



Climate Change As A Non-Traditional Security Threat: Its Implications For Pakistan's Economy

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Abstract: *The biggest challenge of the 21st century is climate change. It is predicted to increase human vulnerability and the frequency and intensity of non-traditional insecurities. Due to its diverse terrain and tropical and continental climates, Pakistan is subject to several climatic and weather-related natural disasters (cold winters and hot summers). It is usual to experience extreme weather, droughts, water logging, landslides, hurricanes, and sea storms. The country's temperature is expected to rise significantly, particularly in the snow-capped mountainous north, accelerating the melting of glaciers and altering the course of the Indus River downstream. This paper examines the non-traditional security threat, namely climate change, and its adverse impacts on the economy of Pakistan. This paper applies the mixed method of research. It concludes that climate change significantly impacts Pakistan's agriculture, forest, livestock, health, etc., as these sectors pay directly or indirectly to the state economy.*

Key Words: Climate Change, Non-traditional Security, Pakistan

Introduction

Security is generally defined as guarding people in their homes, workplaces, streets, communities, and surroundings (Haq, 1995). National security has received more attention since the end of the Cold War. National security aims to defend a state's inhabitants, borders, and territorial integrity from conventional security threats (Bailey, 2005). The problems offered by non-traditional security threats have increased in the 21st century, escalating the dilemma of national security. Traditional security can be referred to as any conventional threats, especially those emanating from another state's civil and armed forces institutes, aimed at harming the people or the government. Traditional national security thinking focused solely on identifying the source of a state's perception of threats from a particular adversary state. In addition, non-

traditional challenges that threatened the state's inhabitants, property, and economy simultaneously emerged from a variety of natural sources (Kissinger, 2004). A rising range of unsettling worries have surfaced throughout time, including military, sociological, political, economic, and ecological security, which are categorised as non-traditional dangers or Copenhagen School threats. According to the Copenhagen school of thought, environmental concerns are a global threat to future security (Rucktäschel, 2018).

With the Industrial Revolution, the industrial release of greenhouse gases increased. GHGs contribute to global warming because they have a high potential for warmth and a lengthy lifetime (decades to centuries) (Barnett, 2014). According to Wheeler (2015), climate change is entirely caused by human

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activity, GHG emissions like carbon dioxide and methane, and changes in land use. The effects of climate change on the duration and intensity of meteorological conditions include warmer temperatures, altered precipitation patterns, and a rise in the frequency and severity of weather events. The apparent human influence on climate behavior is shown in the Fifth Assessment Report of the Intergovernmental Panel on Climate Change. This study predicts that climate change will exacerbate current issues and generate fresh hazards to people and the environment. (Climate Change: Synthesis Report, 2014). Extreme weather conditions including protracted flooding, severe rainfall, and stifling heat waves might increase the danger of climate change. In many places around the world, heat waves have become more intense. Similar to here, more instances of excessive rainfall on land have occurred.

Global climate change is expected to have a significant impact on emerging and underdeveloped countries more than on wealthy ones. Due to a lack of resources and inadequate access to information, common people, especially the poor, will suffer the most from the disastrous repercussions of climate change. (Barnett, 2014). Climate anomalies have become routine, but human-caused activities that fuel climate change continue to intensify global environmental disasters. The poorest people who already earn the lowest wages are the most prominent victims, although not the leading cause.

The fluctuating summer monsoon rain pattern in South Asia significantly impacts how freshwater resources are managed, how much food is produced, and how the economy is affected. Global climate change may affect these changes (Kumar, 2012). The IPCC 5th Assessment Report finds that rainfall intensity has increased in Indian monsoon regions (Ueda Hiroaki, 2006). Studies on changing precipitation patterns in Pakistan are also available. Ali and Khattak (2015) analyze the monthly rainfall over the Punjab province of Pakistan for 54 years (1961-2014). Accordingly, mean annual and summer precipitation will increase by 3.23 and 1.79 mm/year, respectively. Ali et al. (2015) conducted a model survey over Pakistan using 30 years (1981-2010) station-based monthly precipitation

