous leaders and academics from around the world. The Club of Rome published a series of volumes on the "world problematique"[10] in the 1970s, highlighting the issues such as poverty, environmental degradation, loss of faith in institutions, rampant urbanization, job insecurity, youth disaffection, rejection of traditional values, inflation and economic stagnation (Meadows & Randers,2012).

According to the report, an individual is various challenges and pressures every day that need to be noted and addressed. These challenges harm him at various levels. He is busy in search of food (food insecurity), and he may be concerned about personal security or the security of the state where he lives. He may have fear or next world war or civil war or political instability in the state. The individual's problems must be understood in a global context such as overpopulation, poverty, starvation, scarcity of resources, political turmoil, industrialization and environmental degradation (Meadows & Randers,2012).[11]

This was followed by two other important commissions that changed the perspective on development and security; first, the North -South Report presented in 1980, its discussion revolves around the significance of revamping North-South ties in terms of addressing the global Socio-Economic challenges. The report was based on simple common or shared interests of humanity. This not only highlighted the question of war and peace, but also underscores how

10 A concept created by the Club of Rome to describe the complex set of crucial problems (political, social, economic, technological, environmental, psychological, and cultural) that humanity faces, and that need to be solved.

11 Meadows et al., Limits to Growth, pp. 17-18.

to address world hunger, misery, and inequalities in the living standards of affluent and poor[12] . Second, in 1980's, the independent commission on Disarmament and security issues, headed by Olof Palme (Former Prime Minister of Sweden) published the "common security" report, that presented numerous novel perspectives on peace and security. The report emphasized on the significance of military and state security in the third world countries and also highlighted the issues like poverty and economic disparity in those areas. The report further noted that common security requires that the people live in dignity and peace, that they have food security, job security and they can lie in peace without poverty and deprivation[13]. Following the above significant steps "common responsibility" the Stockholm initiative on Global Security and governance was introduced. It was the brainchild of prominent members of four commissions including the North-South Commission, chaired by Willy Brandt; the Independent Commission on Disarmament and Security headed by Former Prime Minister of Sweden Olof Palme; the Brundtland commission established by Javier Pérez de Cuéllar, Secretary-General of the United Nations; and the south commission, an initiative taken by developing nations and headed by Julius Nyerere (Alatas et al., 1991). In 1995, the commission on global governance's report,' Our Global Neighborhood, provided a much broader perspective of security, stating that the definition of global security must be broadened from the historical concept of state security to people security and planet security (Baxi, 1996).

According to Baldwin (1997, p.8), understanding the concept of security is not the same as defining how to achieve it. Conceptual clarity is important before identifying security conditions; to understand or identify conditions it is imperative to clear the concept of security. David Baldwin, suggests that a more precise definition of security is necessary to assess the discussion surrounding its idea. To achieve this, two things are imperative: a proper definition of security and a more precise definition that addresses questions such as who needs it, what values it serves, how much security is needed, what risks it protects against, and how it is achieved "security for whom, security for which values, how much security, security from what threats, and security by what means?"[14]

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12 The Independent Commission on International Development Issues, North-South: A Programme for Survival (Cambridge, MA: The MIT Press, 1980), p. 13.

13 The Independent Commission on Disarmament and Security Issues, Common Security: A Blueprint for Survival (New York: Simon and Schuster, 1982), p. xv and p. 172, respectively.

14 David Baldwin, "The Concept of Security," Review of International Studies, vol. 23 (1997), pp. 12-18.

Baldwin's work distinguishes itself from other literature by clarifying the definition of security. The author expands on Wolfers' (1952, p.484) idea that security refers to the protection of previously acquired values. "The absence of threat to acquired values" and alters this to "a low probability of damage to acquired values."[15]

The concept of human security is traced back to the United Nations Development Programme report, in 1994. The former Minister of Finance of Pakistan, and a consulting economist Mahbub-ul-Haq, who was instrumental in developing the Human Development Index (HDI) and the Humane Governance Index (HGI), was closely linked to the notion from the start. Haq's viewpoint is articulated in his 1994 paper "New Imperatives of Human Security" [16] . He addresses the question of "security for whom" in a very simple manner. Human security focuses on individuals, not states or nations. He believes that the world is entering a new epoch of Human security when the concept of security will undergo epochal changes. This new idea of security priorities individual security over state security, or "security of people over territory."

He writes "We need to practice a new concept of human security that reflects in the lives of our people, not in the weapons of our country" (Haq,1994).

Haq's view on what values will we strive to protect was not explicit but he emphasizes on the security and well-being of individuals whereas traditional concept revolves around the protection and safety of territory.

What are the threats to these values? He precisely elucidates some non-traditional security threats including, the spread of viral diseases, drug trafficking, terrorism, and poverty. The essay highlighted another fundamental threat; unequal world order where few states are dominant elite at the expense of the rest of the humanity. Current international order is reflected in the development methods weaponry race for security, the North-South divide and marginalization of global institutions. So, what needs to be done to achieve human security, Haq's contribution mostly focused on this part. He emphasizes the development programme rather than arm buildup. He proposed five-step programmes for global human security betterment including:

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15 Baldwin, "The Concept of Security," p. 13.

16 Mahbub ul Haq, "New Imperatives of Human Security," RGICS Paper No. 17, Rajiv Gandhi Institute for Contemporary Studies (RGICS), Rajiv Gandhi Foundation, New Delhi, 1994, p. 1.

Step 1	Developmentally	Emphasis on sustainable development, and equal opportunities for all (including asset distribution, job creation, social life security, access to market, to resources, through fundamental restructuring of global wealth distribution and consumption patterns.
Step 2	Militarily	Need for a paradigm shift from military aid to economic for the world to ensure peaceful development and welfare of humanity. Halt the arms export and require significant cuts to military expenditure.
Step 3	North-South Restructuring	Equal access to the global market for developed, developing and least developed nations. Removal of trade barriers (particularly in textile and agriculture). Economic reparations from elite countries to those who are bearing the environmental, resource depletion and other economic and social losses due to their development.
Step 4	Institutionally	Restructuring and revitalization of the major institutions (like the UN, and IMF World Bank) are required to empower the poor, for human development, and economic adjustments. Adding to this there is a need to establish new institutions like the global central bank, world taxation system, World Trade Organization and above all a veto-less Economic Security Council established to ensure global environmental security, food security, job security, and deal with issues like global poverty, migration and drug trafficking.
Step 5	The Development of a global civil society	Above all, there is an urgent need for grassroots or local participation to address individual-level challenges and a shift from an authoritarian to a democratic system of governance.[17]

Source: Mahbub-ul-Haq, "New Imperatives of Human Security," RGICS Paper No. 17, Rajiv Gandhi Institute for Contemporary Studies (RGICS), Rajiv Gandhi Foundation, New Delhi, 1994, pp. 3-17

3.1 Barry Buzan's Human Security Approach

Theoretically, different schools of thought attempted to explain the concept from different viewpoints. The more appropriate explanation of this complex connection is presented by Barry

[17] Haq, "New Imperatives, pp. 3-17

Buzan's Human Security approach; the theory provides broader and multifaceted perspectives of human security concerns.

Buzan provides a different perspective of security that covers both micro and macro levels, it also covers the social dimension of security and elucidates how societies view threats. He initiated debate about different parameters of security and explored the relationship between state security and individual security. According to Buzan, the state is both a source of threat and security for the people. Most of the time people face threats that are the product of unavoidable social, economic and political instability in the state. Buzan believes that the state and individual have a reciprocal relationship: both can threaten the security of each other (Waisová 2003).

The UN's human security agenda is primarily included in the work of the following two agencies: UNDP and UNHCR. The UNHCR derives its definition of human security from the Human Development Report of the United Nations Development Programme. "It understands security first and basic right of the individual, and links the concept of security inseparable to the idea of dignity and human rights to the relief of human misery".

3.2 Nexus Between Climate Change & Human Security: Linking Development & Security

Climate change is no longer an environmental issue, but every unprecedented climate event underscores it's now becoming a political and security concern at the state security level. The most significant changes like natural disasters (earthquakes, floods, tsunamis, landsliding, etc.), changes in precipitation level, changes in average temperature, sea level rise, coral bleaching can exacerbate conflicts and violence. The current climate induces challenges already hampering global security and peace and is projected to worsen in future.

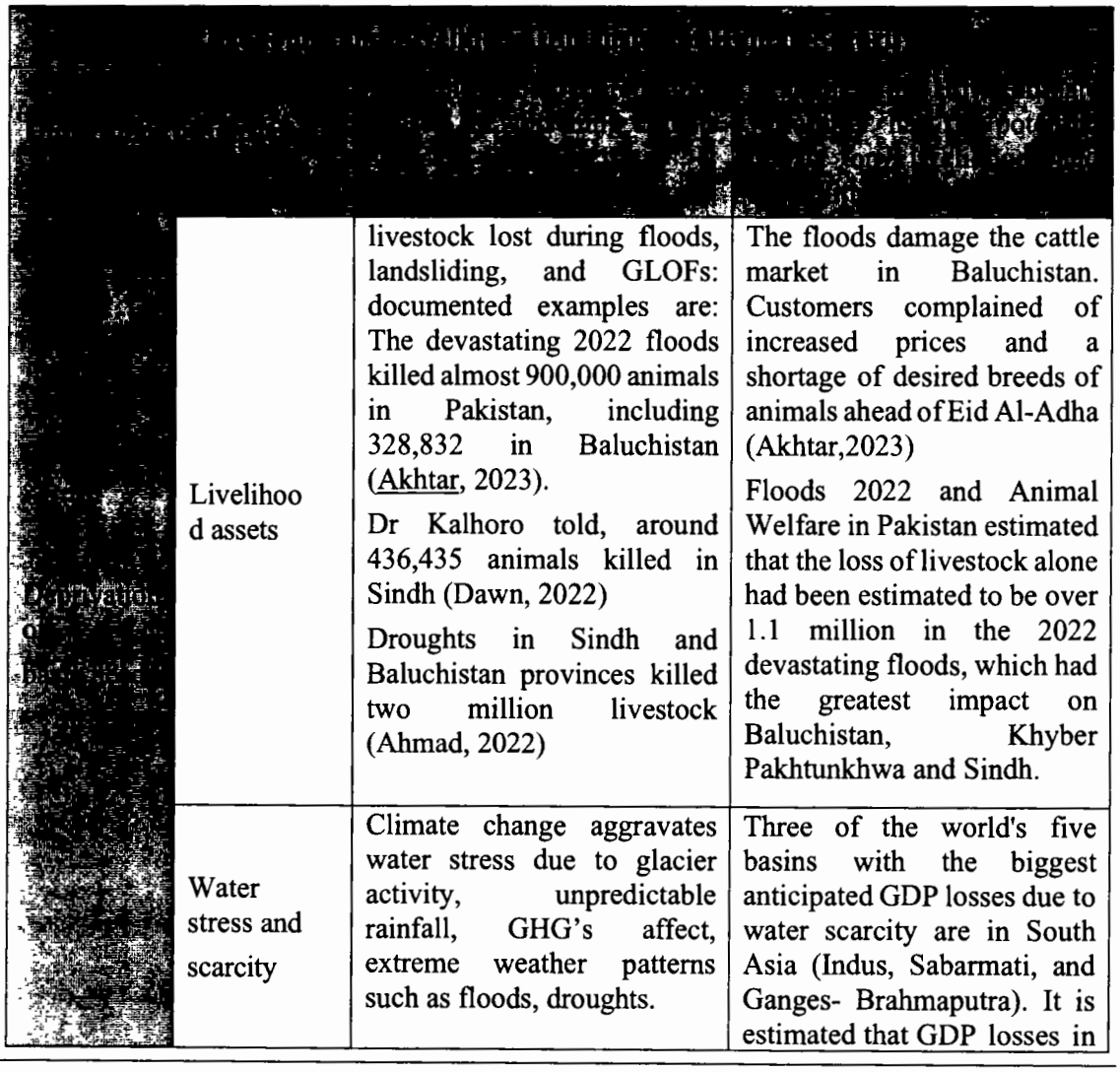
In context of natural climate variations, earlier, the climate was stable and predictable but now the changes are uncertain, unpredictable and rampant due to the aggravating anthropogenic activities share in disturbing natural equilibrium of earth and climate system. The nature strike back and effecting ultimately the humans globally. The vulnerable communities are at top of the risk list. Their social, personal life is at stake. They do not have economic, environmental, social, and personal security. To understand the impact of climate change on human security and on human development it is imperative to collect evidence on social, economic and environmental processes at variant levels and scales. Human security and climate changes both are worldwide issues. However, numerous studies asserted that climate change is expected to have significant and serious impacts on human security in developing and least developing

countries. The most vulnerable populations are at high risk globally.

3.3 Economic and Livelihood Dimension of Human Security

Climate change poses a threat to human security by undermining livelihood, and economic activity, compromising personal security, increasing unwanted replacements and limiting states' ability to provide aid and necessary security measures. Climate change may affect a few or sometimes all factors for instance, starvation, violence and political and social instability often make a complex combination of acute insecurity. Ironically, most of the time climate change threatens the human security of already vulnerable communities.

The material factors of livelihood include access to food, clean water, health services, shelter and job. Besides that, demographic aspects also matter such as, age (adults, kids, elders), gender (men, women), income and livelihood status, mountainous area, plain or agriculture area, costal area or inland places. Depending on the socio- demographic aspects impact of risk varies.



Livelihood assets	livestock lost during floods, landsliding, and GLOFs: documented examples are: The devastating 2022 floods killed almost 900,000 animals in Pakistan, including 328,832 in Baluchistan (Akhtar, 2023). Dr Kalhoro told, around 436,435 animals killed in Sindh (Dawn, 2022) Droughts in Sindh and Baluchistan provinces killed two million livestock (Ahmad, 2022)	The floods damage the cattle market in Baluchistan. Customers complained of increased prices and a shortage of desired breeds of animals ahead of Eid Al-Adha (Akhtar,2023) Floods 2022 and Animal Welfare in Pakistan estimated that the loss of livestock alone had been estimated to be over 1.1 million in the 2022 devastating floods, which had the greatest impact on Baluchistan, Khyber Pakhtunkhwa and Sindh.
Water stress and scarcity	Climate change aggravates water stress due to glacier activity, unpredictable rainfall, GHG's affect, extreme weather patterns such as floods, droughts.	Three of the world's five basins with the biggest anticipated GDP losses due to water scarcity are in South Asia (Indus, Sabarmati, and Ganges- Brahmaputra). It is estimated that GDP losses in

			the Indus Basin alone will approach $5,000 billion by 2100
		Severe flooding happened in the years 1950 to 2012. Between 1998 and 2004, Pakistan saw the worst droughts in its history. (Hussain & Mumtaz, 2014)[18]	(Ahmad, 2022)[19]
	Loss of property and residence	According to Henson (2022) in 2010 floods 1.8 million homes destroyed. However, 2022 floods portrayed another drastic picture around 300,000 homes and other infrastructure destroyed. Owing to these losses 6 million people force to displaced in 2010 and 3.1 million in 2022.	According to World Bank, in its most recent assessment, Climate induced disasters affected 75 million people over last three decades in Pakistan, and the projected economic losses are more than $ 29 billion, or nearly $ 1 billion per year (Ahmad, 2022) World Bank reported, Sindh is the most -affected area of Pakistan with 70% of total damages and losses (including: agriculture, infrastructure, livestock, transportation, communication and fatalities) followed by Baluchistan, kapok, and Punjab (Altaf,2022)
	Agriculture and food security	Crop yield is affected by the heat stress in different regions of Pakistan. Studies shows 1°C rise would cause 5-7% decline in crop yield[20] Ali & Olaf (2015) findings indicated that wheat production would decrease by 6-9% in Pakistan's arid, semi-arid and sub- humid regions. Ahmad et al.'s (2013) study anticipated that rice production in different areas of Pakistan also	September 2022 report presented by the provincial disaster management highlighted that 35% of affected communities livelihood based on cultivation. Around 6.5 million acres of crops were affected, including about 4.8 million acres in Sindh, and 0.9 million in Baluchistan.[21] According to World-Wide Fund for Nature-Pakistan report, the changing climate have a direct impact on agricultural productivity, and have significant threat to food security[22]

		declines due to heat stress. In semi-arid areas rice production would decline by 15% from 2012 to 2039, 25% from 2040-2069 & 36% from 2070 to 2099 id the temperature rises with same acceleration. It is expected that by 2040 the heat stress will decrease agriculture production by 8-10% in Pakistan (Cradock-Henry et al., 2020).	
	Human capital (Health, education, loss of lives)	Air pollution is another serious environmentally-induced health issues that is increasing death rates due to growing infections, lungs cancer and cardiovascular diseases (WHO, 2016). UNICEF, in a 2019 study highlighted that 70 % of people in Pakistan are still drinking contaminated water. Due to recurrent floods many pollutants mix with ground water and increase water pollution level (Ahmed and Suphachalasai 2014; Ministry of Climate Change 2012).	World Health Organization in a study highlighted the adolescents are higher at risk. Deaths due to heat waves among 65 + ten deaths per 100,000 and 63 deaths per 100,000 every year (WHO, 2016). Ahmed and Suphachalasai (2014) conducted the study, and according to their findings, that re-emerged after the 2010 floods almost 1,218 cases were reported in 2014. In August 2020, due to heavy flooding infrastructure and sewage system affected badly and resulted as outbreak of waterborne diseases like diarrhoea and Cholera (KI1; Kii2; NEEDS 2020).

