CLIMATE CHANGE AND NATIONAL SECURITY

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Abstract

Historically, the social or political unrest that could lead to destabilisation as well as physical threats from extremist groups, whether locally or abroad, has been used to analyse national security. However, after the 1960s, people began to consider the threats posed by climate change from the perspective of global security and a system was set up to create a cogent worldwide response to the looming issue. Climate Change threatens Pakistan's National Security because it directly impacts food and water security. The total cumulative damage to the economy from Floods has been calculated at USD 70 Billion since independence, other disasters have not been factored in. The threats emanating from rising global temperatures must be taken seriously and long-term impactful plans must be devised and implemented to ensure the country's national security.

Keywords

Climate Change, National Security, Food Security, Agriculture Yield, Water Security, Water Availability, Urban Sprawl, City Development, Disasters, Floods, Economy.

Introduction

The national security of any country is often explained via the prism of substantial threats from radical groups domestically or abroad and social or political disturbances that could cause destabilisation. However, after the 1960s, the world started to look at the challenges of climate change from a global security point of view and an order of organisation was established to devise a coherent global response to the global impending crisis. From 1972's Stockholm conferences to the creation of the Intergovernmental Panel on Climate Change (IPCC), the evidence of climate change has become concrete, and some countries are disproportionately more vulnerable to the impacts of the global climate crisis.

Pakistan has been battling different national security elements on different fronts. The traditional security elements have been there since inception, but the vulnerability of the country has increased to non-traditional security elements over the years and climate change is one of them. The country's vulnerability to climate change has increased manifold over the years. Just by looking at the history of recurring floods and the country's damp response, the picture is clear. The lack of capacity, capital, and political will makes the situation even more challenging for the country. A comprehensive framework is required to tackle climate change and control its implications on national security because the vulnerability to climate change dents national security in multiple ways.

Pakistan consistently ranks among the ten most climate-change-vulnerable nations, according to the Global Climate Risk Index.[1] Recurring floods, heatwaves, droughts, flash floods, Glacier Lake Outburst Floods (GLOFs), and changes in weather conditions are many faces of climate change consequences.[2] Floods have remained a recurring phenomenon, but the country has not been able to implement a long-term flood management, adaptation, and mitigation plan. The intensity of the floods increases year over year and the response mechanism stutters responding. More than 29 Floods have battered the country since its inception and the response mechanism continues to be weak and ill at its responses.[3] As the country's vulnerability to climate change increases, its national security risks all increase making it vulnerable to international forces and regional aggressions. The article will analyse the impacts of climate change on food security, water security, urbanisation, and climate-induced disasters, particularly floods, and what measures should be taken to secure the country.

IPCC assessment reports have been guiding researchers, policymakers, and practitioners at all levels about the impacts of climate change on different dimensions of our livelihoods.

Table-1: Potential Impacts and Threats of Climate Change

Water	• "Increased water availability in moist tropics, and high altitudes" • "Decreasing water availability and increasing drought in mid-latitudes and semi-arid low latitudes (Pakistan is in the mid-latitude region)" • "Millions of people are exposed to increased water stress"
Food	• Complex, localized negative impacts on smallholders, subsistence farmers, and fishers • Productivity of all cereals decreases at low latitudes. • Cereal productivity to decrease in some mid-to-high latitudes and for some cereals it might increase
Coasts	• "Increased damage from floods and storms" • "Millions of people could experience coastal flooding each year"
Health	• "Increasing burden from malnutrition, diarrheal, cardio-respiratory, and infectious diseases" • "Increased mortality and morbidity from heat waves, floods, and droughts" • "Changed distribution of some disease vectors, the burden on health services"

Source: IPCC Fourth Assessment (2007)

The latest Change 2023 synthesis report has all the updated impacts and threats from climate change. The findings are very clear on the impacts of climate change and how the different variables are shaped in the new order. Here is the summary report of the IPCC's latest assessment findings. The initial reports of the IPCC