information indices and discovered that precipitation increases during the storm and pre-rainstorm (April-June). Maida and Rasul (2011) announced increasing patterns in Pakistan's unusual rainfall. The country of Pakistan is at risk of significant flooding, according to Hashimi et al. (2012), who studied the causes of flooding in Pakistan. In addition, Ijaz et al. (2015) reported an increasing tendency for precipitation over Pakistan's Swat Channel Basin during the pre-rain season (May and June). As a result, the vast majority of research looking at changes in rainfall over Pakistan concur with the highly favorable trends across Pakistan's central monsoon zone.

This study focuses on how numerous facets of life that in some way or another contribute to the state economy are impacted by climate change. Moreover, it focuses on how climate change impacts the state economy as a non-traditional security threat. This paper applies the mixed method of research. Within the paradigm of mixed research, descriptive and interpretive approaches have been utilized, primarily based on secondary sources like books, research papers, reports, etc.

Current Scenario of Climate Change in Pakistan

Annual and sporadic rainfalls have increased over the past 30 to 50 years in Pakistan (Ahmad, 2017). There was a pronounced pattern toward increasing rainfall in the upper Indus, Punjab, and northern Balochistan plains, whereas the western Balochistan plains, particularly the coastal region, had decreasing rainfall (Yu. Winston, 2013). Mixed findings have been discovered in studies on the shifting patterns of precipitation in the Indus Basin. However, the data generally shows that during the 1960s the amount of winter precipitation increased in the upper Indus Basin (Fowler, 2008).

Every day, more and more of the consequences of climate change on Pakistan's atmosphere can be seen (Ahmad, 2010). Studies of temperature databases show a warming trend spreading across Pakistan. General warming trends in the lower Indus Basin are influenced by regional shifts. As this occurs, Upper Indus Basin temperatures show clear patterns between winter and summer seasons, with normal and most extreme winter

temperatures showing an increase (0.1 °C to 0.55 °C per decade) while normal and least extreme summer temperatures showed constant cooling (Archer, [2006](#)). Finding precipitation patterns caused by global environmental change is complicated by the seasonal and decadal variations in precipitation levels already existing in Pakistan.

Pakistan, a warm region, is particularly vulnerable to atmospheric changes due to its location in an area where the temperature is above the global average. The country is typically arid and semi-arid (about sixty percent of the region obtains less than 250 millimeters of rain per year and twenty four percent gets between 250 and 500 millimeters). The Hindu Kush-Karakoram Himalayas glaciers fed the rivers, and these glaciers are retreating very quickly because of global warming. In recent years, Pakistan has faced increasing threats from unstable monsoon weather and annual rainfall, which have caused major floods and widespread droughts. The aforementioned problems seriously jeopardise Pakistan's agriculture, water security, food security, and energy security (Boone, [2008](#)).

Pakistan is one of the 33 countries (Pakistan Needs to Control Water Demand-supply Gap, 2017) with acute water stress because Karachi is the sixth largest metropolis in the world (Toppa, [2016](#)) to be affected by decrease in water. Pakistan would also experience serious water shortages by 2025 if current rates of use continue (Roberts, [2017](#)). The number and quality of freshwater sources are declining while population and water demand are increasing (Ebrahim, [2018](#)). The lack of freshwater resources within Pakistan's borders is one of the country's major water challenges (Ali, [2017](#)). Five Indus River tributaries, which originate in Tibet, a region contested by India, China, and Pakistan, and flow through the Jammu and Kashmir highlands, a region also contested by India, Pakistan, and China, before entering the interior, are crucial to Pakistan. Environmental changes pose additional threats as temperature increases alter patterns of precipitation, flooding and resulting droughts, which may prove to be more extreme (The

Consequences of Climate Change, NASA Report).