18 Hussain, M., & Mumtaz, S. (2014). Climate change and managing water crisis: Pakistan's perspective. Reviews on environmental health, 29(1-2), 71-77.

19 Ahmad, A. (2022, May 17). Pakistan's Water Crisis to deepen with Climate Change. Dawn News. HTTPs://www.dawn.com/news/1690086

20 Aggarwal, P., & M. V. Sivakumar. (2011). Global climate change and food security in South Asia: An adaptation and mitigation framework. Climate change and food security in South Asia, Springer, pp. 253–275

21 Baigal, P. M. "Pakistan Farmers Who Lost Crops to Floods Struggle Without Compensation." _Dialogue Earth_, [date accessed or published if known], https://dialogue.earth/en/justice/pakistan-farmers-who-lost-crops-to-floods-struggle-without-compensation/.

22 Baigal, P. M. "Pakistan Farmers Who Lost Crops to Floods Struggle Without Compensation." _Dialogue Earth_, [date accessed or published if known], https://dialogue.earth/en/justice/pakistan-farmers-who-lost-crops-to-floods-struggle-without-compensation/

CHAPTER FOUR

IMPACT OF CLIMATE CHANGE ON PAKISTAN'S SOCIO-ECONOMIC CONDITIONS

The chapter four assesses the effects of climate change on the Socio-Economic condition of Pakistan. In further discussion it offers critical analysis of different climate events in variant parts of country particularly the most vulnerable areas like Sindh, Northern areas of the country, Baluchistan and on the intricate connection of climate change with Socio-Economic status of a state and its people.

Before diving in to a narrower dimension where the impact of change on socioeconomic conditions of Pakistan will be discussed. It is imperative to first shed light on the intricate linkage of climate change with Socio-Economic status of a state and its people. Climate change is not only an environmental crisis as it has interventions linked with the Socio-Economic status of the humans as well. The nexus between climate change and socioeconomic development is complex and deeply intertwined. The social and economic activities of an individual are the primary driver of climate change, yet the consequences of climate change also significantly impact these same activities, creating a symbiotic relationship. This phenomenon works in the form of a cycle, this cycle comprises of numerous factors; Socio-Economic development, energy and land use, emissions, climate change and then the impact of climate change on these factors.

Socioeconomic development of a states encompasses a wide range of determinants, including population growth, economic activity, social equity, urbanization, education, consumption patterns, lifestyles, and institutions. These elements shape how an individual lives and interacts with its environment, allocating their energy usage and land management practices. Further energy and land use represent significant sources of human-generated greenhouse gas emissions and air pollutants. This includes CO2 from burning fossil fuels and through the process of deforestation, methane from livestock, rice paddies, waste landfills, and fossil fuel extraction, as well as Nitrous oxide from agricultural sources. Emissions from energy and land use activities increase the presence of greenhouse gases and air pollutants in the atmosphere. This leads to an imbalance between the incoming sunlight and the outgoing heat radiation, a phenomenon known as radiative forcing. This imbalance has a direct impact on Earth's climate system. The climate change, driven by increased radiative forcing, manifests in rising global temperatures and altered precipitation patterns. The impacts of climate change are felt across natural and human systems, leading to a range of consequences such as droughts, floods, storms, rising sea levels, the scarcity of freshwater availability, heat stress, and potential large-scale reconfiguration of Earth's ecosystems (often referred to as tipping points).

As climate change progresses, its impact increasingly influences Socio-Economic activity. Social and economic damages arise not only from effects like damage to infrastructure, reduced human productivity, or loss of natural resources and ecosystem services, but also from indirectly linked effects such as turbulence in global supply chains, weakened institutions, and climate- forced migration. This argument is supported by Barry Buzan's theory of human security, which focuses on the non-traditional security challenges rather the traditional security challenges to broaden the scope of traditional security studies and encompass a wider range of

threats that affect individual and communal well-being.

Buzan's framework identifies various sectors, military, political, economic, societal, and environmental which collectively shape the security landscape with an interlinked pattern. In the light of human security theory climate change has profound implications for socioeconomic conditions. Within the environmental sector, climate-induced changes such as rising temperatures, fluctuated precipitation patterns, increased sea levels, and extreme weather conditions can have cascading effects on natural resources and ecosystems. This environmental instability directly impacts the economic sector, leading to reduced agricultural productivity, disrupted supply chains, and damage to infrastructure. Such economic disturbances can trigger job losses, reduced income stability, and increased poverty rates, thereby threatening the socioeconomic security of communities.

The societal sector, another key component of Buzan's theory, is also victim to the effects of climate change. As environmental degradation and economic disruptions occur, societal cohesion can weaken. This can manifest as increased social inequalities, marginalization of vulnerable groups, and climate-induced migration, which can, in turn, lead to inter-group conflicts and social unrest. When communities are displaced due to climate-related disasters or loss of livelihoods, the resulting migration can strain local resources and exacerbate existing social tensions. As the climate-induced crises becomes more frequent, the ability of political institutions to maintain order and provide essential services is compromised, and thus further erodes the societal stability. Through Barry Buzan's human security theory, the interconnected impacts of climate change on socioeconomic conditions become evident. By examining the environmental, economic, societal, political, and military dimensions, it becomes clear that climate change represents a multifaceted threat to human security.

4.1 Climate Change and Pakistan; A Developing State

Climate change has impacted the global sustainability and especially severely the rural communities in the developing areas, Pakistan being the notable example. Over the past decade, the Indus River system has seen large-scale floods, which have caused significant damage. Alongside floods, the country has faced frequent droughts and heatwaves, adding to the challenges posed by climate change. Climate change has significantly impacted Pakistan, leading to altered weather patterns and devastating floods that have disrupted the nation's environment and economy. These projections suggest that these climate-related events,

combined with ongoing environmental degradation and air pollution, have the potential to create a severe economic impact on Pakistan. According to the World Bank, Pakistan's GDP is projected to decline by a minimum of 18 to 20 % by 2050 due to these climate-related challenges. Climate change has had a profound impact on Pakistan's socioeconomic conditions, with serious implications for agriculture, water resources, public health, and the economy. Pakistan's agricultural sector, heavily reliant on stable weather patterns, has experienced significant disruptions due to changing climatic conditions in the past three years. This disrupted climate and its impact on the agriculture of Pakistan has resulted in reduced crop yields and has threatened food security, with unpredictable rainfall and rising temperatures affecting staple crops such as wheat and rice. The massively increased frequency of extreme weather events, particularly floods, has caused widespread damage to the infrastructure, homes, and farmland of the rural communities of Pakistan. In 2010, for instance, Pakistan faced one of its worst floods, which displaced millions of people and caused extensive economic losses. This event had far-reaching effects, leading to prolonged economic and social disruptions and setting back the country's development efforts.

Additionally, climate change has intensified droughts, leading to significant water scarcity. This has not only hampered agricultural productivity but has also strained water resources for domestic and industrial use. The recurring droughts in regions such as Baluchistan and Sindh have highlighted the severity of the problem. The resulting water shortages have also fuelled social tensions, as communities compete for limited resources. The public health has also been adversely affected by the extreme climate change in Pakistan. Rising temperatures and shifting weather patterns have also played a crucial role in the spread of diseases like dengue fever and malaria Extreme heatwaves, which have become more frequent, pose significant health risks, particularly for vulnerable groups like the elderly and children. These health risks, combined with inadequate healthcare infrastructure, exacerbate the country's broader social challenges.

4.2 Climate Change and Food Security in Pakistan

Food security, which involves crop production and the accessibility of food, is heavily influenced by climate change. As a result, climate change plays a crucial role in determining food security at global, national, and regional levels. A Daily Times report from April 16, 2015, notes that the Federal Minister of Climate Change, Senator Mushahid Ullah Khan, issued a warning about the increasing frequency of natural disasters in Pakistan. He pointed out that the catastrophic floods of 2010 alone wiped out 6% of the country's GDP. A report released by the World-Wide Fund for Nature-Pakistan (WWF-Pakistan), in partnership with the London School

of Economics-Political Sciences and the Lahore University of Management Sciences, examined climate change's effect on Pakistan's agriculture and food security. According to this report, the changing climate is set to have a direct impact on agricultural productivity, indicating a potentially significant threat to food security. In 2022, Pakistan's agricultural sector was devastated by floods that caused billions of dollars in damage. Thousands of farmers, especially those with smaller holdings, found themselves struggling without insurance or compensation schemes to fall back on. The flooding, which occurred in mid-June, July and August, affected 33 million people and resultantly displaced approximately 8 million. The Planning Commission of Pakistan reported that the agricultural, food, livestock, and fisheries sectors suffered damage of around PKR 800 billion, with long-term losses projected to reach PKR 1.98 trillion.

Sindh and Baluchistan bore the brunt of the floods. A September 2022 report presented by the provincial disaster management authorities indicated that 35% of households in the flood-affected areas were engaged in cultivation. Approximately 6.5 million acres of crops and orchards were affected, including about 4.8 million acres in Sindh, and 0.9 million in Baluchistan.

4.3 Socio-Economic Impact of Climate Change on Northern Areas of Pakistan

Glaciers across Asia are melting at an alarming rate, particularly in Central Asia, due to rapidly rising temperatures. In the eastern and central Himalayas, including the Northern Areas of Pakistan, the swift melting of glaciers has led to a surge in glacial runoff and a higher frequency of glacial lake outbursts, resulting in more mudflows and avalanches. Conversely, some glaciers in the western regions are expanding because of more intense winters. International Union for Conservation of Nature IUCN Pakistan is currently researching the impacts of climate change on communities in the Northern Areas of Pakistan.

The northern areas of Pakistan, particularly Gilgit Baltistan, are long known for their stunning landscapes and rich cultural heritage. However, this beauty has become a hub of crisis because of growing climate change consequences. Climate change is intensifying in these mountainous regions, leading to more frequent and severe natural disasters. These changes are profoundly affecting the socioeconomic conditions of the local population, with impacts spanning education, health, and general living standards. One of the most catastrophic effects of climate change on the northern areas of Pakistan is the increased frequency of Glacial Lake Outburst Floods (GLOFs). These events occur when glacial lakes, swollen by melting glaciers, burst their banks, leading to sudden floods that can destroy villages and agricultural land in their path.

GLOFs often bring mudflow and debris, causing significant loss of life and economic devastation. These floods force many inhabitants to migrate, leaving behind their homes and livelihoods, and contributing to the growing problem of climate-induced displacement[23].

The 2020 floods in Pakistan provided a stark example of the impacts of climate change on these regions. Heavy monsoon rains led to widespread flooding, with significant damage reported in Gilgit Baltistan, including Hunza. The floods triggered landslides, blocking roads and isolating remote communities, while many villages faced destruction due to mudflows and debris. These floods caused significant loss of life and property, displacing families and disrupting local economies. Many residents of Hunza and surrounding areas had to be evacuated, and the rebuilding efforts took months, highlighting the vulnerability of these regions to climate-induced disasters.

The impacts of climate change are not only physical but also affect the social fabric and economic opportunities available to the people of Gilgit Baltistan. Education is one area where these effects are particularly pronounced. The region already suffers from a lack of educational institutions, and extreme weather events like heavy snowfall and avalanches often lead to school closures, disrupting children's education. Furthermore, many educational institutions are in disrepair due to repeated climate-induced disasters, making them unsafe for students and teachers alike. Teacher absenteeism and the lack of higher education facilities compound the problem, forcing many to seek education in urban centres, which is not always feasible for low- income families.

Another significant socioeconomic impact of climate change in the northern areas is the decline in living standards. The infrastructure, already inadequate, is frequently damaged by floods, landslides, and avalanches. This destruction leads to financial losses and makes it harder for families to afford necessities. Many houses in the region are not built to withstand extreme weather, and as climate change intensifies, the risk of damage and loss increases. The transportation and road infrastructure in Gilgit Baltistan also reflect the socioeconomic challenges brought about by climate change. Narrow roads, frequent landslides, and avalanches make travel hazardous, limiting access to education, healthcare, and economic opportunities. The low road density in the region compared to the rest of the country underscores the need for

23 Majeed, Rabia, Moazzam Ali Khan, Syeda Urooj Fatima, Nadeem Mahmood, Nasir Sulman, and S. Shahid Shaukat. "Public Health Status and Socioeconomic Conditions in Climate Change-Affected Northern Areas of Pakistan." _International Journal of Biology and Biotechnology_ 17, no. 2 (2020): 307-317.

improved infrastructure to better connect these remote areas to the rest of Pakistan.

4.4 Climate Change and Its Impact on Sindh's Fishing Economy

Communities in Sindh, particularly those whose livelihoods depend on fishing, are facing serious Socio-Economic challenges due to environmental and climate changes. These fishing villages, once able to sustain themselves with a combination of fishing and limited rice cultivation, now struggle to make ends meet. Thirty years ago, they supplemented their income from fishing with small-scale rice farming during the off-season. However, due to the degradation of agricultural land, this is no longer an option. The impact on fishing has been severe. Fish yields have plummeted from around 120 kg per person per day three decades ago to just 5 or 6 kg today. This drastic decline has forced many community members to migrate temporarily to agricultural areas in northern Badin, where they work as farm labourers. The reduced income from fishing has also driven some to fish off-season, not to sell but to provide food for their families, as they have few other means of earning a living [24].

The environmental changes have had broader social implications. The constant exposure to seawater has caused a rise in solar radiation, heating the shallow waters and creating conditions for vector-borne diseases like malaria and diarrhoea. The lack of proper drainage and vegetative cover has only made matters worse, leading to widespread contamination and health issues. Women in these coastal areas are particularly affected by these changes. The deterioration of drinking water quality has forced them to walk long distances, sometimes more than 5 kilometres, just to fetch clean water. This can take up to four hours, leaving little time for other monetary activities such as needlework. In the past, women supplemented their family's income by selling handicrafts, but this source of income has diminished due to the reduced quality of work and the lack of markets.

The concept of human security extends beyond traditional military threats to include economic, societal, and environmental risks. Genuine human security encompasses the protection of individuals and communities from a range of threats that can undermine their stability and well- being. Pakistan's climate marches, reflect the understanding that climate change puts a profound threat to human security. As the effects of climate change become increasingly severe, the effects extend beyond environmental damage to affect the core

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24 Abbass, Z. _Climate Change, Poverty and Environmental Crisis in the Disaster Prone Areas of Pakistan_. Oxfam, 2009.

elements of human security outlined by Buzan: economic stability, societal harmony, and even personal safety. In Pakistan, the environmental challenges associated with climate change, such as water shortages, smog, and pollution, directly affect the economy and food security. Farmers in Sindh are experiencing a reduction in water supply, which compromises agricultural productivity and food security. This economic instability directly affects the livelihoods of families and entire communities, leading to migration and social disruption. Similarly, the intense smog in Lahore and increasing pollution in Peshawar are health risks that affect people's ability to work and lead a normal life, thus challenging societal security. Health issues like respiratory problems, headaches, and allergies create further stress on healthcare systems and strain family resources.