Table-2: Climate Changes and its Impacts

 Evidence	"Since at least 1971, human involvement has most certainly been the primary cause of these increases. Since the Fifth Assessment Report (AR5) was published in 2014, the evidence supporting observed trends in severe events, including heatwaves, heavy precipitation, droughts, and tropical cyclones, and, in particular, the attribution of these changes to human activity, has grown. Between 3.3 and 3.6 billion individuals reside in environments that are extremely sensitive to climate change."
 Ecosystem	"Ecosystem fragility and human vulnerability are interrelated. People and places with significant development limits are particularly vulnerable to climate dangers. Increased weather and climate extreme events have put millions of people at risk of severe food insecurity and decreased water security, with the worst effects seen globally for Indigenous Peoples, small-scale food producers, and low-income households in many regions and/or communities in Africa, Asia, Central and South America, Small Islands, and the Arctic. In comparison to locations with very low susceptibility, human mortality from floods, droughts, and storms was 15 times greater in highly vulnerable regions between 2010 and 2020."
 Hydrology and Sea Level	"Some environmental effects, such as the effects of hydrological changes brought on by glacier retreat, are almost irreversible. There is no doubt that human activity has caused the atmosphere, ocean, and land to warm. Between 1901 and 2018, the global mean sea level rose by 0.20 [0.15 to 0.25] m."
 Weather Extremities	"Extreme weather and climate are a growing factor in migration to North America, Asia, and Africa (high confidence). Human death and morbidity have increased in all locations due to increases in extreme heat episodes (extremely high confidence). Very high confidence in the occurrence of climate-related food- and water-borne diseases, and high confidence in the prevalence of vector-borne diseases."
 Agriculture	"Agriculture, forestry, fisheries, energy, and tourism are some of the climate-exposed sectors where economic harm from climate change has been found. The devastation of homes and infrastructure, the disappearance of property and income, the loss of human health and food security, and negative consequences on gender and social equity are just a few examples of how individual livelihoods have been impacted. The Sustainable Development Goals are being more difficult to achieve as a result of decreased food security and impacted water security (high confidence)."
 Overall Impact	"The observed climate change has negatively influenced people's Health, way of life, and essential infrastructure in urban areas. Extreme heat has increased in urban areas. Extreme and slow-onset disasters have harmed urban infrastructure, including transport, water, sewage, and electricity systems, leading to financial losses, service interruptions, and detrimental effects on well-being."

Source: IPCC AR6 Synthesis Report (2023)

did not look at the security aspect of the impacts of climate change until security experts started exploring the possibilities. However, extensive literature on the subject has established a robust relationship between climate change and security.