Geographically, the Tibetan Plateau and western Himalayas, where the Indus River rises, currently experience temperatures of 4-5 degrees Celsius and 9.5 inches of annual rainfall, respectively (UNEP Report, 2015). Extreme flooding in 2010 affected nearly 20 million people and cost Pakistan's horticultural industry \$5 billion in losses (Pakistan: Flood Impact Assessment," Survey Report, 2010-11). There is increasing evidence that climate change could exacerbate Pakistan's current water shortages, the vulnerability lives in how severe this change can occur and the potential impacts it could have.

The delay in the dry season continues to threaten small-scale agriculture in several parts of Pakistan. In its 2020 annual report, GCRI ranked Pakistan fifth on the list of states most susceptible to climate change. From 1999 to 2018, Pakistan experienced 152 extreme weather events, cost 9,989 lives and suffered US\$3.8 billion in fiscal losses. Based on this information, it was concluded by think tank that Pakistan is becoming more susceptible to climate change (Abubakar, [2020](#)). Further, according to estimates, Pakistan's water supply will be reduced by 31-million-acre feet by 2025. As a country with a water-intensive economy, Pakistan will need proper water storage facilities to conserve water for later use (Dawn, 2018).

Climate Change and its implications on Pakistan's Economy

Agriculture, which makes up a substantial portion of Pakistan's economy, is negatively impacted by climate change. It is well known that climate change has a negative influence on socioeconomic sectors, forests, biodiversity, agriculture, human and animal health, as well as monsoon floods and dry weather. With approximately 250 mm of annual rainfall, Pakistan is one of the driest countries in the world. (Salma S., [2012](#)). According to the Water Aid Report (2016), the average amount of water per person in Pakistan is 908 m³ cubic meters, a decrease of more than 406 percent since the 1950s.

Since the nineteenth century, Pakistan has seen ongoing droughts that have impacted the

Indus Basin. Drought has been named as one of the factors contributing to Pakistan's slow economic growth (Economic Survey of Pakistan 2017-18). Droughts in recent years have increased the number of inter-ethnic conflicts in Pakistan. For instance, the city of Quetta experiences a daily water scarcity of almost twenty million gallons. Likewise, 21 million inhabitants of Karachi regularly get only half of the UN-recommended daily water provision (Aamir, [2019](#)). Periodically between 1998-2002 and 2014-2017, Pakistan's southern region, including Tharparkar, experienced severe droughts. (Government of Pakistan [2018](#)).

Pakistan has an agricultural economy, and the agricultural sector employs roughly 38.5 percent of the country's workforce. The Economic Survey of Pakistan 2018-2019 reports that the agriculture sector only grew by 0.85 percent, far less than the target of 3.8 percent, primarily because insufficient water was available (Pakistan Economic Survey [2018-19](#)). According to one estimate, 18.63 Mha of Pakistan's 23.4 Mha of arable land is irrigated (Campeanu, 2014). Pakistan places a high value on irrigation, with seventy-seven percent of Punjab being irrigated and less in other provinces. There are many different agricultural practices, such as spate irrigation. Flood irrigation is a method of crop irrigation that uses gravity to direct seasonal rainwater onto farmland at a lower elevation than floodwaters in rivers, valleys, ravines, and riverbeds (World Bank 2017). In Pakistan, crops are grown during both Rabi and Kharif seasons. Wheat is a major rabi crop; white rice, corn, turmeric, and sugarcane are prominent Kharif crops. Kharif crops are grown in the summer, starting with sugar cane in February, cotton in March through May, rice in June through July, and maize in July through August. Important cropping systems include those for wheat grown in rice, corn, cotton, and sugarcane. Plants in irrigated and tillage systems are incredibly sensitive to changes in water temperature and volume. By 2040, agricultural production is expected to reduce by eight percent to ten percent as temperatures rise (Cradock-Henry, [2020](#)). The research model anticipated a drop in agricultural productivity, particularly for wheat and rice, using the crop growth simulation method. With

the exception of Pakistan's northern regions, practically all agroclimatic systems are predicted to have a six percent loss in wheat yield and a fifteen to eighteen percent reduction in basmati rice yield.