4.5 Social and Political Disruption from Climate Change

On September 20, 2020, protests erupted across Lahore as people took to the streets to demand action against climate change and its Socio-Economic impacts. The marchers, a mix of students, environmental activists, and concerned citizens, rallied together because they felt the growing urgency of climate change. They had seen firsthand how rising temperatures, smog, and water shortages were affecting their lives and livelihoods. The march in Lahore was part of a global movement to raise awareness about climate change and demand action from governments. Participants carried banners and chanted slogans, calling for measures to reduce carbon emissions and protect vulnerable communities from the effects of climate change. Many were motivated by the increasing frequency of extreme weather events, which had led to severe flooding, heatwaves, and other disruptions. In Lahore, the high levels of smog had become a serious health concern, causing respiratory problems and other illnesses. The marchers demanded cleaner air and stricter regulations on industrial pollution. They also highlighted the need for sustainable practices in agriculture and industry to mitigate the adverse effects of climate change[25].

But protests, such as those witnessed on September 20, 2020, in Lahore, can present significant challenges for the state. These demonstrations, while expressions of public concern and activism, can disrupt normalcy in urban centres, leading to traffic congestion and logistical complications. Additionally, they strain state resources as law enforcement and emergency services are mobilized to ensure public safety and maintain order. Security concerns often loom

25 Raja, Mehrbano. "This Friday, March with Me for the Planet's Future." _Dawn_, September 18, 2019. https://www.dawn.com/.

large, with the potential for escalations or clashes, further complicating the situation. Moreover, the economic impact of protests cannot be overlooked, as businesses may suffer losses due to reduced operations and consumer activity in affected areas. These demonstrations can also exacerbate political tensions and strain public relations if not managed effectively, posing challenges for governance and stability.

Climate change has far-reaching effects that ripple across social, political, and economic landscapes, fundamentally disturbing human security at every level. It disrupts traditional livelihoods, leading to economic instability and forcing communities to migrate in search of better opportunities. Politically, it can foster unrest and challenge governance as citizens demand action to combat environmental degradation and its associated impacts. On a social level, climate change exacerbates inequalities, with the most vulnerable populations bearing the brunt of its effects, from food and water insecurity to health risks and loss of cultural heritage. These disruptions create a complex web of challenges that require coordinated, inclusive responses to ensure that the burdens of climate change do not perpetuate or deepen existing social and economic divides. By advocating for these interconnected issues, the state, the civil society and the people of Pakistan can work toward a more resilient and secure future for all.

CHAPTER FIVE

MITIGATION AND ADAPTATION POLICIES OF PAKISTAN: STRATEGIES, IMPLICATIONS, AND LESSONS LEARNED

Chapter five offers a critical analysis of adaptation, mitigation and resilience-building policies adopted by Pakistan including the National Adaptation Plan (NAP) and its loopholes in the implementation phase. Second part of chapter, presents detailed account of measures taken under the National Climate Change Policy 2021 (NCCP) and underscores its multifaceted challenges in Pakistan's climate governance landscape. Third part provides, comparative analysis Pakistan Global and Regional Climate initiatives including COP-28 landmark achievement and other regional efforts like the Economic Cooperation Organization (ECC), South Asian Cooperative Environment programme (SACEP), South Asian Association Cooperation (SAARC), the United Nations Economic and Social Commission for Asia and the Pacific (UNESCAP), and the United Nations Environment Programme.

Pakistan officially announced the National Adaptation Plan (NAP) in March 2021. The plan was meant to increase the country's resilience to climate change. National adaptation plans serve as an important tool for countries to cope with the harmful effects of climate change. These plans usually offer medium- and long-term strategies to reduce vulnerabilities. Integration of the adaptation policies with national policies is also an integral aspect of the plans. The Green Climate Fund provided 2.7 million US dollars for NAP, which also received support from the UN Environment Programme (UNEP). Different stakeholders, including key government officials, attended the virtual launch ceremony of NAP[26].

The country's dependency on climate-sensitive sectors, including agriculture, water, and natural resources, makes it highly vulnerable to the impacts of climate change. According to Jessica Troni, head of UNEP's Climate Change Adaptation Unit, since 1990, global greenhouse gas emissions have increased by 62%. NAP planned the establishment of systems for creating and sharing adaptation knowledge among different stakeholders. Pakistan has been using nature- based and ecosystem-based adaptation techniques for building climate resilience. NAP tried to utilize the gains obtained by existing programmes like the Ten Billion Trees Tsunami, the Ecosystem Restoration Fund, and the Recharge Pakistan initiative. The Global EbA Fund is also an initiative aimed at tackling the shortcomings of nature-based and ecosystem-based adaptation techniques.

Despite achieving significant milestones, Pakistan's efforts in climate adaptation have been marred by several major failures and challenges. One of the major failures in Pakistan's climate adaptation efforts has been the lack of sufficient funding and resources. Despite the support from the UN Environment Programme (UNEP) and the Green Climate Fund, the allocated USD 2.7 million was not adequate to cover all the necessary activities and projects[27]. This funding shortfall led to delays in the implementation of key initiatives, limiting their overall impact. For instance, the ambitious Ten Billion Trees Tsunami Program faced significant financial constraints, hindering its full execution and scaling up. Another significant challenge was the delay in project execution. The bureaucratic processes and administrative hurdles slowed down the timely implementation of the National Adaptation Plan (NAP) and related projects. The Recharge Pakistan initiative, aimed at improving water resource management, experienced

26 UNEP. "Pakistan to Develop National Adaptation Plan for Climate Change." March 25, 2021.

27 UNEP. "Green Climate Fund Allocates $2.7 Million for Pakistan's Climate Adaptation Plan." 2021. Accessed May 22, 2024

multiple delays due to lengthy approval processes and coordination issues among different government departments. These delays not only postponed the benefits but also reduced the momentum and enthusiasm generated by the initial launch of the projects. Integrating adaptation measures across all sectors proved to be a complex and difficult task. The NAP aimed to incorporate climate adaptation into various sectors such as agriculture, water, and natural resources.

However, the lack of cohesive planning and coordination between these sectors led to fragmented efforts. For example, while the agriculture sector implemented certain adaptive practices, these were not always aligned with water management strategies, leading to inefficiencies and sub-optimal outcomes. Another crucial factor was the capacity building at different levels of governance where Pakistan's adaptation efforts fell short. While the NAP included provisions for training and knowledge sharing, these initiatives were not comprehensive enough to reach all relevant stakeholders. Many local government officials and community leaders did not receive adequate training on climate adaptation measures, which limited their ability to effectively implement and sustain these initiatives. The gap in capacity building was particularly evident in rural areas, where the impacts of climate change are most severe. While Pakistan made strides in addressing climate change through its National Adaptation Plan, several significant challenges impeded its success.

In July 2023, Pakistan unveiled its first-ever National Adaptation Plan (NAP), a comprehensive seven-year strategy spanning from 2023 to 2030. The NAP aimed to address the severe consequences of climate change on the nation, which, despite contributing less than 1% of global CO2 emissions, ranked among the top ten countries most affected by climate change. This initiative marked a significant stride towards confronting the multifaceted challenges posed by a changing climate. The devastating 2022 mega-flood, which affected 33 million lives and set new records for monsoon flooding, highlighted the urgent need for a robust adaptation plan. The cumulative effects of climate change threatened to exacerbate Pakistan's financial problems, potentially reducing the country's GDP by 18 to 20% by 2050.

5.1 National Adaptation Plan 2023

The NAP outlined six priority areas to combat the impacts of climate change on marginalized groups: the agricultural Nexus, Natural Capital, Urban Resilience, Human Capital, Disaster Risk Management, and Gender, Youth, and Social Inclusion. The development of this adaptation plan involved multiple stakeholders, including the United Nations Framework Convention on Climate Change (UNFCCC) and the Ministry of Climate Change (MOCC). The

primary goals of Pakistan's NAP included enhancing resilient development, mitigating risks, fostering collaboration, ensuring inclusivity, fulfilling global commitments, and promoting sustainable growth to achieve equitable outcomes. The NAP framework aimed to integrate climate change adaptation into policies and initiatives, addressing vulnerabilities to lower climate risk. However, despite its comprehensive approach, the NAP faced several criticisms and challenges that could hinder its effectiveness. Pakistan's National Adaptation Plan (NAP), published by the Climate Change Ministry in July, was aimed to prioritize climate adaptation in response to longstanding environmental challenges. This initiative, although arriving more than a decade after the country's initial climate strategy called for such a plan, strategically coincided with the lead-up to COP28, signalling Pakistan's commitment to international climate agendas. Aligned with UN best practices, the NAP outlined a seven-year road map to 2030. It integrated recommendations from a McKinsey report advocating for a systemic approach to climate adaptation, emphasizing climate risk management, technological and behavioural adaptation, economic adjustments, societal considerations, and robust governance and institutional support. These principles were designed to enhance resilience and promote inclusion and equity, particularly for vulnerable groups like women, youth, and marginalized communities. Despite these strategic alignments, NAP encompassed significant challenges and gaps. While the plan emphasized the importance of local implementation and community engagement, the reality of Pakistan's governance structure posed obstacles. Local governments, often marginalized and disempowered, faced challenges in effectively executing adaptation strategies on the ground. This gap between policy intentions and local implementation remains a critical hurdle, limiting the plan's impact at grassroots levels where climate impacts are most keenly felt.

The UN Framework Convention on Climate Change (UNFCCC) model, praised for its high adoption rate of adaptation plans among member states, underscores global commitment to resilience-building. Yet, it had some common shortcomings: inadequate grounding in physical risk assessments, vague articulation of financing needs, and challenges in effective implementation. Pakistan's NAP, similarly criticized for its ambiguous financing mechanisms and lack of specific implementation details reflects broader difficulties in translating adaptation strategies into tangible actions that resonate with local realities and societal attitudes. McKinsey's recommendations for integrating adaptation into economic and societal frameworks highlight the need for comprehensive reforms beyond technical solutions. This approach called for compensatory mechanisms for vulnerable communities and strengthened governance structures that prioritize community engagement and awareness. However, the disconnect

between adaptation planning and entrenched societal attitudes remains a significant barrier. Deep-seated issues of inequity and insufficient societal support for climate action continue to undermine the effectiveness of adaptation efforts[28].

5.2 Lack of Continuity and Integration with Past Efforts

One of the significant shortcomings of the NAP was its failure to integrate policies and climate- related programs introduced by previous governments. Ignoring prior efforts undermined the continuity and accountability essential for effective climate adaptation strategies. Previous initiatives provided valuable insights, lessons learned, and progress that could have informed the new plan. The NAP largely overlooked existing developmental plans, such as the Planning Commission's Vision 2030, the Sindh Government's Vision 2025, and even annual development plans linked with fiscal year budgets. These plans determined how the state allocated funds and resources. For the NAP to have been successful, it needed to embed itself or lead the conversation on developmental plans. By disregarding these, the NAP risked being less effective and disorganized, wasting resources and time that could have been saved by building on past successes.

5.3 Inadequate Focus on Forestry

The NAP notably overlooked the critical role of forests in climate resilience. Forests acted as natural buffers against disasters and supported the livelihoods of various communities in Pakistan. By neglecting forestry, the NAP failed to recognize the vulnerabilities of these communities and missed the opportunity to develop strategies for sustainable forest management. Forests also played a vital role in helping Pakistan achieve its emission reduction targets. A comprehensive adaptation plan should have included measures to enhance and protect forest ecosystems.

5.4 Outdated Climate Data and Lack of Concrete Actions

The climate data used in the NAP did not reflect the current 2023 climate situation in Pakistan. This outdated information could lead to ineffective strategies and responses to contemporary climate challenges. Additionally, the plan lacked specific action measures to address critical issues like agricultural contamination. The MOCC should have conducted a fresh assessment and collected relevant data to ensure the NAP's strategies were effective and aligned with

28 Yusuf, Huma. "Climate Adaptation." Published November 13, 2023.

present-day challenges.

5.5 Insufficient Stakeholder Engagement

The development of the NAP did not involve a comprehensive consultation process with all relevant stakeholders, including non-governmental actors. This lack of engagement meant essential input and concerns from various groups were omitted, resulting in a less inclusive and holistic adaptation strategy. Environmentalists criticized this approach as unsustainable, pointing out the lack of financial transparency and the dominance of bureaucratic control over specialist and environmentalist input.

5.6 Financial Challenges, Lack of Implementation Strategies & Reliance on Foreign Funds

Former Minister Sherry Rehman highlighted that Pakistan needed $348 billion by 2030 to build resilience and sustainability. The Bretton Woods system required structural reforms and $1.5 trillion annual investment in developing countries. While the United Nations Development Program (UNDP) provided some funding through the Green Climate Fund Readiness Programme, it is quite evident that Pakistan heavily relied on foreign funds for its adaptation strategies. The NAP lacked an effective strategy for utilizing private sector assets and did not detail how various financing mechanisms would be employed. A clear and comprehensive financing strategy was essential for sustainable climate change adaptation efforts. In the past as well, Pakistan received modest funding for climate change adaptation from international sources, which served as the primary source of financing for its adaptation initiatives[29]. By April 2015, Pakistan had received $20.8 million from dedicated multilateral and bilateral climate funds, with only $7.3 million directed toward adaptation initiatives through the Adaptation Fund and the Special Climate Change Fund. In 2013, the Organization for Economic Co-operation and Development (OECD) reported that of the $192.4 million in climate-related funding approved for expenditure in Pakistan, only $28.6 million was primarily directed toward adaptation. Despite these inflows, Pakistan's institutional capacity to manage and deploy these funds effectively was lacking, leading to bureaucratic hurdles and administrative inefficiencies that delayed project execution and undermined their impact[30].

Pakistan has failed miserably to align its funding priorities with the immediate adaptation needs

29 Environmental News Network. "Financial Constraints in Pakistan's Ten Billion Trees Tsunami Program." 2022. Accessed May 22, 2024.

30 Parry, Jo-Ellen, Review of Current and Planned Adaptation Action in Pakistan, CARIAA Working Paper #15.

of vulnerable sectors and communities. The focus has always been on large-scale infrastructure projects, such as hydroelectric power plants, rather than urgent adaptation needs like agricultural resilience and water management, reflecting a misalignment of funding priorities. Local governments, essential for executing climate adaptation strategies, often lack the necessary support and resources, creating a disconnect between national plans and local execution. This gap fails to address the specific needs and vulnerabilities of communities most affected by climate change. Addressing these issues is crucial for Pakistan to enhance its climate resilience and effectively leverage international support for its adaptation efforts.

5.7 Failure in Proper Consultation

A significant failure in the consultation process of Pakistan's National Adaptation Plan (NAP) was highlighted by Rafay Alam, an environmental lawyer, who emphasized the need for a more 'bottom-up' approach. He expressed concerns that the NAP, which primarily addressed sectors like irrigation, agriculture, and land management, should have evolved from provincial perspectives rather than being dictated top-down by the federal government. According to the Pakistani constitution, these sectors fall under provincial governance. Alam questioned whether the provinces had agreed to the responsibilities assigned to them in the NAP, particularly in terms of funding provision. He further criticized the NAP for shifting the financial burden of costly adaptation measures onto provinces that had not allocated budgets for such purposes. This failure in consultation and alignment with provincial priorities underscores a crucial gap in the NAP's implementation strategy, potentially hindering effective coordination and comprehensive adaptation efforts across Pakistan[31].

While Pakistan's NAP represents a significant step towards climate adaptation, its effectiveness hinges on addressing critical gaps in implementation and alignment with local governance and societal attitudes.

5.8 NCCP and its Failure to Curb Climate Change in Pakistan

Just like the National Adaptation Plan (NAP), the National Climate Change Policy 2021 (NCCP) faced multifaceted challenges in Pakistan's climate governance landscape. The NCCP aimed to integrate climate considerations into national development strategies across key sectors such as agriculture, water resources, energy, and urban planning (Government of

31 Ebrahim, Zofeen. "Pakistan Has a Plan for Adapting to Climate Change – Will It Work?" Dialogue Earth.

Pakistan, 2021). However, similar to the NAP, the NCCP encountered significant hurdles in implementation, resource allocation, and achieving tangible outcomes on the ground (Saleem, 2022; World Bank, 2021). Pakistan proposed its National Climate Change Policy in 2021, marking a significant step towards addressing the country's pressing climate challenges. The policy aimed to integrate climate considerations into national development strategies, focusing on building resilience across critical sectors such as agriculture, water resources, energy, and urban planning (Government of Pakistan, 2021). It emphasized the adoption of sustainable practices and technologies to mitigate greenhouse gas emissions, aligning with global sustainability goals and commitments[32].