Variables of Potential Threats to Security

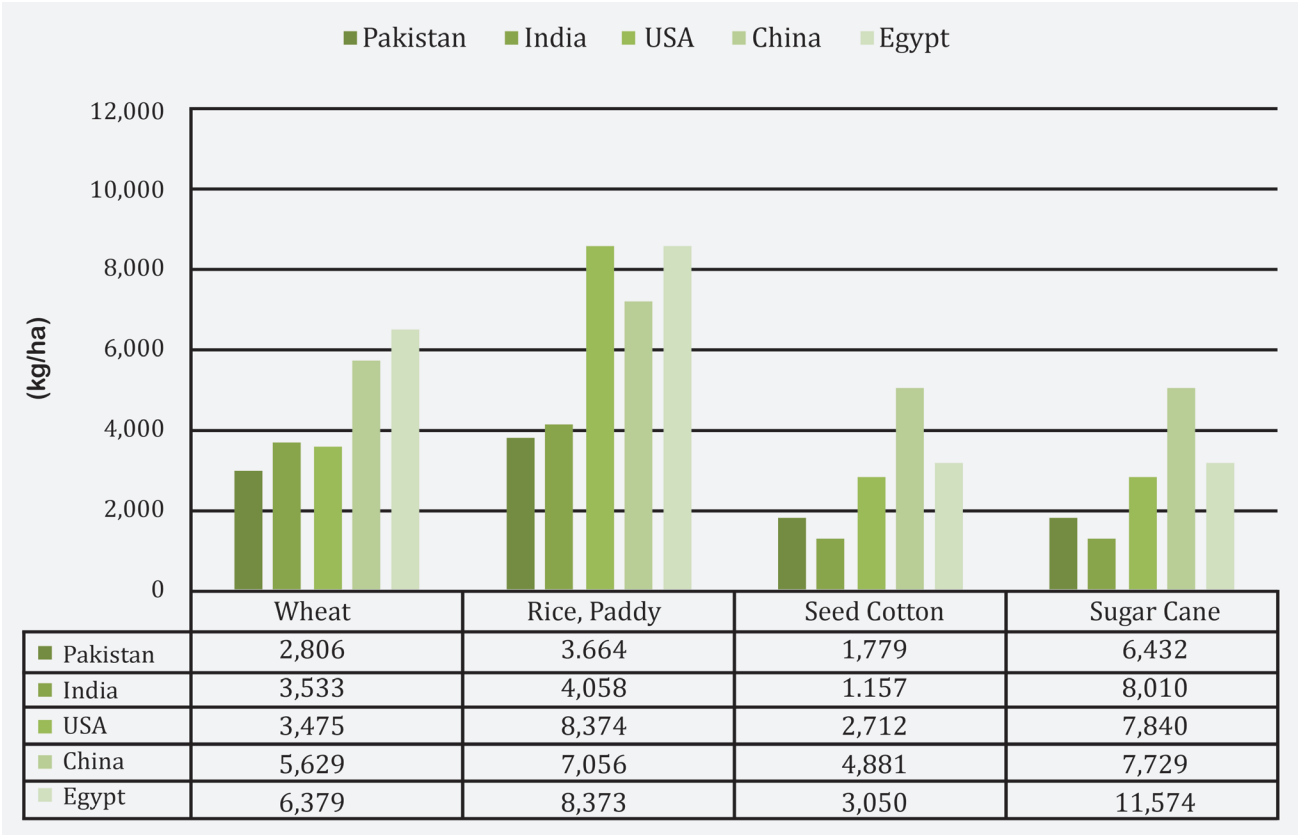
Pakistan faces huge challenges but will focus on variables of immense gravity: food security in terms of agriculture productivity, water security, urban sprawl, and climate-induced disasters.

Agriculture and Food Security

Pakistan is an agrarian country as agriculture contributes to 22.9% of the Gross Domestic Product (GDP) and employs 37.4% of the workforce.[4] The impact of climate change will be severe as Pakistan already tails in the agricultural yield in regional comparisons. The increase in global temperatures impacts agriculture production by location and since Pakistan is in the low altitude region/semi-arid region, the country may face a higher increase in temperature negatively impacting crop productivity. According to the IPCC synthesis report, Agriculture/crop productivity has a very high adverse impact in Asia.[5] Pakistan is in a high-risk region with huge implications as the country has to feed over 240 million people. The agriculture sector relies on soil fertility, water availability, fertilizer proportions, and best growth practices to achieve maximum results, but Pakistan has not been able to achieve that in past years.[6] The country's per-acre yield is the lowest in the region and it is a cause of concern. With low agricultural yield and growing food demand, the country struggles to meet its annual demands.

Pakistan imports basic cereals from different countries, placing food security at the mercy of global stocks. The three staple grains are rice, wheat, and maize. Pakistan has not been able to significantly increase its production to meet the demand. Recently, the Russia-Ukraine conflict saw a jolt to grain trade, and Pakistan narrowly managed to acquire stocks amidst the uncertainty. In the eight months of 2022-2023, Pakistan became the fifth importer of Russian wheat as the wheat deficit grew to 2.37 Million matric ton.[7]

Table-3: Agricultural Yield Comparison



	Wheat	Rice, Paddy	Seed Cotton	Sugar Cane
Pakistan	2,806	3.664	1,779	6,432
India	3,533	4,058	1.157	8,010
USA	3,475	8,374	2,712	7,840
China	5,629	7,056	4,881	7,729
Egypt	6,379	8,373	3,050	11,574

Source: Food and Agriculture Organisation (FAO) (2021)

Pakistan has not been able to significantly increase its production of fundamental crops. If significant action is not taken to address this serious problem, it is predicted that Pakistan could lose USD 20 Billion by the middle of this century because of Climate Change related losses in the production of its rice and wheat crops.[8] According to the Pakistan Economic Survey 2022-23, wheat production has shown only a growth difference of 4.7% which is not sufficient, and rice production 10-13% which confirms the claims of using more land for rice cultivation. But last year, rice production was badly hurt by Floods in the country. Production fell by 21.5%. For maize as well, the increase in yield is 5-6% as per the Pakistan Economic Survey. With soaring population growth, Pakistan must re-think its agricultural practices, agriculture land use, and climate-adaptive agriculture to ensure food/grain security for the country.