Due to various agronomic and social factors, including labor availability because of seasonal weather variations and pesticides, and water availability, the wheat crop is notably impacted by climate change. The growth and yield of winter crops (Rabi) depend on heavy summer and Kharif rains. By 2080, according to the International Institute for Applied Systems Analysis in Austria, main agricultural and grain yields would plummet, with wheat production falling the most (Chaudhary, 2017). Water scarcity could lead to a decline in cotton production, resulting in widespread unemployment. While the effects on farmers are evident, there will also be a high unemployment rate among those employed in the textile business who process most of the industry's exports, textile goods.

These dire predictions require significant adjustment interventions for Pakistan and are frightening. One of the most notable effects of climate change is the likely increase in food poverty and malnutrition. These sporadic weather patterns have a detrimental impact on family income and food security because they can ruin livelihoods and worsen poverty by damaging vital public assets, important infrastructure, and agricultural products. Another aspect of ongoing climate change is rising sea levels, which further endanger the livelihoods of coastal towns and river deltas. Rapid thawing of glaciers will change flood and drought patterns and the amount and reliability of available irrigation water (Davidson, [2018](#)). Numerous studies have revealed that approximately half of Pakistan's people and about 23% of Pakistan's territory are under threat from climate change. The Asian Development Bank estimates that by 2050, climate change may cost Pakistan more than 2% of its yearly GDP. (Chaudhry, [2017](#)).

Along with this, the country's economy livestock sector is also very important that also comes in the way of climate change. Twelve percent of the national GDP comes from livestock, which accounts for 53 percent of agricultural GDP. It is dependent on grasslands and rangelands, which are threatened by

climate change and are under more frequent and severe droughts, flash floods, and rising temperatures. For 30-35 million rural farmers who depend on livestock for around forty percent of their income, livestock is an important agricultural activity (Framework for Implementation of Climate Change Policy 2014-2030, 2013). There are regional variations, with the dry province of Balochistan hosting the largest percentage, eighty-seven percent of people raising animals (Asian Development Bank, 2017). Heat stress reduces milk and meat production and reproduction, which is one of cattle's main climate change effects. The likelihood of zoonotic epidemics and livestock deaths is increased by rising temperatures and water-related catastrophes (UNDP, 2016). Livestock farming will also suffer from indirect climate-related pressures such as reduced forage production, soil erosion, and land degradation. While 1,136 people died nationwide due to the July and August 2022 floods, at the time of writing this research article Khyber Pakhtunkhwa continued to face the possibility of further flooding. A situation reports from the National Disaster Management Authority said about 735,375 livestock were lost, and 1,634 people were wounded in numerous rain and flood events (Sirajuddin, 2022).

Moreover, domestic and international migrations in Pakistan are expected to increase. Heat stress and flooding, climate change-related factors severely impacting agricultural livelihoods, have already led to resettlements in Pakistan (Fahad, 2000). In 2016, natural disasters in Pakistan resulted in the forced displacement of over a million people (Bennett, 2017). Due to climate change, this number is expected to increase. Natural disaster-related temporary displacement is common in Pakistan, as evidenced by the 2010 floods, which drove 20 million people from their homes. (National Climate Change Policy, 2012

). Because health facilities have not been upgraded to cope with the increased number of people, heat waves and more frequent flooding can exacerbate the health problems of migrants and internally displaced persons (Malik, 2019). Migrants also often have low-paying jobs and struggle to afford health care. In Pakistan, a sizable maximum population

lives in rural regions where farming is their prime source of income. Climate change's impact on agricultural productivity has drastically changed livelihoods, which may accelerate and worsen the urbanization trend. Rural poverty is frequently linked to one's ability to access resources and lack of land ownership, both of which can cause rural-to-urban migration.