However, the policy faced significant challenges and criticism for several key shortcomings. One primary reason for its limited effectiveness was the lack of robust mechanisms for implementation and enforcement. For instance, while the policy outlined broad goals and strategies, there was often a disconnect between these aspirations and practical actions on the ground (Saleem, 2022)[33]. This gap hindered the translation of policy intentions into tangible outcomes, undermining overall progress. Financial constraints also posed a significant barrier to the policy's success. The National Climate Change Policy 2021 acknowledged the need for substantial funding to support adaptation and mitigation efforts. However, actual resource mobilization fell short of requirements, limiting the implementation of critical initiatives (World Bank, 2021)[34]. For example, investments in improving water management systems and promoting sustainable agricultural practices were insufficient to meet the growing challenges posed by climate change. Moreover, the policy's reliance on international cooperation and funding introduced vulnerabilities and dependencies. While partnerships with global entities are vital for sharing knowledge and technology, Pakistan's heavy reliance on external aid sometimes conflicts with national sovereignty and priorities in climate action (Haque, 2020)[35]. This dependency could lead to fluctuations in support and agendas that may not always align with Pakistan's long-term strategic interests in climate resilience. Another significant loophole

32 Government of Pakistan. National Climate Change Policy. October 2021.

33 Saleem, A. "Challenges in Implementing National Climate Change Policy in Pakistan: A Critical Review." Journal of Climate Policy 12, no. 3 (2022): 345-362. https://doi.org/10.1080/14693062.2022.2000000.

34 World Bank Group. Pakistan Climate Change Policy Brief. Washington, D.C.: World Bank Group, 2021. Accessed May 22, 2024.

35 Haque, M. "International Cooperation and Climate Change: Implications for Pakistan's Policy Landscape." Journal of Environmental Studies and Sciences 10, no. 4 (2020): 567-580. https://doi.org/10.1007/s13412-020-00600-5.

was the inadequate integration of climate considerations into local governance and community-level planning. Effective climate adaptation requires robust engagement with local governments and communities, yet these stakeholders often lack the capacity, resources, and authority to implement climate-sensitive policies effectively (Siddiqui, 2021)[36]. As a result, vulnerable communities, particularly in rural areas, continued to face disproportionate risks from climate impacts without adequate support or adaptation measures tailored to their specific needs.

Furthermore, the policy's monitoring and evaluation framework was often criticized for being weak and insufficiently transparent. Clear metrics and benchmarks for assessing progress were lacking, making it difficult to gauge the policy's impact accurately over time (Asian Development Bank, 2022)[37]. This lack of accountability and transparency further undermined public trust and confidence in the government's ability to effectively manage climate challenges. While Pakistan's National Climate Change Policy 2021 represented a significant commitment to addressing climate change, its effectiveness was hampered by implementation gaps and financial constraints.

5.9 Pakistan Global and Regional Climate Initiatives

To address the challenges of environment and development the government of Pakistan promote viable and functional cooperation with the global community in Socio-Economic and environmental dimensions. Soon after the Stockholm conference in 1972, Pakistan shifted its focus to environmental conservation, as a chairman of G77, Pakistan took the lead at the 1992 United Nations Conference on Environment and Development (UNCED) in Rio. Pakistan is one of the handful of developing states that developed a comprehensive National conservation strategy in 1992 (National Implementation Agenda, 1997).

Following this, in June 1994, Pakistan ratified the United Nations Framework Convention on Climate Change (UNFCCC) as the first South Asian nation to recognize the importance of anthropogenic climate change and responding to its repercussions. As per UNFCCC Article 4

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36 Siddiqui, M. "Local Governance and Climate Adaptation in Pakistan: Challenges and Opportunities." Pakistan Journal of Environmental Law 7, no. 2 (2021): 112-130. Accessed May 22, 2024.

37 Asian Development Bank. Monitoring and Evaluation Frameworks for Climate Change Policies: Lessons from Asia. Manila: Asian Development Bank, 2022. Accessed May 22, 2024.

(1), member states have to submit a "National Communication report", Pakistan submitted its initial report in 2003 to comply with the convention's objective (Pakistan's second national communication on climate change,2018).

Furthermore, Pakistan adopted the Kyoto Protocol in 1997 and implemented it in 2005. Its aim was carbon mitigation through the Clean Development Mechanism (CDM) and to reduce greenhouse gas emissions through carbon trading.

Pakistan, as part of UNFCCC's Paris Agreement, has contributed to international efforts to mitigate climate change. Pakistan's government presented Nationally Determined Contributions (NDC) to reduce Carbon dioxide emissions. The agreement has been a significant move in accelerating efforts to counter climate change and a reflection of national efforts to galvanize the transition to a climate-resilient economy.

5.10 COP28 and its Impact Assessment for Pakistan

COP28, the 28th Conference of Parties to the United Nations Framework Convention on Climate Change (UNFCCC), took place in Dubai intending to address global climate change issues. It included discussions on transitioning away from fossil fuels, establishing a Loss and Damage Fund, and setting targets for emissions reductions. Pakistan participated in COP28, advocating for funding and support due to its vulnerability to climate impacts despite low per capita emissions. The outcomes of COP28, while acknowledging the need for climate action, were criticized for their non-binding nature and loopholes. The key concerns included insufficient financial pledges for the Loss and Damage Fund, vague commitments to phase out fossil fuels, and reliance on unproven technologies like carbon capture and storage[39]. These loopholes can impact Pakistan by limiting the effectiveness of global climate agreements in addressing its specific challenges, such as extreme weather events and economic losses.

Pakistan's approach to climate policy, in the context of COP28, faces dilemmas regarding energy security and economic development. While aiming to shift towards renewable energy and reduce emissions, Pakistan also plans to expand coal-fired capacity to meet energy demands, which contradicts global climate goals. Pakistan, a country acutely vulnerable to the impacts of climate change, faces a formidable challenge in reconciling economic growth with climate resilience. The nation has grappled with recurring climate disasters that inflict

38 Polychroniou, C. J. "COP28 Gave Us Another Agreement Full of Loopholes for Fossil Fuels." Global Policy, 22 December 2023.

substantial economic and human costs, underscoring the urgent need for robust adaptation and mitigation strategies. Despite these imperatives, Pakistan's energy strategy remains heavily reliant on coal, driven by concerns over energy security and affordability. Plans to expand coal-fired capacity run counter to global efforts aimed at phasing out fossil fuels, highlighting a significant tension between national energy priorities and international climate commitments. Moreover, while Pakistan has set ambitious targets to transition to 60% renewable energy and increase electric vehicles to 30% by 2030, translating these goals into action faces multifaceted challenges. Financial constraints, inadequate infrastructure for renewable energy integration, and technological limitations pose substantial barriers. The country's infrastructure development, which leans towards expanding road networks over investing in public transit systems, exacerbates its carbon footprint and perpetuates its dependence on fossil fuels. Addressing inefficiencies in gas and electricity transmission systems is crucial for reducing emissions but requires substantial investment and technological upgrades.

Economically, Pakistan's heavy external debt burden restricts fiscal space for climate investments. Raising external financing for climate projects risks exacerbating debt vulnerabilities unless managed prudently. Limited budget allocations for climate resilience projects further constrain Pakistan's ability to implement comprehensive climate policies, with competing priorities such as healthcare and education often taking precedence. Socially, vulnerable communities, particularly women and marginalized groups, bear disproportionate burdens from climate impacts, necessitating inclusive and equitable adaptation strategies[40].

The dichotomy between international climate commitments and national development imperatives underscores Pakistan's delicate balancing act. Aligning domestic priorities with global climate goals requires nuanced policy-making and effective stakeholder engagement. Successfully navigating these challenges demands integrated approaches that prioritize sustainable development, resilience-building, and inclusive growth. Pakistan's journey towards achieving climate resilience amidst economic pressures and structural constraints necessitates strategic investments, technological innovations, and collaborative efforts both domestically and internationally. The country's participation in COP28 underscores its efforts to balance economic growth with climate resilience, but the feasibility of aligning national priorities with international climate commitments remains uncertain.

While COP28 aimed to advance global climate efforts, its outcomes reveal ongoing challenges

39 Khan, Ammar H. "COP28 & Pakistan." Dawn, December 4, 2023.

and contradictions in international climate diplomacy. Pakistan's role and responses to these challenges reflect broader tensions between economic development and environmental sustainability, highlighting the complex dynamics at play in global climate governance.

Pakistan grapples with formidable challenges in implementing climate change policies such as the National Action Plan (NAP), and National Climate Change Policy 2021 (NCCP), and responding to global frameworks like COP28. The NAP and NCCP, designed to mitigate and adapt to climate impacts, face critical loopholes including poor implementation due to bureaucratic inefficiencies, insufficient funding, and a skewed focus towards mitigation rather than adaptation. These gaps hinder effective climate resilience efforts, exacerbating Pakistan's vulnerability to extreme weather events. At COP28, while global commitments to reduce emissions and support adaptation were reiterated, Pakistan confronted the harsh reality of insufficient financial aid and the complexities of translating global pledges into actionable national policies. The country's economic and political landscape, marked by instability and fiscal challenges, complicates its ability to prioritize long-term climate resilience over immediate economic growth. Dependency on foreign aid further limits Pakistan's autonomy in shaping climate strategies tailored to its developmental needs.

Pakistan must adopt a pragmatic, context-specific approach. This involves customizing climate policies to align with local Socio-Economic realities, enhancing governance capacities at all levels, and integrating climate resilience into broader development agendas. Empowering local communities through inclusive decision-making and equitable distribution of climate project benefits is crucial. By navigating these challenges strategically, Pakistan can enhance its climate resilience, contribute meaningfully to global climate efforts, and safeguard its sustainable development goals amidst evolving climate realities.

Besides International collaborations Pakistan is actively engaged with regional organizations for instance, the Economic Cooperation Organization (ECC), the South Asian Cooperative Environment Programme (SACEP), South Asian Association Cooperation (SAARC), the United Nations Economic and Social Commission for Asia and the Pacific (UNESCAP), and the United Nations Environment Programme. Numerous collective efforts have been made in this context and successfully carried out. For example, the United Nation's environmental programme / South Asia Cooperative Environment Programme (SACEP) is enforcing a regional sea programme to protect the sea environment from land-based activities (like water pollution, oil spills, waste dumping etc.).Pakistan participated in (the South Asia Cooperative Environment Programme) SACEP's environmental management seminar held in Sri Lanka (National Implementation of Agenda 21,1997).In addition, Pakistan has built a

potential institutional linkage with UNEP, UNFCCC, WMO, and UNESCO.

Under different regional programmes, Pakistan took a few pragmatic measures to deal with this colossal crisis for example:

- ✓ Enhancing exchange of real-time hydro-logical information between neighbouring countries for better flood predictions and warnings.
- ✓ Collaborating with Nepal, Bhutan, Kyrgyzstan, and other highland states to take measures regarding mountain ecosystems, especially glaciers by highlighting their role in sustainable development and livelihoods, and spotlighting the region's susceptibility to climate change;
- ✓ Supporting the WMO- UNESCAP- sponsored Intergovernmental Panel on Tropical Cyclones in the Arabian Sea and Bay of Bengal to improve tropical cyclone monitoring and prediction;
- ✓ Supporting institutional collaborations between national institutions in the South Asian region to facilitate knowledge sharing and capacity building for climate change-related domains, as well as collaboratively handling the transboundary water, air quality, and pandemic concerns (locust, Covid, etc.).
- ✓ Work on establishing the SAARC Climate Change Research Centre, preferably in Pakistan near the Global Change Impact Studies Centre (GCISC).
- ✓ Work on establishing a regional Intergovernmental Expert Group on Climate Change to develop policies for regional interactivity as conceived in the SAARC Plan of Action on Climate Change.
- ✓ Facilitate SAARC centres to research changing monsoon patterns to gauge vulnerability caused by climate change and integrate Disaster Risk Reduction (DRR) and Climate Change Adaptation (CCA);
- ✓ Undertake awareness campaigns regarding climate change to enhance the use of green technology and practices for adopting low-carbon sustainable and inclusive development.
- ✓ Strengthen regional and international collaborations for effective resource mobilization to generate gender-sensitive responses.
- ✓ Support student exchange programs between SAARC member states, especially in the domain of climate change.

CHAPTER SIX

ANALYSIS OF CLIMATE ADAPTATION POLICIES: LESSONS FROM ETHIOPIA, KENYA, LESOTHO

Pakistan, Kenya, Ethiopia, and Lesotho exemplify the diverse ways in which climate change intersects with their agrarian economies, highlighting shared vulnerabilities and distinctive challenges shaped by their unique geographic and socio-economic contexts. Pakistan, with its varied topography spanning from arid plains to the temperate north, faces significant climate- related risks exacerbated by global warming. The country experiences extreme weather events such as floods, droughts, and heatwaves with increasing frequency and intensity. These events disrupt agricultural cycles crucial for staple crops like wheat and rice, affecting food security and rural livelihoods. Moreover, Pakistan heavily relies on hydropower generation, which is susceptible to variations in water availability influenced by climate change, further impacting economic stability.

Ethiopia, characterized by its diverse climatic zones from cool highlands to hot lowlands, confronts challenges such as erratic rainfall patterns and prolonged droughts. Agriculture forms the backbone of Ethiopia's economy, employing a large portion of the population and contributing significantly to GDP. However, climate variability threatens agricultural productivity, particularly for crops like coffee, maize, and pulses. The dependency on rain-fed agriculture makes Ethiopia vulnerable to climate shocks, jeopardizing food production and exacerbating poverty among rural communities reliant on farming [41] . Lesotho, nestled in Southern Africa's highlands, presents a unique climate scenario with a cool temperate climate influenced by seasonal rainfall. The country's economy relies heavily on agriculture, despite limited arable land and susceptibility to soil erosion and land degradation exacerbated by intense storms and short, heavy downpours. Agriculture in Lesotho, predominantly subsistence-based, faces challenges in meeting food security needs due to climate variability affecting crop yields and livestock health. The dependence on imports, especially during droughts, underscores the economic fragility exacerbated by climate change impacts.

Despite their geographical and developmental disparities, Pakistan, Ethiopia, and Lesotho share

[41] United Nations Development Programme (UNDP). 2016. *Ethiopia Drought Response and Recovery Report

common vulnerabilities stemming from climate change. These include water scarcity, soil degradation, and heightened risks from extreme weather events, all of which impact agricultural productivity, food security, and economic stability. Adaptation strategies in these countries emphasize the promotion of climate-resilient agriculture, sustainable water management practices, and enhanced early warning systems to mitigate risks and build resilience. International cooperation plays a pivotal role in supporting these efforts, facilitating knowledge exchange, technology transfer, and financial assistance to bolster adaptive capacities and promote sustainable development. Pakistan, Ethiopia, and Lesotho, all predominantly agrarian economies, face significant challenges from climate change impacting their agricultural sectors.

In Pakistan, agriculture contributes about 24% to GDP and employs nearly 40% of the workforce (World Bank, 2020). The country experiences increasing frequency of extreme weather events, including floods and droughts, which disrupt agricultural production cycles. Ethiopia, where agriculture employs over 70% of the population and contributes around 34% to GDP (World Bank, 2020), faces recurrent droughts and erratic rainfall patterns that threaten food security and rural livelihoods. Lesotho, despite its small size and limited arable land, relies heavily on agriculture, with over 80% of the population engaged in farming (World Bank, 2020). The country's vulnerability to soil erosion and climate variability underscores the challenges posed by intense storms and changing rainfall patterns, impacting agricultural productivity and food self-sufficiency. Each of these agrarian nations—Pakistan, Ethiopia, and Lesotho—faces the daunting challenge of climate change, yet their approaches to mitigation and adaptation vary significantly.

The first UN Human Security Fund for climate change provided to Ethiopia was established in 2008. This initiative was aimed to address the multifaceted challenges posed by climate change, focusing on enhancing resilience and supporting sustainable development efforts in vulnerable regions of the country. The UN Human Security Fund provided critical support to Ethiopia and Lesotho, addressing key challenges exacerbated by climate change. In Ethiopia, the fund facilitated climate-resilient agricultural practices, enhanced irrigation systems, and bolstered early warning systems, aiding farmers in mitigating and adapting to climate risks. In Lesotho, the fund promoted sustainable farming practices, improved water management, and developed drought-resistant crop varieties, enhancing the adaptive capacity of rural communities. This international intervention significantly improved food security, economic stability, and overall resilience in both countries. The details of the fund and how its interventions played their part

are explained below:

6.1 Ethiopia's Climate Policy Action

Ethiopia, a country with a rich agricultural heritage dating back millennia, has long relied on farming as a cornerstone of its economy and culture. Situated in the Horn of Africa, Ethiopia's agricultural sector has historically been diverse, encompassing crops like coffee, teff, wheat, maize, pulses, and various livestock. This sector not only sustains the population but also serves as a significant source of exports, contributing substantially to the nation's GDP. In Ethiopia, the link between agriculture and the economy is profound and multifaceted, influencing both national development and the well-being of its population. Agriculture serves as a pivotal sector, contributing significantly to the country's GDP, providing employment for a large percentage of the workforce, and playing a crucial role in international trade through exports of key commodities like coffee and oil seeds.