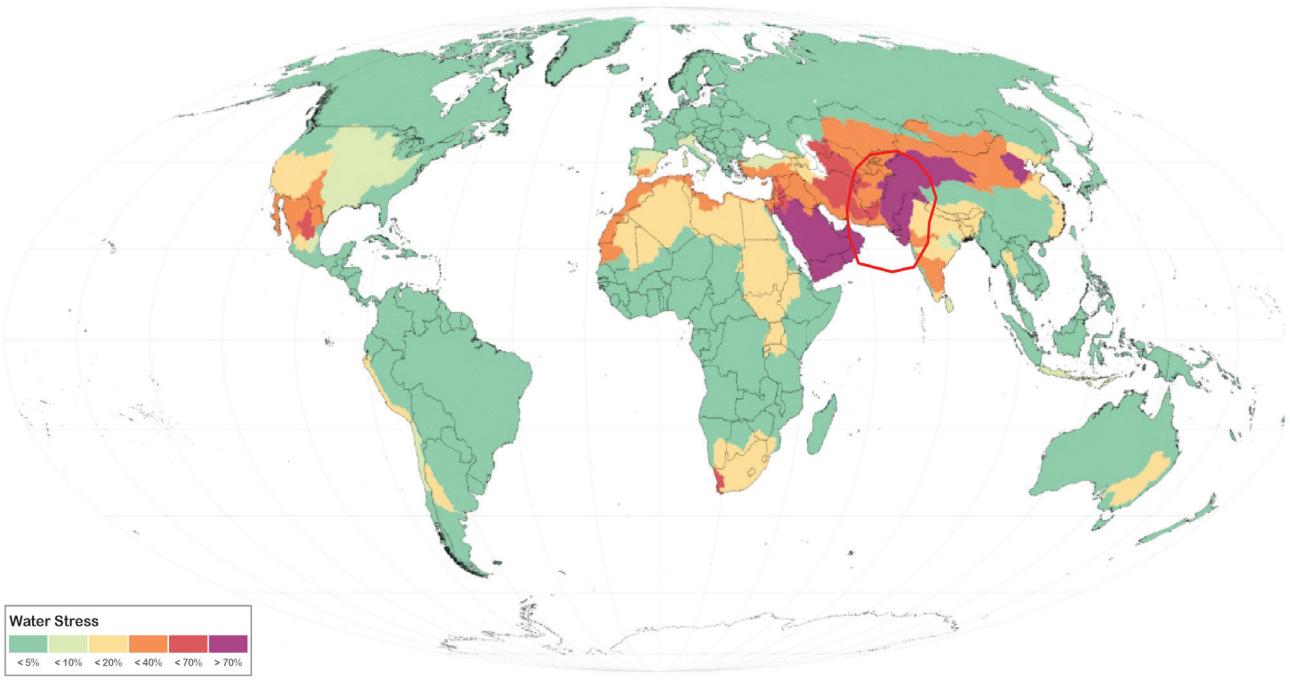
Water Security

The amount of water available per person was measured in 1962 at 5237 cubic metres and in 2017 at 1188.[9] 2019 saw a decrease to less than 1000 cubic metres per person. With 240 million people, or 2.8% of the world's population, Pakistan now holds the fifth-highest population ranking. The nation, however, barely makes up 0.5% of the global sustainable water resources. According to the renewable water resource ranking, Pakistan ranks 164 in terms of per capita renewable water resources, India ranks 127th and Bangladesh at 147th in the same ranking.[10] Pakistan relies on a single water basin: the Indus Water Basin which has security management implications and it is one of the most stressed basins in the world. Moreover, it is contested between Pakistan and India and the Indus Water Treaty has managed to avoid conflicts because of its robustness.