The forest plays a very significant role in the stability of the country's economy. Climate change and climate variability threaten a range of essential commodities (timber and non-timber) and ecological services that forests provide and on which a projected 1.6 billion individuals depend in whole or in part. Forests and trees provide a continuous supply of clean water but also help protect against landslides, erosion, and soil degradation and create or enhance aquatic habitats. Given that nearly 1 billion of the 1.2 billion individuals who live in extreme poverty (Sustaining forests. A World Bank strategy, 2002) rely directly on forest resources, it is reasonable to assume that the poorest will be adversely impacted by climate change's effects on forests, making already susceptible people even more vulnerable. It is widely accepted that trees and forests are vulnerable to climate change. Numerous areas could experience harmful consequences. There is evidence that the effects of climate change, including increased drought and temperature strain, augmented water and wind erosion, greater storm damage, more frequent wildfires, pest and disease outbreaks, avalanches, and landslides, are to blame for decreased production and tree deaths in many locations. Changes in the habitats of forest animals and plants, damage from flooding, saltwater intrusion, increased forest fires, and landslides and avalanches (Meybeck, 2012).

In addition, the health sector affects by climate change. Clean drinking water, clean air, sufficient food, and adequate housing are ecological and social factors that can be influenced by climate change. It might be impacted by instances of extreme heat, natural catastrophes, and irregular rainfall. It is anticipated that heat wave episodes will last longer and occur more frequently. In Karachi alone, more than 1,200 people died during the June 2015 heatwave, and another 200 died in other areas of Sindh province (Qamar, 2015).

The second highest temperature after 1979 was recorded in Karachi, with a maximum temperature of 44.8 OC. In Pakistan, heat waves are common on the country's plains before the May-June monsoon season.

The spread of several infectious diseases and food availability were associated with differences in precipitation and temperature (Tayyab, 2014). A preliminary investigation by UNDP found that during the 2010 floods, the proportion of the populace below minimum levels of food energy consumption augmented by three percent, adding another 5 million people to the population of undernourished (UNO. Annual Report 2010). A similar correlation was found between extreme events and the mental health of the affected population, showing that extreme events often result in depression, despair, anger, etc. (Save the Children. Psychological Assessment Report: 2011). As temperatures rise, so does the risk of waterborne and vector-borne infections. Temperature fluctuations and heavy rainfall are responsible for dengue and malaria cases, possibly related to an increase in mosquito breeding sites. In addition, drinking water contamination and inadequate sanitary infrastructure are to blame for more than sixty percent of diseases in Pakistan and other developing nations. According to statistics, roughly 13.6 percent of all fatalities are caused by waterborne illnesses like typhoid, cholera, dysentery, and diarrhea, which are social tragedies and hindrances to the nation's economic growth (Baig, 2017).

In addition, changing climate also affects the country's physical assets, adversely impacting the state economy. Property, plants, and equipment may be impacted by the vast spectrum of extreme weather events predicted for Pakistan. Sea level rise has already an impact on coastal inhabitants' homes and major cities like Karachi. (Asian Development Bank. 2017). The Asian Development Bank estimates that in the last 100 years, Pakistan's sea level has increased by 10 cm (four inches) (Lee, January 2017). The coastal region of Sindh is regularly inundated by seawater. According to reports, seawater is encroaching at 80 acres per day, and thirty-eight percent of the mangrove forests have been destroyed in the last 20 years. The fertile soil is becoming sterile as a result of this encroachment.

The fragility of houses, employment, and infrastructure in Pakistan has been made clear by the devastating floods the country has faced over the previous ten years (ILO, 2017). Over ten million hectares of crops were damaged or destroyed, along with 197,230 villages, 3.45 million dwellings, and more than \$4 billion in damages between 1995 and 2013 (UN-Habitat, 2018). Moreover, experts predict that storms will worsen in the future, harming infrastructure and triggering significant flooding. The country saw five major floods between 2010 and 2015, totaling \$18 billion in economic losses. In addition to these financial losses, 38.13 million people were impacted, 3.35 million homes suffered significant damage, and 10.43 million acres of agriculture were devastated, causing the topsoil to erode (Ahmad, 2015).