The economic significance of agriculture in Ethiopia is evident in several key aspects. Firstly, agriculture is a major contributor to Ethiopia's GDP. While exact figures vary annually, agriculture typically accounts for around one-third of the country's GDP. This contribution underscores the sector's importance in driving economic growth and stability, particularly in rural areas where farming is the primary livelihood. Secondly, agriculture is the backbone of employment in Ethiopia. The majority of the population, especially in rural areas, depends on agriculture for their livelihoods. Smallholder farmers form the backbone of agricultural production, cultivating crops and raising livestock to meet both subsistence needs and market demands. Employment in agriculture extends beyond farming itself to include agro-processing industries, transportation, and market services, thereby supporting a broad spectrum of economic activities. Thirdly, agriculture plays a critical role in Ethiopia's trade balance and foreign exchange earnings. The country exports a range of agricultural products, with coffee being a standout example. Ethiopia is renowned globally for its high-quality Arabica coffee, which not only contributes to export revenues but also enhances the country's international reputation. Export earnings from agriculture help stabilize the economy, support infrastructure development, and finance imports of essential goods and services.

Throughout its history, Ethiopia has faced challenges from varying climate patterns, but in recent decades, the impacts of climate change have become increasingly pronounced. For example, in the early 21st century, Ethiopia experienced severe droughts exacerbated by climate change. The drought of 2015-2016, known as one of the worst in decades, affected millions of

people and led to food insecurity and loss of livelihoods, particularly in rural areas where agriculture is predominant. Coffee production, which is crucial to Ethiopia's economy and cultural identity, has also been significantly impacted by climate change. Over the years, changing rainfall patterns and rising temperatures have affected the suitability of traditional coffee-growing regions. For instance, areas in the highlands that were once ideal for coffee cultivation have faced challenges due to altered climate conditions, impacting both the quality and quantity of coffee yields.

Furthermore, Ethiopia's reliance on rainfed agriculture makes it particularly vulnerable to climate variability. In recent years, variations in rainfall became more erratic, leading to periods of drought or unexpected floods. The El Niño weather phenomenon, which affected Ethiopia from 2015 to 2016, resulted in failed rains, crop failures, and widespread food insecurity, affecting millions of people across the country. The United Nations (UN) has introduced several initiatives aimed at bolstering Ethiopia's response to climate change, recognizing its vulnerability despite minimal contribution to global emissions. Through the UN Framework Convention on Climate Change (UNFCCC), Ethiopia benefited from the establishment of the Least Developed Countries (LDCs) work programme in 2001. This initiative facilitated flexible provisions under the Convention and the Paris Agreement, enabling Ethiopia to access crucial climate finance and technical support.

Key projects introduced through UN collaboration include Ethiopia's National Adaptation Program of Action, focusing on sectors such as agriculture, water resources, and infrastructure most susceptible to climate impacts. Supported by UN agencies like the UN Environment Programme (UNEP) and technical expertise from the Ethiopian Federal Environment and Climate Change Commission (EFCCC), these projects aim to enhance climate resilience and adaptation capacities across the country. The UN has also played a pivotal role in shaping Ethiopia's Climate Resilient Green Economy (CRGE) Strategy. This strategy, developed with UN assistance, integrates mitigation and adaptation measures into national development plans such as the Growth and Transformation Plans (GTP) and the ongoing 10-year Development Plan (10YDP). Additionally, the UN has supported the establishment of the CRGE Facility Secretariat within Ethiopia's Ministry of Finance, crucial for mobilizing and managing domestic and international climate finance. Furthermore, the UNFCCC mechanisms, including the Global Environment Facility (GEF) and the Adaptation Fund, have been instrumental in channeling financial resources to Ethiopia. These funds support the implementation of Ethiopia's Nationally Determined Contributions (NDCs), which outline ambitious emission

reduction targets and adaptation initiatives.

Despite challenges in scaling up financial resources commensurate with its needs, Ethiopia has made significant strides in accessing funds through enhanced UN-supported capacity building initiatives. Ethiopia emerged as a leader in climate action among African nations and least developed countries through the adoption of comprehensive policies and strategies to tackle climate change. Since the early 2000s, Ethiopia integrated climate considerations into its national and sub-national development frameworks. A significant milestone was the introduction of the Climate Resilient Green Economy (CRGE) Strategy in 2011, initially focusing on mitigation and later expanding to include resilience strategies for key sectors like agriculture, forestry, water resources, energy, transport, urban, and health.

Before the CRGE, Ethiopia developed the National Adaptation Program of Action (NAPA) in 2007 to prioritize adaptation measures for vulnerable sectors. The United Nations played a crucial role in supporting these efforts by facilitating technical assistance and capacity building through various programs and agencies, enhancing Ethiopia's ability to formulate and implement effective climate policies. In 2010, the Ethiopian Program of Adaptation on Climate Change and Nationally Appropriate Mitigation Actions (EPACC-NAMA) further integrated adaptation and mitigation into national development plans. Ethiopia's commitment to global climate goals was underscored by its Nationally Determined Contributions (NDCs), submitted to the UNFCCC in 2015 and ratified with the Paris Agreement in 2017. These commitments aimed to achieve a 64% reduction in emissions from business-as-usual levels by 2030 and enhance societal resilience to climate impacts. These policies were embedded within Ethiopia's national planning and policy frameworks, including the Second Growth and Transformation Plan (GTP II, 2015-2020) and the ongoing Ten-Year Development Plan (10YDP, 2021-2030).

These plans mainstreamed climate change across all sectors, aligning with Ethiopia's ambitious targets to reduce emissions and build resilience, as articulated in its updated NDC (2021), which aimed for a 68.8% reduction in emissions. Throughout these initiatives, the United Nations provided critical support, leveraging its global network and expertise to assist Ethiopia in accessing climate finance, enhancing institutional capacity, and facilitating knowledge transfer. This collaboration underscored Ethiopia's proactive approach and leadership in addressing climate change, setting an example for other developing nations in the region and globally[42].

[42] United Nations. "Ethiopia: Capacity Building for Climate Change Financing." Accessed June 20, 2024. https://www.un.org/ldcportal/content/ethiopia-capacity-building-climate-change-financing.

Ethiopia achieved significant success in addressing climate change through its proactive policies and strategies implemented over the past decade. The introduction of the Climate Resilient Green Economy (CRGE) Strategy in 2011 marked a pivotal moment, integrating climate considerations deeply into national development plans. This strategy focused initially on mitigation efforts and later had expanded to include resilience-building measures across sectors such as agriculture, water resources, and energy. Early policies like the National Adaptation Program of Action (NAPA) and the Ethiopian Program of Adaptation on Climate Change and Nationally Appropriate Mitigation Actions (EPACC-NAMA) laid a strong foundation for adaptation measures. These initiatives enhanced Ethiopia's resilience to climate impacts, notably through programs like the Productive Safety Net Programme (PSNP) and Sustainable Land Management Programme (SLMP). These efforts improved agricultural practices, soil conservation, and water management, crucial for safeguarding against climate-related challenges like droughts and floods.

Ethiopia's commitment to mitigation are evident in initiatives such as the Green Legacy Initiative (GLI), which had focused on large-scale afforestation, and participation in REDD+ projects aimed at reducing emissions from deforestation and land degradation. These actions not only mitigated greenhouse gas emissions but had also contributed significantly to biodiversity conservation. The successful integration of climate-resilient practices into national planning and policy frameworks supported sustainable economic growth, particularly in agriculture, a key sector for Ethiopia's economy and livelihoods. This approach bolstered the country's adaptive capacity and had reduced vulnerability among rural communities.

6.2 Kenya's Climate Policy Action

The Green Climate Fund (GCF) has significantly impacted Kenya by addressing climate change through transformative initiatives in agriculture and energy sectors. The Acumen Resilient Agriculture Fund (ARAF), supported by GCF and managed by Acumen, focuses on improving climate resilience, boosting agricultural productivity, and increasing the incomes of smallholder farmers. In Kenya, where agriculture is a crucial industry and 80% of farmland is managed by smallholders, the sector is particularly vulnerable to climate change. ARAF's initiatives, including those by Farmerline, have provided rural farmers with essential tools and resources like weather data, sustainable farming techniques, flexible financing, and high-quality inputs. Farmerline's scalable engagement solutions and climate-smart information initiatives, such as the Farmer Helpline, have greatly benefited smallholder farmers. The helpline sends regular messages to over a million farmers in West Africa, including Kenya, with updates on

weather, market prices, and sustainable farming practices. This service helps farmers make informed decisions, improving their yields, sustainability, and profitability. The helpline also operates in Ghana, Côte d'Ivoire, Togo, Benin, and Burkina Faso, with plans for further expansion across Africa.

In the energy sector, the widespread use of biomass for cooking and heating in Kenya poses significant environmental challenges. Over 80% of the population relies on biomass. The GCF, in partnership with the German Federal Ministry for Economic Cooperation and Development (BMZ) and Kenya's Ministry of Energy, supports the Promotion of Climate-Friendly Cooking project. This project aims to reduce greenhouse gas emissions by promoting improved cookstoves (ICS) instead of traditional open hearths. Female-led ICS businesses, such as Charity Clay Works and the Keyo Women Group, have significantly increased their production capacities, providing sustainable cooking solutions and reducing biomass reliance. These projects have not only reduced emissions but also improved livelihoods by creating job opportunities and empowering women. The market-based approach of the ICS project has enabled producers to scale their operations and expand their reach, fostering sustainable market growth. The project has led to the sale of over 1,120,000 ICS, reducing 1,575,000 tons of CO_2 and contributing to Kenya's climate goals. Beyond agriculture and energy, GCF initiatives address displacement and ecological threats. Since 2010, flooding in the Great Rift Valley lakes has displaced communities, disrupted lake-based livelihoods, and caused freshwater scarcity in Lake Baringo, forcing migration. The Horn of Africa has faced five consecutive dry seasons since 2020, resulting in the worst drought in 40 years across Ethiopia, Kenya, and Somalia. These droughts have forced pastoralists to migrate and switch to farming, while communities around Lake Baringo have turned to fishing due to rising water levels.

In other African regions, GCF has addressed key climate challenges. In Ethiopia, the fund has supported climate-resilient agricultural practices, enhanced irrigation systems, and improved early warning systems, helping farmers mitigate and adapt to climate risks. In Lesotho, the Human Security Trust Fund has promoted sustainable farming practices, improved water management, and developed drought-resistant crops, enhancing the resilience of rural communities. These interventions have significantly improved food security, economic stability, and overall resilience in both countries. The GCF's efforts have prompted policy shifts and improvements in Kenya and beyond. Emphasizing climate resilience and sustainable development has created better conditions for smallholder farmers and the wider population. These initiatives have enhanced food security, environmental conservation, and economic opportunities, representing substantial progress compared to previous conditions. Integrating

technology, capacity building, and community engagement has paved the way for a more resilient and sustainable future for these regions. For instance, Farmerline's helpline has empowered farmers with timely, relevant data, enabling them to adapt to changing weather patterns and market conditions. Promoting improved cookstoves has reduced greenhouse gas emissions and decreased reliance on biomass, conserving forests and reducing the labor burden on women who collect firewood. Additionally, focusing on women-led businesses has strengthened community resilience by providing stable incomes and fostering economic independence.

In essence, GCF's interventions have created a more robust framework for climate adaptation and mitigation, directly benefiting those most vulnerable to climate change. This holistic approach, combining economic, environmental, and social dimensions, ensures sustainable development and resilience in the face of ongoing and future climate challenges.

6.3 Lesotho's Climate Policy Action

Ethiopia and Lesotho, both agrarian countries, face significant challenges from climate change, impacting their agricultural sectors and economies. Similarly, Lesotho has experienced its own climate challenges. Lesotho, despite contributing minimally to global greenhouse gas emissions, confronts significant challenges from climate change that intensify existing vulnerabilities and jeopardize its agricultural economy and food security. The country's distinct landscape of highlands and steep slopes, coupled with its seasonal rainfall patterns and delicate ecosystem, render it highly susceptible to the impacts of climate variability. Climate change effects in Lesotho are already observable in several ways. Irregular rainfall patterns, characterized by intense storms and brief but heavy downpours during spring and summer, contribute to soil erosion and land degradation. This erosion diminishes soil fertility, restricting agricultural productivity and hindering rural communities' ability to produce food sustainably beyond subsistence levels.

Furthermore, Lesotho's cold and dry winters exacerbate agricultural challenges by halting active vegetation growth, thereby heightening the vulnerability of already degraded soils. Reliance on rain-fed farming leaves the country prone to droughts and extreme climate fluctuations, which can devastate crop yields and livestock health, further compromising food security and economic stability. Climate change impacts extend across all dimensions of food security in Lesotho: availability, access, utilization, and stability. With a significant rural population and limited arable land, the country faces difficulties in meeting its food production requirements. Only a fraction of Lesotho's land is suitable for agriculture, necessitating

sustainable soil erosion management and efforts to enhance land productivity to mitigate climate change effects on food availability and livelihoods. The interplay of Lesotho's agricultural sector with regional dynamics, such as its reliance on maize imports from neighboring South Africa, underscores the broader implications of climate change on regional food security. Events like the 2007 food crisis, triggered by droughts affecting both Lesotho and South Africa, underscore the transboundary nature of climate impacts, necessitating coordinated regional strategies to enhance resilience and ensure food sovereignty in the face of changing climatic conditions[43].

The years 2015 to 2016 also marked a period of severe drought in Lesotho, which severely affected agricultural productivity and food security. The drought conditions were exacerbated by erratic rainfall patterns and high temperatures, impacting crops such as maize, sorghum, and vegetables, which are crucial for the country's food supply and economy. But both Ethiopia and Lesotho have been addressing these challenges through various measures. Ethiopia has focused on promoting climate-resilient agriculture, expanding irrigation systems, and enhancing early warning systems to help farmers mitigate and adapt to climate risks. International organizations and partnerships, such as with the United Nations and development agencies, have supported Ethiopia's efforts in building resilience and improving food security.

In Lesotho, efforts to address climate change impacts on agriculture include promoting sustainable farming practices, improving water management, and developing drought-resistant crop varieties. The government has also worked with international partners to strengthen adaptive capacity and support rural communities affected by climate-induced shocks.

[43] Lesotho Meteorological Services. 2016. *Lesotho Drought Assessment Report*.

CHAPTER SEVEN

DISCUSSION and ANALYSIS

Chapter seven provides a detailed comparative analysis of the climate policies of Pakistan, Ethiopia, Kenya and Lesotho. Ethiopia Kenya and Lesotho provide insightful examples of how developing countries can approach climate change through strategic policies, highlighting their successes and challenges that Pakistan can learn from.

7.1 Comparative Analysis of Climate Policies of Pakistan, Kenya, Ethiopia, & Lesotho

Kenya, Ethiopia and Lesotho provide insightful examples of how developing countries can approach climate change through strategic policies, highlighting both successes and challenges that Pakistan can learn from. These nations have implemented frameworks like Ethiopia's Climate Resilient Green Economy (CRGE) Strategy and Lesotho's National Climate Change Policy and Strategy, demonstrating proactive steps towards mitigating climate impacts and building resilience. Ethiopia's CRGE Strategy, launched in 2011, stands out for its comprehensive approach integrating climate considerations into national development plans.

This strategy initially focused on mitigation efforts, emphasizing renewable energy, afforestation, and sustainable agriculture practices. Over time, it expanded to include resilience-building measures across critical sectors like agriculture and water resources. The strategy's success lies in its alignment with Ethiopia's broader development goals, fostering sustainable economic growth while addressing climate vulnerabilities. Similarly, Lesotho's National Climate Change Policy and Strategy outline targeted actions to enhance climate resilience and reduce emissions. This policy framework emphasizes adaptive measures in sectors vulnerable to climate impacts, such as agriculture and water management. By integrating climate considerations into national policies, Lesotho aims to achieve sustainable development while safeguarding its population from climate-related risks.