The per capita water availability is a measure of a country's water security. Pakistan has already skipped the safe levels. An area is water stressed when yearly water supplies per person fall below 1,700 meter cubic.[11] When water supply drops below 1,000 meter cubic per person annually, the population faces water scarcity, and below 500 cubic meters "absolute scarcity". With 935 cubic metres per person in 2019,[12] Pakistan has already been above the global water scarcity threshold of 1000 cubic meters per person, whereas the global average is 1800 cubic meters per person. Between 1962 and 2021, there was a more than 400% decline in the amount of water available per person.

According to data from the Water and Power Development Authority (WAPDA), the average river flow between 1979 and 2015 was 143 Million Acre

Figure-1: Major River Basins Stress Level



Source: Food and Agriculture Organisation (FAO) (2020)

Feet (MAF), while groundwater was at 50 MAF, for a total of 193.3 MAF of freshwater availability.[13] Pakistan is frequently referred to as the third pole having more than 7000 glaciers.[14] Precipitation (rainfall and snowfall) is significantly responsible for Pakistan's water availability. 50-80% of the river flows are caused by runoff from the Karakorum, Himalaya, and Hindukush (KHH) mountain ranges. Climate change is impacting glaciers in the North and with increasing temperatures, the glaciers are at risk putting Pakistan in a precarious situation.

Pakistan ranks fourth for groundwater extraction globally, drawing 64.82 km^3/year of water out of the earth annually, according to the National Groundwater Association of the US.[15] India, China and the US are first, second and third in the world in terms of the amount of groundwater extracted each year, respectively, with 251 km^3/year, 111.95 km^3/year and 111.70 km^3/year respectively. The water withdrawals do not match the agricultural yield in the country thus the country wastes precious water without translating it into meaningful usage. With the stress on underground aquifers and the impending climate vulnerabilities, Pakistan must proactively devise plans otherwise its national security will be under stress.

Urban Sprawl

Pakistan's population has grown by 2.6 times between 1972 and 2020, moving it up the rankings from 9th to 5th. Being unable to control its population increase, Pakistan's expanding population is a major worry. National population control initiatives like "Bachay do hi achay" have disappeared from newspapers and television. Pakistan is the most urbanising country in South Asia with 35% of its population living in cities, however, urban planning has been very poor. Most city developments are haphazard and do not follow any plan. Cities on the border and coastal areas must be designed with evacuation in mind. The cities grow like cancer without any stoppage making service delivery difficult and choking the available services. Pakistan requires concerted city planning and those should be implemented. National safeguards and security are further ensured by ensuring human safety in cities and unfortunately, urban areas in Pakistan are not safe and secure. The main causes of Pakistan's rapid urban expansion have been identified as migration, the development of peri-urban areas surrounding the periphery of cities, the installation of industrial facilities, enhanced infrastructure, and population growth.[16]

Table-4: The 15 Nations with the Largest Estimated Annual Groundwater Extractions

Country	Population 2010 (in thousands)	Groundwater Extraction			
		Estimated groundwater extraction 2010 (km^3/yr)	Breakdown by Sector		
			Groundwater extraction for irrigation (%)	Groundwater extraction for domestic use (%)	Groundwater extraction for industry (%)
India	1224614	251.00	89	9	2
China	1341335	111.95	54	20	26
United States	310384	111.70	71	2	36
Pakistan	173593	64.82	94	6	0
Iran	73974	63.40	87	11	2
Bangladesh	148692	30.21	86	13	1
Mexico	113423	29.45	72	22	6
Saudi Arabia	27448	24.24	92	5	3
Indonesia	239871	14.93	2	93	5
Turkey	72752	13.22	60	32	8
Russia	142985	11.62	3	79	18
Syria	20411	11.29	90	5	5
Japan	126536	10.94	23	23	29
Thailand	69122	10.74	14	60	26
Italy	60551	10.40	67	23	10

Source: https://www.ngwa.org/what-is-groundwater/About-groundwater/facts-about-global-groundwter-usage

Uncontrolled urban development is a serious problem that strains the water supply infrastructure. This results in unchecked groundwater extraction by households and society without permission from authorities. Due to their frequent failures to perform their tasks, the authorities rarely react forcefully. If prompt action is not taken to avert the catastrophe, urban sprawl, and unchecked population increase will push the country towards untenable scenarios.