Climate change, development, and population growth can potentially increase disaster damage. The urban poor is particularly vulnerable, with emergency shelters and informal settlements often built in empty floodplains (UN-Habitat, 2014). The recent floods in Pakistan in July and August 2022 also caused damage to around 3,451 km of highways, 149 bridges, 170 stores, and 949,858 homes throughout the nation. (Sirajuddin, 2022).

Further, climate change impacts the country's coastal zone, which plays a pivotal role in the development of the state economy. Coastal regions are facing significant physical changes due to sea level rise. The IPCC Assessment Report (Church, 2013) anticipated a Global mean sea-level rise of 0.44m to 0.74m by the end of the 21st century. However, other studies have emphasized the potential for larger increases. The coast of Pakistan is extremely vulnerable to sea level rise. In the coming years, between 2070-2100, Metrological office research shows that almost one million people will face coastal flooding annually without adaptation. The Indus Delta, which covers around 4,750 km² and is below 2m above sea level, is the most vulnerable region (Syvitski, 2009). It is estimated that almost a million people live in the delta. After many years of migration caused by the upstream diversion of freshwater supplies away from the delta, this is far fewer than have previously lived in the region. Salt intrusion,

which lowers the land quality and agricultural productivity, remains a significant problem in the coastal zone. These problems are likely to worsen, harming many poor and marginalized groups.

Furthermore, climate change also has an impact on the land and soil industries. Land degradation, desertification, and dryland expansion are major issues in Pakistan. Human activities including overgrazing, excessive water consumption, over-cultivation, and excessive fertiliser use are deteriorating soil quality and expanding dry areas in Pakistan, where 80% of the nation is arid or semi-arid. The National Action Program to Combat Desertification was adopted, but there were difficulties in its implementation (IUCN Pakistan, 2017). According to Huang et al. (2016), larger emission pathways could significantly increase the area classified as hyper-arid, the driest category, as an outcome of climate change. Since droughts are more common in arid and semi-arid areas, this phenomenon has already been observed in several areas (Ahmed, 2018). Potential effects of dryland expansion and desertification include sedimentation of reservoirs, the creation of dust storms, and loss of biodiversity. Restoring Pakistan's natural environment is a goal of programs such as Clean Green Pakistan, which will make significant efforts to plant trees between 2016 and 2021.

Conclusion

This study has thoroughly investigated non-traditional security issues, concentrating in particular on climate change and its effects on Pakistanis' economic well-being. Every area of life is impacted by climate change, but it has a specific impact on the forest, livestock, agriculture, water, health, and other areas that support the stability of the national economy. The majority of Pakistan's economy is agro-based, yet climate shifts are quickly becoming

apparent. That has an effect on human life and the economy by disrupting the climatic processes of the planet, resulting in cyclones, scarcities, famines, and floods, among other natural disasters. In Pakistan, for instance, it is predicted that climatic changes will have a significant impact on the country's agricultural output, water availability, seawater intrusion, natural disasters, coastline erosion, and frequency of extreme climatic occurrences. Climate change and population expansion have a negative and major impact on all sectors, particularly the economy. These adverse effects of climate change are becoming more severe with time in a variety of contexts. The agriculture industry in Pakistan is extremely vulnerable to climate change, shifting weather patterns, and other environmental factors. In other words, achieving food security and lowering poverty in the state may become more challenging as a result of the effects of climate change on farming.

Climate change, however, is an international or local issue. Pakistan's potential to slow down climate change is limited by its insignificant relative to wealthier countries contribution to global GHG emissions. The ecological concerns may not be effectively addressed by less developed nations like Pakistan. As a result, in order to execute mitigation measures to stop climate change, a coordinated and comprehensive policy is needed. Furthermore, environmental problems that are common to South Asian countries necessitate concerted action, at least among the countries, to meet the climate crisis. In order to control climate change at the micro-scale, adaptation and mitigation methods are required to deal with the effects of climate change across numerous industries. It is crucial to create localised adaptation plans and minimise unwelcome human interference with wetlands, glaciers, forests, and rangelands.

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