Comparatively, Pakistan faces significant challenges in addressing climate change despite having a National Climate Change Policy since 2012. The country struggles with the implementation gap between policy formulation and effective execution on the ground. Challenges include limited financial resources, institutional capacity constraints, and competing development priorities. Pakistan's vulnerability to climate impacts, such as water scarcity, extreme weather events, and agricultural losses, underscores the urgent need for robust climate action. Pakistan's approach to climate change, as reflected in its National Climate Change Policy (NCCP) since 2012, contrasts with the more integrated and proactive strategies seen in Ethiopia and Lesotho. While all three countries recognize the urgency of climate action, Ethiopia and Lesotho have made strides in policy integration and implementation that Pakistan could learn from. Ethiopia's Climate Resilient Green Economy (CRGE) Strategy, initiated in 2011, exemplifies a holistic approach that Pakistan's policies initially lacked. Ethiopia's strategy not only focused on mitigation efforts like renewable energy and afforestation but also prioritized

resilience-building across critical sectors such as agriculture and water resources. This comprehensive approach ensured that climate considerations were deeply embedded into national development plans, fostering sustainable economic growth while addressing climate vulnerabilities. Similarly, Lesotho's National Climate Change Policy and Strategy emphasize adaptive measures tailored to sectors vulnerable to climate impacts, such as agriculture and water management. This targeted approach allows Lesotho to mitigate risks and build resilience effectively, aligning climate objectives with broader development goals.

In contrast, Pakistan's NCCP, while laying foundational principles, faced challenges in effective implementation and integration across sectors. Kenya, Ethiopia and Lesotho integrated climate resilience into national planning frameworks and sectoral strategies more comprehensively than Pakistan. These countries prioritize climate considerations in agriculture, water management, energy, and urban planning, aligning climate goals with broader development objectives. Pakistan could strengthen policy coherence by mainstreaming climate resilience across all sectors, ensuring that climate considerations are not treated as separate but integrated into national development plans. Kenya's, Ethiopia's and Lesotho's strategies demonstrate effective implementation capacity, supported by clear institutional frameworks and coordinated efforts across government agencies. In contrast, Pakistan has faced challenges in translating policy intentions into tangible actions on the ground, due to institutional capacity constraints, limited resources, and competing development priorities. Enhancing Pakistan's institutional capacity and coordination mechanisms can improve policy implementation and accelerate climate action[44].

In comparison to Pakistan's climate action policies, Kenya's initiatives, bolstered by the Green Climate Fund (GCF), exhibit a strong focus on agriculture and energy sectors, emphasizing resilience-building and sustainable practices. Pakistan could benefit from a similar emphasis on scalable solutions and market-based approaches to enhance climate resilience among smallholder farmers and reduce biomass reliance. Kenya's integrated approach, combining technology deployment and community engagement, contrasts with Pakistan's need for more robust implementation strategies and broader stakeholder involvement to achieve comparable outcomes in climate mitigation and adaptation.

Kenya, Ethiopia and Lesotho have benefited from international support, including technical expertise and financial assistance from organizations like the United Nations. This support has

[44] National Climate Change Policy (NCCP). 2011.

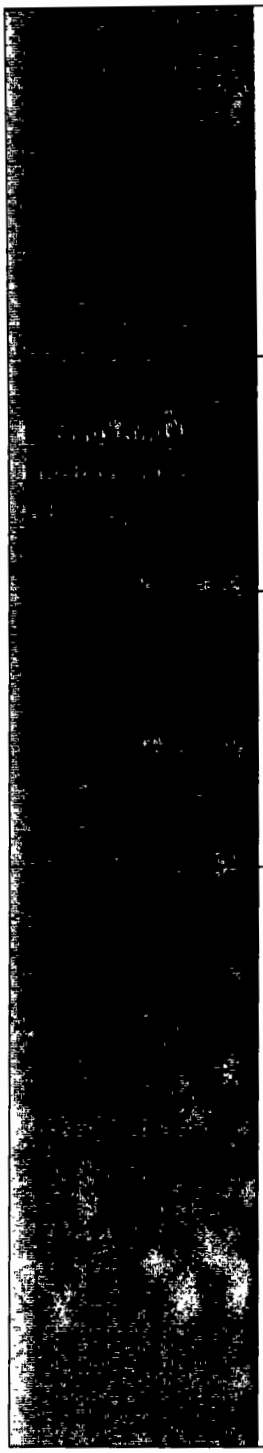
facilitated capacity-building, knowledge-sharing, and access to climate finance, crucial for implementing ambitious climate strategies. Pakistan can leverage international partnerships and climate finance mechanisms to bolster its climate resilience efforts, similar to how Ethiopia mobilized resources for its CRGE Strategy.

Furthermore, developing countries, especially developing states like Pakistan, can benefit significantly from international support, similar to Kenya and Ethiopia's experience with UN intervention. The United Nations can provide technical expertise, capacity-building initiatives, and financial assistance to strengthen climate governance, policy implementation, and institutional frameworks. Collaborative platforms facilitated by UN agencies enable knowledge-sharing and best practices exchange among countries facing similar climate challenges. For Pakistan and other LDCs, developing robust climate strategies and policies requires a multi-faceted approach: integrating climate resilience across sectors, enhancing institutional capacity, mobilizing adequate financial resources, and leveraging international partnerships. UN intervention can play a pivotal role in supporting these efforts through tailored assistance programs, climate finance mechanisms, and advocacy for global climate action.

While Pakistan's NCCP outlines foundational principles for climate action, the country can enhance its approach by learning from Ethiopia's and Lesotho's integrated strategies. By mainstreaming climate resilience across sectors, improving implementation capacity, prioritizing adaptive measures, and leveraging international support, Pakistan can strengthen its resilience to climate change, achieve sustainable development goals, and contribute effectively to global climate mitigation efforts. To bridge these gaps, Pakistan can draw lessons from Kenya, Ethiopia and Lesotho by strengthening policy coherence and implementation capacity. Integrating climate considerations more deeply into national planning frameworks, such as development plans and sectoral strategies, is crucial. This involves mainstreaming climate resilience into agriculture, water management, energy, and urban planning sectors. Emphasizing nature-based solutions, sustainable resource management, and renewable energy adoption can enhance Pakistan's climate resilience while supporting economic growth.

Comprehensively, while Pakistan faces challenges in climate governance and policy implementation, lessons from Kenya, Ethiopia and Lesotho illustrate pathways towards effective climate resilience. By learning from successful strategies, enhancing policy coherence, and leveraging international support, Pakistan can accelerate its climate response, mitigate vulnerabilities, and foster sustainable development in the face of global climate change.

The National Climate Change Policy 2021 (NCCP)	The NCCP aimed to integrate climate considerations into national development strategies across key sectors such as agriculture, water resources, energy, and urban planning (Government of Pakistan, 2021).
In July 2023, Pakistan unveiled its first-ever National Adaptation Plan (NAP), a comprehensive seven- year strategy spanning from 2023 to 2030.	Integrating adaptation into economic and societal frameworks highlights the need for comprehensive reforms beyond technical solutions. This approach called for compensatory mechanisms for vulnerable communities and strengthened governance structures that prioritize community engagement and awareness.
National Disaster Risk Management Fund (NDRMF) digitization Under Enterprise resource planning (ERP) introduce the Specialized Enterprise Resource Planning tool (SAP)	At the heart of this endeavour is a desire to simplify and optimize fundamental business activities. NDRMF's implementation of SAP ERP aims to reduce manual labour and errors. The Financial and Controlling (FI/CO), Human Capital Management (HCM), and Material Management (MM) modules are expected to transform NDRMF's operations. SAP ERP (S/4HANA). The strategic move intends to modernize and consolidate fundamental business processes, resulting in increased efficiency and effectiveness within the organization. A software solution to reduce paper use to promote environmental responsibility.
Natural Catastrophic Model (Nat-Cat): A Revolutionary Approach	Evaluate Risk for Resilience building. The application of mathematical models and simulation to quantify risk and the potential impacts on various vulnerable elements such as buildings, infrastructure, and economy and prepare better and to minimize the future losses.



Nat-Cat Risk Calculator	Risk calculator is a technology-based tool for investigating the multi-hazard risk connected with major national disasters in the country. It allows you to investigate and create exposure, vulnerability, and risk maps for a specific geographic area. It also gives you a risk-sensitive decision-making tool for disaster Risk management and ongoing development projects.
UNFCCC (The United Nations Framework Convention on Climate Change)	A UN agreement to limit the danger of climate change was adopted in 1992. The treaty is signed to resist dangerous human interference with the Climate system. Pakistan adopted it in June 1994
Kyoto Protocol	Pakistan adopted the Kyoto Protocol in 1997 and implemented it in 2005. Its aim was carbon mitigation through the Clean Development Mechanism (CDM). To reduce greenhouse gas emissions through carbon trading.
Global frameworks like COP28	Transitioning away from fossil fuels. Operationalization of the Loss and Damage Fund Commitments for capitalization of the L&D Fund remained low. Commitment to keeping the 1.5 degree hope alive, even while the level of ambition has not increased. Increase their renewable energy capacity internationally. Pakistan COP -28 website was launched for all climate activists, state institutions, civil society and academia.

	SAARC	Work for establishing the SAARC Climate Change Research Centre, preferably in Pakistan near the Global Change Impact Studies Centre (GCISC). Work for establishing a regional Intergovernmental Expert Group on Climate Change to develop policies for regional
		Interactivity as conceived in the SAARC Plan of Action on Climate Change. Facilitate SAARC centres to undertake research on changing monsoon patterns to gauge vulnerability caused by climate change and integrate Disaster Risk Reduction (DRR) and Climate Change Adaptation (CCA);

	Collaborating with Nepal, Bhutan, Kyrgyzstan	Supporting the exchange of real-time hydrological information between neighbouring countries for better flood predictions and warnings. Collaborating with Nepal, Bhutan, Kyrgyzstan, and other highland states to take measures regarding mountain ecosystems, especially glaciers by highlighting their role in sustainable development and livelihoods, and to spotlight the region's susceptibility to climate change
	WMO (World Meteorological Organization) - United Nations Economic and Social Commission for Asia and the Pacific (UNESCAP)	Supporting the WMO- UNESCAP- sponsored Intergovernmental Panel on Tropical Cyclones in the Arabian Sea and Bay of Bengal to improve tropical cyclone monitoring and prediction; Supporting institutional collaborations between national institutions in the South Asian region to facilitate knowledge sharing
		and capacity building for climate change- related domains, as well as collaboratively handling the transboundary water, air quality, and pandemic concerns (locust, Covid, etc.).

CHAPTER EIGHT

CONCLUSION, FINDINGS & RECOMMENDATIONS

Chapter eight concludes the above discussion on climate change and human security nexus, and the socio-economic implications for developing countries like Pakistan. Inter alia, summarizes the comparative analysis of Ethiopia, Lesotho and Pakistan's policy measures to deal with these crises. Section two presents the findings of all interviews and side events transcribed in this and the next section. In addition, the chapter draws on the most cited documents on climate change resilience building, adaptation and mitigation models.

8.1 Conclusion

This comprehensive research deconstructs the state-centric approach and delve into the realms where human security becomes the central pivot. It investigates the intricate relationship between the climate change, and human security. These factors are intertwined in such a manner that dealing with them in isolation becomes impractical. To varying degrees, these fused aspects exhibit interdependence. As the global landscape has undergone a gradual shift from traditional to non-traditional security challenges, the world has pivoted towards more inclusive perspective, considering both national security and individual development essential to the Socio-Economic fabric. The discussions had initially focused on "freedom from fear" and "freedom from want" in 1994, but now the discourse has evolved to demand a broader understanding of human security that encompasses economic, food, environmental, health, political, and community security.

Human security theory by Barry Buzan, provides a comprehensive framework for understanding and addressing individual-level problems. When we weave into the Socio-Economic vulnerabilities generated by climate change, we come to the conclusion that a collective responsible action as well as an individual-level proactive approach is required to foster a global perspective, emphasizing shared responsibilities and collaborative solutions that transcend geographical boundaries. Barry Buzan's human security theory broadens the discourse beyond the state-centric approach, recognizing the multi-dimensional nature of threats to individuals and exploring the reciprocal relationship between citizens and the state and simultaneously, the interplay between environmental challenges and individual security at all levels including social, economic, political, environmental and personal level. It highlights the importance of sustainable practices for long-term well-being. Altogether the theory offers a holistic understanding of the complex issues generated by climate change.

The detailed analysis of the climate crisis in Pakistan underscores that country like Pakistan that is struggling to stabilize its Socio-Economic fabrics is more vulnerable and is at high level of risk of social and economic instability. The floods in Pakistan in 2022 provide a living example of how the environment, human security, and structural issues unleash devastating consequences. This shocking climate change showed how gradual climate change can cause such a big change in the lives of people and can be a threat to their security. This phenomenon causes displacement on a large scale. These forced migrations of more than 8 million people due to environmental threats disrupted the economy as well. There was a total of 15.2 billion USD in economic loss for Pakistan, according to the World Bank it not only caused displacement but affected food security as well; the food basket was heavily

damaged after the 2022 floods. At least 4 million acres of crops were destroyed. This, in turn, translated into economic hardships as farmers lost their primary source of income, factories were shuttered, and workers faced unemployment. Health issues like waterborne diseases, and mothers giving birth to malnourished children were seen more often because of those floods.

The health crisis unfolded in the aftermath of the floods due to a confluence of factors. The contaminated floodwaters and the lack of clean, accessible water sources created a breeding ground for waterborne diseases. The overcrowded and unsanitary conditions in temporary shelters further exacerbated health risks. Vulnerable groups, such as pregnant women and children, bore the brunt of the health crisis, facing increased susceptibility to malnutrition and diseases.

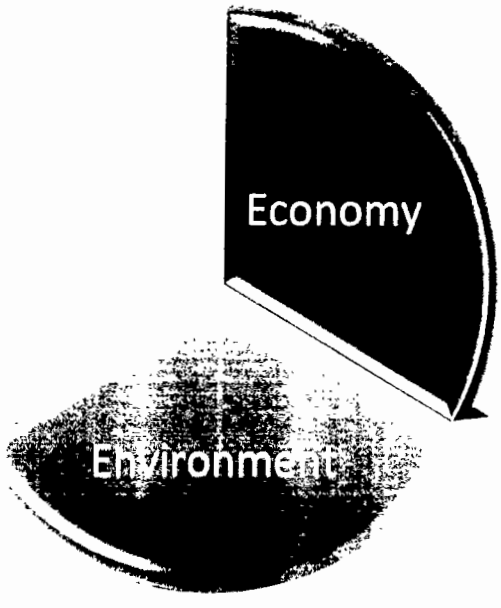
These displaced individuals grappling with the loss of livelihoods and necessities because of the eternally induced psychological changes resort to criminal activities as a means of survival. In conclusion, flood-induced poverty serves as a catalyst, exacerbating existing vulnerabilities and creating a conducive environment for criminal behavior.

Additionally, the floods of 2022 have put the government discrepancies to the front, particularly the illegal constructions in vulnerable zones and the establishment of hotels contributing to deforestation. These practices reveal a lack of a robust policy framework, regulatory bodies, and enforcement mechanisms. These deficiencies prove Buzan's view that the state can pose threats to individuals through various means, including domestic law-making and external security policies, which aligns with the observed governance issues contributing to the devastating consequences of climate change.

The responsibility to work for climate change adaptation is not only for individuals and the state but is a global concern. The high rate of smog in Pakistan is reflected in the alarming Air Quality Index (AQI) of 302 categorized as unhealthy, such global issues require global solutions. Need of the hour demands inter-connectedness, and shared responsibility for global challenges. In the case of Pakistan's smog crisis, transboundary pollutants can travel through shared ecosystems and transboundary movement, harming neighbouring countries, and making it a global concern. This phenomenon underscores the interdependence of nations in environmental matters, where actions and policies in one region can have far-reaching consequences globally. So, it's time to realize the importance of collective efforts, international collaboration, and shared accountability to address the complex issue of climate change and its diverse consequences in COP 28 participants showed enthusiastic responses towards UNFCCC's basic principle of "common but differential responsibilities". It's a ground breaking deal in which the global community is aligning with what the science has been saying that we must end our

addiction to fossil fuels. Under COP-28, loss and damage fund personalize is a huge success for climate- vulnerable states. Now they have a global fund to at least deal with the crisis to some extent. Another major step of COP-28 was Methane reduction,155 countries pledged to cut 30% in human, and methane emissions by 2030.