Climate Change Induced Disasters

Pakistan is highly vulnerable to climatic events. The country has faced twenty-nine devastating floods and the catastrophic floods of 2022 are a forceful reminder of the country's vulnerability. Floods, heatwaves, droughts, landslides, GLOFs, and flash floods are major climate stressors that have dismantled the economic standing of the country. In the past decade and a half, Pakistan was battered by floods of high magnitude. For instance, an estimated 14-20 million people were directly impacted by the floods in Pakistan in 2010; more than 1,700 people died.[17] At least 436 medical facilities were also destroyed, bringing the total number of damaged or destroyed residences close to 1.1 Million. In 46 of the country's 135 districts, the flooding, which lasted nearly six months in some places, resulted in damages of USD 9.7 Billion.[18]

According to a report by the Flood Commission of Pakistan, the floods of 2015 affected 4634 villages, affected 1.93 Million people, damaged 10716, killed 238 people, and injured 232. The report further added that the restoration cost to lost or damaged infrastructure put forward by provinces stood at Rupees 14934 Million in Punjab, Rs 1448 Million in Khyber Pakhtunkhwa, Rs 14.67 million in Balochistan, and Rs 786 Million in Gilgit Baltistan.[19] The floods have persistently put the infrastructure under stress putting an extra burden on the exchequer. The cumulative loss from floods till 2016 was USD 38.165 Billion estimated by the flood commission.[20] However, the number has gone up significantly because of the 2022 floods. The flood affected 4 Million hectares of agricultural land, most of which consisted of cotton crops, and is estimated to have resulted in a USD 30 Billion economic loss.[21] The floods of 2022 were catastrophic in terms of their intensity and damage. The country has not been able to effectively help affected communities as the country lacks capacity and finance. The floods will continue to be more intense as extreme weather events will be the new normal with changing global temperatures. This puts further strains on the security of the country from all different fronts.

Recommendations

- Pakistan must devise long-term climate change adaptation and mitigation plans. The focus should be more on the adaptation plans as the country contributes less than 1 percent to global emissions.
- Food systems must be made climate resilient and integrated systems should be developed to ensure food security in the country.
- Pakistan must devise a long-term flood management plan to counter the impacts of extreme weather events. The disaster response must be strengthened from the federal level to the local level.
- Dedicated institutions must be empowered to steer the adaptation, and disaster management plans and projects perpetuity must be ensured to get desired impacts.
- Integrated Water Resources Management plans and techniques must be incorporated to ensure cross-sectoral collaborations on water security.
- City development plans be developed against the increasing population and to save urban areas from urban sprawl and water and sanitation issues.
- Pakistan must domesticate policy development and implementation regarding all essential measures as international organisations would not take the lead in the country's challenges.
- Capable human resources must be developed, and institutions must be empowered and made accountable for taking the country out of climate-induced crisis.

Conclusion

Climate change, a non-traditional security threat, continues to press the country into economic shocks.

Given the situation of the economy, Pakistan is not in a position to counter the threats arising from climate change impacts unless it places these challenges on the priority list and subsequent governments ensure the continuity of projects to counter these challenges. Food security will be a huge challenge for Pakistan as the burgeoning population will require an adequate food supply, therefore the food systems must be made resilient and sufficient to ensure the sustainability of the food supply. The growing concerns around water shortage is another threat the country must take seriously as the main water sources are contested and the rest are vulnerable to climate change. These problems are further exacerbated by the rapid haphazard industrialisation and urban sprawl which makes the service delivery a herculean task. The continued climatic disaster predominantly in the shape of floods has battered the country. The loss to infrastructure and the economy overall has dented Pakistan's ability to safeguard itself from endogenous and exogenous factors. These elements must be tackled effectively to ensure the country's national security.

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NOTES

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