Inter alia, Pakistan and other developing and least developed states need to integrate their economic and climate policies to ensure inclusive Socio-Economic development taking sustainability into account. Pakistan's major economic crisis based on fossil fuel and its development is required transition to renewable energy resources in order to align its policies with that of the climate change. In this context, Pakistan needs to address 3 E's: Economy, Energy & Environment.



3 E's Need to be Addressed

COP-28 was very successful event in terms of the major pledges taken on this historic move in climate actions history such as, transition away from fossil fuels, trying to triple the number of renewable sources round the globe and trying to double the energy efficiency. The positive side is Pakistan played an instrumental role and a lot of decisions that were taken by COP-28 came through Pakistan's leadership. So, we were able to contribute very positively to

these consensuses. However, the Socio-Economic conditions in the world would have impact on the realization of these pledges for instance at day one it was committed to release $800 Loss and Damage Fund for climate affected communities. However, it's just a trifling amount as compared to what is actually required. What the world need is may be in billions and trillions.

Similarly, at GCF (Global Climate Fund) pledged for $13 billion but implementation has been a challenge due to Socio-Economic conditions but the positive side is at Cop-28 there was a clear realization that if we are not able to provide the financial support that are required by the developing and least developed states it would not be possible for them to take desired action to curb the crisis. This was the view of every member of the conference that is a positive step towards successful climate action after so long particularly, for developing and lest developed states. So, the realization was there and the hope is because of realization pledges will be met.

Pittock in his book "Climate Change the science, impacts and solutions" explains three psychological responses towards crisis situation: Nihilism, Fundamentalism and Activism. There are different groups of people with different beliefs. People fall in Nilhisim group belief that its hopeless situation so let's have fun while we can (Pittock, 2009). Followers of fundamentalism rely on miracles such as God or the free market will save us (Pittock, 2009). Activism refers to the belief system of those who still have hope that we can still fix the problem, if we recognize the sense of urgency of the issue and show commitment to figure it out. According to author man is a rational being and with this rationality and ingenuity man can make possible all impossibles, as history depicts in world wars (Pittock,2009).

Keeping in view the three types of human reactions, humans react towards crisis situation and I tend to Favor the last option Activism that is a sagacious choice to deal with such a colossal crisis in making. So, for that active involvement, a sense of collective responsibility, dedication, and commitment is required. In the other two cases (Nihilism and Fundamentalism) passive or zero involvement at national, international, and global levels hinders the process of adaptation, mitigation, and resilience building.

Inter alia, the confluence of structural deficiencies and climate-driven crises in Pakistan, exemplified by the devastating floods from 2010 to 2022, droughts, heatwaves spell, GLOFs, climate-driven migrations, melting glaciers, rising water level, and the resurgence of smog in 2023, exposes a critical nexus between the climate vulnerabilities and human security challenges, national security, and global responsibility. The identified governance lapses, legislative shortcomings, the absence of robust enforcement mechanisms, and the lack of regional and global required dialogues and collective measures to combat climate change

magnify the Socio-Economic impact of climate-induced events. As Pakistan grapples with these challenges, urgent interventions and holistic policy reforms become imperative to mitigate the intertwined 8threats to human security posed by climate change and structural deficiencies.

8.2 Findings

The climate change crisis is a product of technological advancement and industrialization: Human-Environment Interference. In many ways, climate change is the product of technological advancement and industrialization. The rapidly increasing population accelerates the demand-supply ratio, resulting in natural resource depletion and a drastic increase in production.

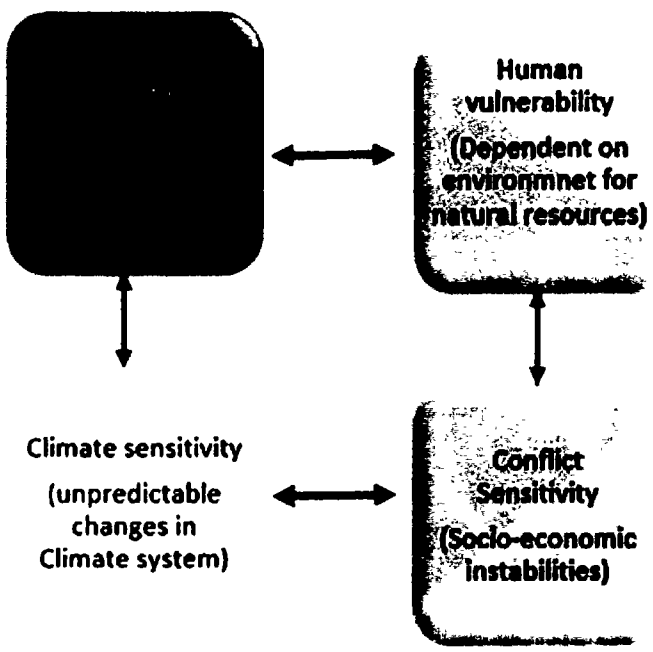


Figure 7: Human-Nature Interdependent Relation

Figure 7, represents this complex integration of Human-Environment relations. The coupling in this network can be elucidated by the vulnerabilities and sensitivities that depict the impact of a change in one variable on another. Climate change impacts the functioning of the earth system, ecological system and natural resources {like soil, forests, water, air, natural balance of ecological cycles (biodiversity)}. Similarly, humans may also have an impact on the climate system as a result of unsustainable socioeconomic development: rampant urbanization, population growth, intensive agriculture production to fill supply-demand gaps (land

degradation), coal-based industrialization, absence of transparency in policy-making, lack of shared responsibility, and inability to maintain a human-nature interaction balance. However, depending on the scale of vulnerability, this can impact individual security, for instance, the provision of basic needs (water, food, energy, shelter, health, job and social security). Humans' reaction to climate change can impact social stability, in extreme cases, it may result in climate-induced conflicts and social instability (political chaos, violence, crime, climate-driven migrations). The need of the hour is to figure out practical and realistic solutions to deal with complexity, control precarious climate change, and maintain the equilibrium of human-environment relations despite the occurrence of unavoidable changes. The interdependence of humans and the environment may cause climate sensitivities and conflict sensitivities. Maintaining a healthy balance among them is the only pragmatic way to deal with the sensitivities.

8.2.1 "Tropic of Chaos": Convergence of Climate Change Poverty and Fossil Fuel Crisis

Climate Sensitivity ----------Conflict Sensitivity---------- Human Vulnerability

Environmental risks are exacerbated in low-middle and low-income countries. As the country is already facing an economic crisis, climate-driven challenges act as catalysts in this situation. Pakistan is at "the tropic of chaos" due to the convergence of growing climate-induced crises, economic challenges, fuel crises, and political instability. For a developing state, building international trust is imperative for attracting foreign investment and finding international aid. However, in Pakistan's case, the trust deficit is increasing due to increasing security challenges and political instability.

Various climate sensitivities like landslides, unpredictable rainfall, heatwaves, floods and dry spills (droughts) aggravate conflict sensitivity and Socio-Economic instability. For instance, Murree grapples with the profound and enduring challenge of landslides each year during the monsoon and winter seasons. This devastating landscape poses a significant threat to residents, tourists, and their security. This phenomenon has extended beyond just physical threats to underscore Socio-Economic challenges.

According to the World Bank, Pakistan's economy suffered from a loss of 15.2 billion US dollars due to the floods that affected a large part of the country in 2022. It not only caused displacement but also affected food security; approximately 6.5 million acres of crops and orchards were affected, including around 4.8 million acres in Sindh, and 0.9 million in Baluchistan45. At least 4 million acres of crops were destroyed. This, in turn, translated into economic hardships for farmers as they lost their primary source of income, factories were

shuttered, and workers faced unemployment. Health issues like waterborne diseases, and mothers giving birth to malnourished children were seen more often because of those floods. The health crises also unfolded in the aftermath of the floods. Moreover, the high rate of smog in Pakistan is reflected in the alarming Air Quality Index (AQI) of 302 categorized as unhealthy aggravating health issues.

Inter alia, climate-induced human displacement is another risk multiplier. Low-lying coastal cities in Pakistan are impacted by coastal climatic variability, resulting in large population displacement. In recent years, more residents have fled Pakistan's coastline region due to rising sea levels and saltwater contamination. Pakistan's coastal belt, particularly Thatta and Badin, has seen over 40,000 people migrating to Karachi due to catastrophic events such as storms, seawater intrusion, and water shortages (Sattar, 2013). According to Oxfame (2019), members of almost all communities of Badin, Sajiwal, and Thatta districts have migrated to Karachi.

8.2.2 Economic Development at the Cost of Environmental Degradation

Climate change has a significant impact on global sustainability, particularly on rural people in developing nations, with Pakistan serving as a notable example. Over the last decade, the Indus River system has seen large-scale floods, causing substantial damage. In addition to floods, the country has seen periodic droughts and heatwaves, which have exacerbated the issues posed by climate change. Climate change has had a substantial influence on Pakistan, causing changing weather patterns and destructive floods that have affected the country's ecology and economy.

According to meteorological science, floods and heat waves are two different but interlinked phenomena. National Aeronautics and Space Administration (NASA) research centre claims Russian wildfires and floods in Pakistan are meteorologically linked.

45 Baigal, P. M. "Pakistan Farmers Who Lost Crops to Floods Struggle Without Compensation." _Dialogue Earth_, [date accessed or published if known], https://dialogue.earth/en/justice/pakistan-farmers-who-lost-crops-to-floods-struggle-without-compensation/.

In May 2010, Russia experienced extremely hot weather for four consecutive days in some areas that caused severe wildfires in forests. The temperature as high as 50 degrees Celsius or above was recorded in four days from 24th-27th May 2010. Analysts say it was 10 degrees Celsius above the normal temperature. When the fire broke out, some 1500 miles away torrential rainfall flooded Pakistan. Pakistan's Meteorological Department (PMD) reported, the rain was 70% above normal in July and 102 % above in August. The figures can quantify the severity of the floods (Lau & Kim, 2012)[46]. It's a classic example of a developing state paying the cost of industrial and developed state activities and climate-induced challenges.

Simon Kuznets proposed the Environmental Kuznets Curve (EKC), which hypothesizes the relationship between economic development and environmental degradation (Figure 8). According to Kuznet, at the start, the economic growth increases and environmental quality declines and at a later stage, economic stability reverses the trends and environment improves. This is somehow the model that developed states are following. But there is no surety that economic stability will reverse the environmental degradation and one country's economic or industrial development will not affect the climate conditions of neighbouring states.[47]

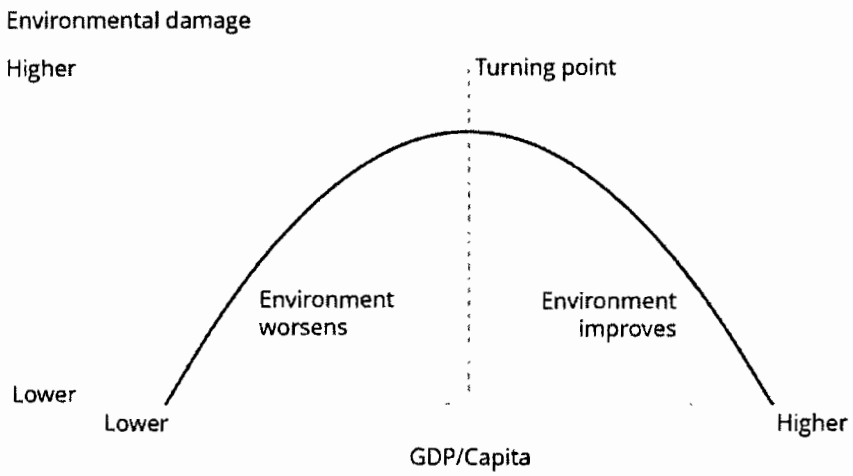


Figure 8: Environmental Kuznets Curve

8.2.3 Lack of Implementation and Risk Factor Calculation

The National Adaptation Plan (NAP), and the National Climate Change Policy 2021 (NCCP)

46 Lau, W. K., & Kim, K. M. (2012). The 2010 Pakistan flood and Russian heat wave: Teleconnection of hydrometeorological extremes. Journal of Hydrometeorology, 13(1), 392-403.

47 Stern, D. I. (2004). The rise and fall of the environmental Kuznets curve. World development, 32(8), 1419-1439.

faced multifaceted challenges in Pakistan's climate governance landscape. The NCCP aimed to integrate climate considerations into national development strategies across key sectors such as agriculture, water resources, energy, and urban planning (Government of Pakistan, 2021). However, similar to the NAP, the NCCP encountered significant hurdles in implementation, resource allocation, and achieving tangible outcomes on the ground (Saleem, 2022; World Bank, 2021).

Furthermore, the policy's monitoring and evaluation framework is often criticized for lack of transparency and weak implementation mechanisms. Clear metrics and benchmarks for assessing progress are lacking, making it difficult to gauge the policy's impact accurately over time (Asian Development Bank, 2022)[48]. This lack of accountability and transparency further undermined public trust and confidence in the government's ability to effectively manage climate challenges. While Pakistan's National Climate Change Policy of 2021 represented a significant commitment to addressing climate change, its effectiveness was hampered by implementation challenges and financial constraints.

Risk factor calculation and cost-benefit analysis are important factors for the successful implementation of policy measures.

8.2.4 Locals Passive Involvement: Nihilism and Fundamentalism Approach

Another important factor that needs to be addressed here is human resource and human reaction towards crises. In the context of human reaction towards crises, Pittock in his book "Climate Change the Science, Impacts and Solutions" explains three psychological perspectives: Nihilism, Fundamentalism and Activism. There are different groups of people with different beliefs. People falling into the Nihilism group believe that it is a hopeless situation so let's have fun while we can (Pittock, 2009). Followers of fundamentalism rely on miracles from God or the free market to solve their issues (Pittock, 2009). So, the passive involvement and such reactions at national, international and global levels hinder the process of adaptation, mitigation and resilience building.

Secondly, Human resource of any state is its power element. People of any area know their problem better than the outsiders and policymakers sitting in capital. In this context, the involvement of locals is very imperative to figure out crisis solutions at the grassroots level and

48 Asian Development Bank. Monitoring and Evaluation Frameworks for Climate Change Policies: Lessons from Asia. Manila: Asian Development Bank, 2022. Accessed May 22, 2024.

to build resilience. For instance, many cotton processing factories exist in the Sanghar district. Floods frequently disrupt the economic activities in the district. Many factories have been closed and those that are open are not functioning properly, labour is unemployed. Over the years, the yield of cotton has suffered from the situation. From Sanghar, water flows towards Mirpur Khas and Umer Kot. UmerKot natives told BBC, that during the flood, they didn't receive the government's help, hence they adopted a self-help approach and with coordination removed the flood water from the field.

Why has flood water not flowed away yet even after 6 months have passed? Members of affected communities in Khair-pur Mir told BBC that no one has come to help rebuild the infrastructure. They are struggling to build mud roads to connect people and to run their economic activities. People are still using boats to travel. Khairpur was one of the districts that were hit badly because of the local landlords of the Kot-D. G diverted water flow towards Khairpur to save their crops. The aforementioned examples depict that locals have the potential to work together with the government and other aiding agencies but better collaboration and coordination are required. They know the root cause of the problem and most of the time grassroots solutions also. For example, a farmer knows what kind of food diversification or crop diversification they may adopt to balance their losses.

8.2.5 Contradictions of Global Climate Management

According to UNFCCC, climate change is a global problem and it needs a global solution. It talks about "common but differentiated responsibilities"

That is all about equity which is very important and without it states won't be able to take any climate action. The global objectives regarding climate change cannot be achieved without equitable and sustainable development of developing nations. On the first day of COP 28, countries pledged $800 million in loss and damage funds but that's just a peanut to what is required. Much more financial input and consideration is required to achieve the ambitious objectives. Similarly, in the Global Climate Fund (GCF), members pledged $13 billion but implementation has been a challenge.

8.2.6 Socio-Economic Conditions and Climate Pledges

The Socioeconomic conditions in the world would have an impact on the realization of these pledges. At COP-28 there was a clear realization that if we are not able to provide the financial

support that is required by the developing and least developed states, it would not be possible for them to take desired action to curb the crises.

Another concern is political turmoil. Political uncertainties and a lack of trust in the international community, impede project funding and, in some cases, timely implementation. Especially when governments change, earlier government projects are often left unfinished.

8.3 Recommendations

Considering the complex interlinked issues related to environmental security, human security, and structures, it is pertinent to devise a comprehensive strategy that deals with the structural deficiencies and climate-driven vulnerabilities in Pakistan. Pragmatic, grassroots-level and realistic policy measures are required urgently to prepare Pakistan for future calamities and provide an adaptation mechanism against climate change and climate-driven vulnerabilities. A few of the measures are mentioned below:

8.3.1 Triangulation of Natives, Government and Aiding Organizations

Human resources are the most important resources owned by any state. People in any area understand their problems better than outsiders or policymakers sitting in the capitals. They are better aware of their situation. Their involvement in the process is imperative and would prove very effective. For instance, rural area residents have a far better understanding of climate-driven crises faced by them than the people residing in cities. Similarly, the professional and economic opportunities of the area are better known by the natives than the policymakers and agencies that occasionally come to assist them. Hence, locals' proactive involvement is critical for developing responses to crises at the grassroots level, building resilience and suggesting solutions rather than the outsiders. Locals show a keen interest in resolving their area's problems as it is in human nature to build a bond with their area. During the floods that affected a large part of the country in 2010 and 2022 and the October 2005 earthquake, we have witnessed the public response to the crises.

8.3.2 Need for a Responsible Climate Action: Cosmopolitanism Approach

Robert Fine argues in his book "Cosmopolitanism" that humanity is confronting a global risk and to resolve them global solution is required. In terms of climate change, he emphasizes humanity's interconnectedness and the shared obligation of individuals and governments to address global concerns (Fine, 2007).

Keeping in view the argument of Robert Fine, the current situation demands responsible

climate action at all levels including individual, state, regional and global levels. COP-28 is a groundbreaking step in this regard, where a commitment was made to release the $800 Loss and Damage Fund for climate-affected people. However, keeping in view the magnitude of the problem, it's just a peanut to what is required.

Similarly, the GCF (Global Climate Fund) pledged $13 billion, but implementation has been difficult due to socioeconomic conditions. On the positive side, there was a clear realization at COP-28 that if we fail to provide the financial support that developing and least-developed countries require, they will be unable to take the necessary action to cope with the crisis. Every member of the conference agreed that this is a great step towards successful climate action after so many years. So, the realization was there, and the hope is that because of it, pledges will be met. This realization and proactive approach are required to address such global challenges before it is too late to act upon them.

8.3.3 Proactive Involvement: Activism Approach Required

A. Barrie Pittock highlights three common psychological responses in his book "*Climate Change the Science, Impacts and Solutions*": **Nihilism, Fundamentalism and Activism**. I tend to favour the last one in this context.

Activism; those who adopt activism believe that we are still able to resolve the problem if we understand the urgency and importance of the issue and show commitment to resolve it. The writer is of the view that human beings are rational beings and by using ingenuity and commitment humans can achieve the unachievable as history witnessed during global wars and other events (Pittock, 2009).

8.3.4 Bio-Fuels: A Climate Solution

Bio-fuels or agro-fuels are products derived from different purpose-grown energy crops. According to Smith & Ruysenaar, two and a half billion of the world's poor population depends upon biofuels. In African countries, for the last few decades, bio-fuel production increased particularly in Mali, where different crop yields accelerated like jatropha to produce agro-fuel. In Africa, 60% of all acquired land is used for purpose-grown energy crops (Smith & Ruysenaar, 2015). Bio-fuel production creates a link between the agricultural system, the global market, petrochemical firms, consumers, and farmers.

8.3.5 Eco-Friendly Urbanization: Model of Singapore

Cities like Berlin and Athens are known for ameliorating their transport system.

Bangkok has been praised for developing green spaces in the city. However, the Asian state of Singapore is leading in introducing eco-friendly urbanization. It is considered one of the world's most sustainable and eco-friendly cities. Such approaches could be adopted in Pakistan's metropolitan cities to make them eco-friendly particularly, Karachi, Lahore, Rawalpindi and Islamabad.

Source: earth.org

Plantation should be encouraged inside offices and at homes. The Green Building Code Pakistan promotes the use of energy-efficient construction materials and buildings that are bright and airy to conserve the climate and make the city sustainable and environment-friendly.

Green building is an environment-friendly infrastructure system that is resource-efficient throughout the structure's life cycle. This green building process involves engineers, architects, city planners, contractors and clients to ensure the use of efficient construction materials, technology and eco-friendly design with efficient water utilization. It should also aim at, improving indoor environmental quality and energy efficiency (resulting in lower greenhouse gas (GHG) emissions).

8.3.6 Geo-Engineering: "Solar Radiation Management (SRM)"

In 2013, the Intergovernmental Panel on Climate Change (IPCC), presented its report based on the physical science of climate change. The report highlights the alarming increase in GHG emissions and the need for strong mitigation measures. It also presents an in-depth analysis of "Geo-engineering", considering the technological integration into the climate system is a potential "Plan B" to deal with global warming. Geo-engineering, particularly solar radiation management (SRM), has been a controversial topic since Nobel Laureate Paul Crutzen mentioned it in an editorial essay in the journal Climate Change (Wiertz, 2015). Wiertz discussed two Geo-engineering approaches in the chapter "Technology and Politics in Anthropocene: Vision of Solar Management": Sequestering of carbon (removal of carbon from the air) and Solar Radiation Management (SRM). SRM aims to alter the amount of solar energy that reaches the Earth's surface, thus mitigating some of the negative effects of greenhouse gases.

8.3.7 Integration of Financial Mechanism and Climate Financing

Pakistan and other developing and least developed states need to integrate economic and climate policies to ensure inclusive socio-economic development taking sustainability into account. Pakistan's major economic crisis is based on fossil fuels and the country's development requires a transition to renewable energy resources by aligning its policies with the climate change scenario. In this context, Pakistan needs to address the 3 Es: Economy, Energy & Environment. Pakistan needs to make a coalition in a very operational and achievable way so that we can target climate financing other than the loss and damage funds. Pakistan needs to make its economy more resilient to climate and a more balanced kind of approach should be adopted so that socioeconomic development is inclusive and climate-smart at the same time. In this regard, Pakistan should focus on working with the private sector. It can bring the private investment into renewable energy and energy efficiency folds like in COP-28, it was underscored to triple the renewable energy and double the energy efficiency. The private sector can get back its profits and this can bring financial stability as well. It will not only make Pakistan climate smart but also cut economic burdens in terms of financing. For instance, Pakistan imports oil worth around $1 billion every month and more than $12 billion every year. If it's cut down only about 30% through renewable energy or energy efficiency it can save around $300 million per month and $3.6 billion per year which is equal to the funding achieved through an IMF programme.

8.3.8 Global Models to Build Resilience, Adaptability and Mitigation

Ethiopia, Kenya, and Lesotho provide insightful examples of how developing countries can approach climate change through strategic policies, highlighting both successes and challenges that Pakistan can learn from. These nations have implemented frameworks like Ethiopia's Climate Resilient Green Economy (CRGE) Strategy and Lesotho's National Climate Change Policy and Strategy, demonstrating proactive steps towards mitigating climate impacts and building resilience. Ethiopia's CRGE Strategy, launched in 2011, stands out for its comprehensive approach to integrating climate considerations into national development plans. This strategy initially focused on mitigation efforts, emphasizing renewable energy, afforestation, and sustainable agriculture practices. Over time, it expanded to include resilience-building measures across critical sectors like agriculture and water resources. The strategy's success lies in its alignment with Ethiopia's broader development goals, fostering sustainable economic growth while addressing climate vulnerabilities. Similarly, Lesotho's National Climate Change Policy and Strategy outline targeted actions to enhance climate resilience and reduce emissions. This policy framework emphasizes adaptive measures in sectors vulnerable to climate impacts, such as agriculture and water management. By integrating climate considerations into national policies, Lesotho aims to achieve sustainable development while safeguarding its population from climate-related risks.

Comparatively, Pakistan faces significant challenges in addressing climate change despite having a National Climate Change Policy since 2012. The country struggles with the implementation gap between policy formulation and effective execution on the ground. Challenges include limited financial resources, institutional capacity constraints, and competing development priorities. Pakistan's vulnerability to climate impacts, such as water scarcity, extreme weather events, and agricultural losses, underscores the urgent need for robust climate action. Pakistan's approach to climate change, as reflected in its National Climate Change Policy (NCCP), contrasts with the more integrated and proactive strategies seen in Ethiopia and Lesotho. While all three countries recognize the urgency of climate action, Ethiopia and Lesotho have made strides in policy integration and implementation that Pakistan could learn from.

Tower and Plano, (2023) conducted a case study under the International Institute for Environment and Development (IIED) titled, "Living in the Shadow of Loss and Damage: Uncovering Non-Economic Impacts". According to their research, since 2010 flooding in the lakes of the Great Rift Valley, Kenya's nearby communities are facing displacement and livelihood challenges along these ecological threats like freshwater scarcity in Lake Baringo

forcing people to migrate. Since 2020, the Horn of Africa has endured five dry seasons, resulting in the worst drought in 40 years in Ethiopia, Kenya, and Somalia. These droughts forced Pastoralists to migrate and to switch to farming to build resilience. Similarly, communities around Lake Baringo depending on the tourism industry, due to the water level rise switched to fishing.

Lesotho has also been addressing key challenges exacerbated by climate change. In Ethiopia, the fund facilitated climate-resilient agricultural practices, enhancing irrigation systems, and bolstering early warning systems, aiding farmers in mitigating and adapting to climate risks. In Lesotho, the human security trust fund promoted sustainable farming practices, improved water management, and developed drought-resistant crop varieties, enhancing the adaptive capacity of rural communities. This intervention significantly improved food security, economic stability, and overall resilience in both countries.

8.3.9 Afforestation and Awareness: Carbon Sequestration and Forestry

The Forest Protection mechanism safeguards carbon stores in forests. It stores the carbon by preventing deforestation, reducing emissions, and enabling ongoing carbon sequestration. By protecting an additional 335-466 million hectares of forest, this initiative could reduce 5.55–8.83 Giga tons of carbon dioxide equivalent emissions by the next couple of years. This strategy is meant to address environmental threats and emphasize global responsibility in line with climate change mitigation efforts.

Moreover, Social media campaigns and grassroots efforts are required to galvanize afforestation efforts. Initiatives like kitchen gardens to roadside plantations are a few positive steps that would accelerate the scheme at the national level. Similarly, there is a dire need to manage forests. In Pakistan, according to a 2021 report, only 5% of forest cover is left. July and August are two suitable months for tree plantation in Pakistan. Inter alia, plantation according to the weather patterns of the area is also an important factor in increasing productivity. For instance, in Islamabad, you may plant peaches, apricots and other fruit trees. In dry climate areas like Bahawalpur, such trees should be planted that require less water. Areas like Karachi with high humidity levels are best suited for coco plants. Plant diversification would increase the growth chances. Along this, old plants that reach maturity, and leafless dry plants should be recycled because trees that reach maturity begin to release carbon in the air.

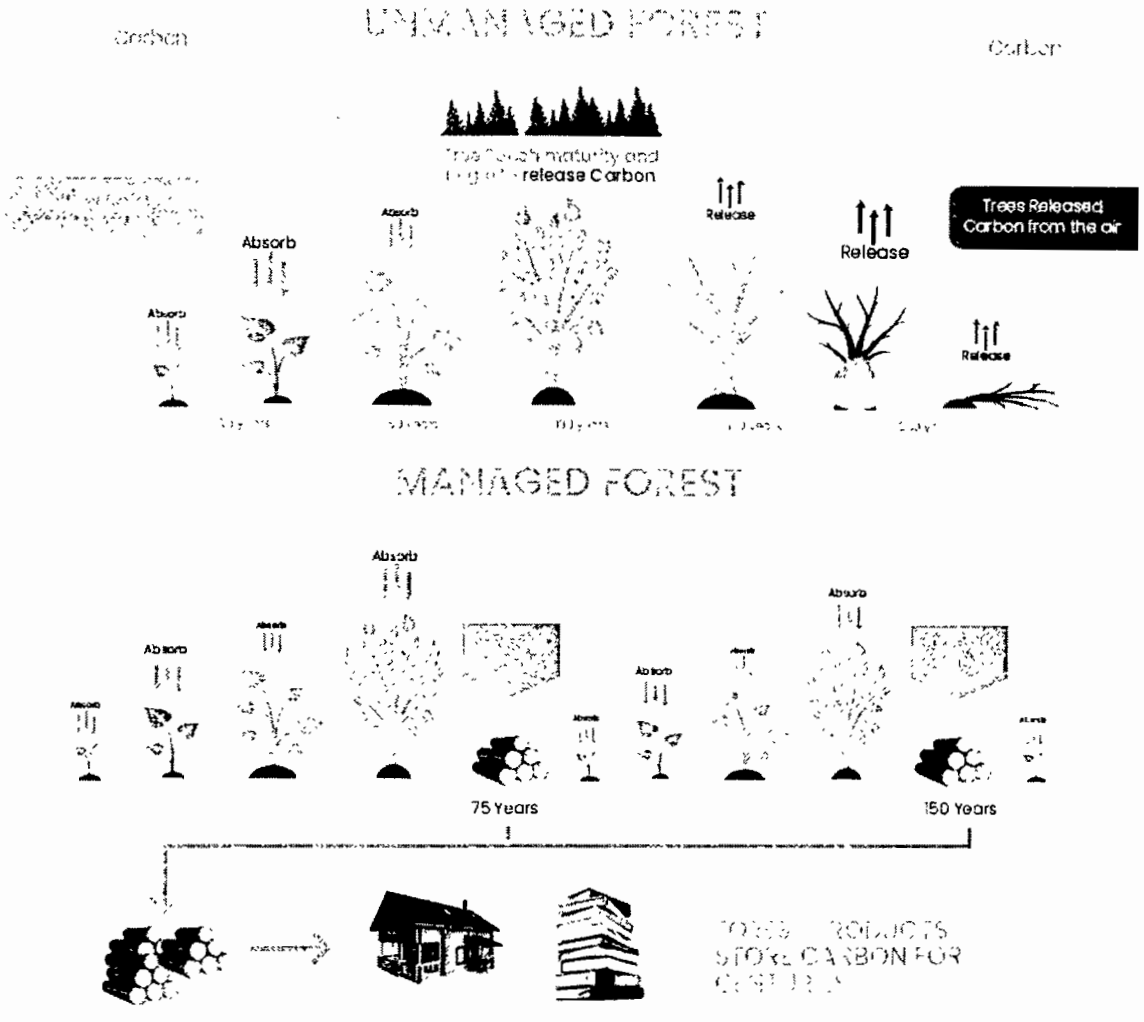


Figure 9: Unmanaged and Managed Forests

Source: (Ahmad, 2020) "What steps has Pakistan taken for climate action?"

Carbon storage means the total quantity of carbon in a forest. Carbon sequestration is the process of collecting carbon from the atmosphere and transforming it into another form such as wood that is not released quickly. It refers to the amount of carbon uptake from the atmosphere. A typical type of afforestation is the planting of short-cycle woody crops such as hybrid poplar. These species develop rapidly, sequestering enormous amounts of carbon in a short period.

8.3.10 Automation Setup

The government should introduce the automation setup and make it a compulsory setup for commercial buildings. They should create a regulatory body to keep a check on the

functioning of this system as well. Building automation systems in commercial buildings that control heating, cooling, lighting, and appliances will cut greenhouse gas emissions by enhancing energy efficiency. The impact of expanding adoption could avoid 9.55–14.01 Giga tons of CO2 equivalent emissions by 2050.

8.3.11 Sustainable Intensification for Smallholders

The government should introduce policies and take international organizations and other states on board for the global implementation of climate-friendly agriculture. The sustainable intensification practices for smallholders, such as pest management, crop diversification, and capacity building, will increase agricultural productivity and reduce the need for additional land clearing. This practice will also increase the framer's income and contribution to food security.

8.3.12 Early Warning Systems

The government should recognize the importance of early warning systems and should collaborate with stakeholders, international organizations, and the private sector to implement location-based SMS alerts. This initiative will ensure timely and tailored information delivery during extreme weather events, enhancing overall disaster preparedness and response.

Furthermore, there should be a focus on public awareness campaigns to educate communities on climate risks, sustainable practices, and disaster preparedness so that climate adaptation and mitigation are also carried out at ground level.

These policy recommendations are aimed at addressing the multifaceted challenges stemming from structural deficiencies and climate vulnerabilities, promoting a holistic and adaptive approach to safeguarding human security in Pakistan. To save the future of the next generations we must adopt sagacious and sustainable choices. As rightly said by **Buckminster Fuller**, "The *best way to predict the future is to design it*"

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