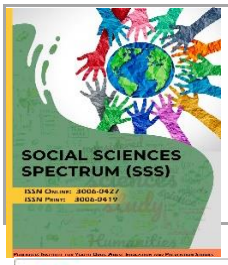

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Water Scarcity as an Issue of Human Security in Pakistan

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Abstract

This paper examines the multidimensional drivers of water stress, situating the crisis within broader debates on environmental security and governance in the Global South. It argues that water scarcity is not merely a resource management issue but a complex, systemic challenge shaped by the intersection of climate change, rapid population growth, unsustainable agricultural practices, excessive groundwater extraction, unplanned urbanization, and persistent governance failures. These internal pressures are further compounded by inter-provincial disputes and transboundary tensions, which collectively exacerbate the country's water insecurity. Employing a qualitative research design, the study draws on secondary sources, including policy reports, academic literature, and field-based studies, to critically assess the socio-economic, political, and environmental consequences of declining water availability. The findings reveal a sharp decline in per capita water resources, inequitable distribution systems, and deteriorating water quality, all of which significantly undermine food security, energy production, and rural livelihoods. The impacts are disproportionately borne by marginalized populations, particularly women and children, thereby intensifying existing social vulnerabilities. The paper contends that conventional, state-centric notions of security are insufficient to address such complex and interlinked challenges. It calls for a paradigm shift toward integrated water governance frameworks that incorporate climate-adaptive strategies, infrastructural investment, participatory policy processes, and enhanced regional cooperation. By conceptualizing water as a strategic resource embedded within the human security framework, the study highlights its centrality to Pakistan's long-term stability and sustainable development. The paper ultimately contributes to rethinking security in South Asia by foregrounding environmental stressors as key determinants of political and societal resilience.

Keywords: Water Scarcity, Environmental Degradation, Environmental Governance, Human Security, Sustainable Development.

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Introduction

Security concept has not been narrowed down to the threat of military issues, but has been expanded to encompass an entire spectrum of non-traditional issues that directly affect the stability of states, human existence and the socio-political order in international security studies nowadays. Global warming, food shortage, the spread of diseases and scarcity of resources have become critical security issues. One of the non-traditional security threats that have come into the limelight over the last couple of years, however, is water insecurity and is especially so among the third world and climate-prone nations. Among the biggest risk multipliers identified by the United Nations Development Programme (UNDP) and the World Economic Forum among others, is water scarcity. It may result in conflict escalation, economic interruption, and emergence of tensions in the societies.

In the South Asia, Pakistan is the example of the country that is confronted with such a dire predicament as the lack of water becomes its unavailability. Average water per person availability in Pakistan that relies on the figures provided by the world bank and the Pakistan council of research in water resource (PCRWR) has been lowered significantly to less than 1000 cubic meters down to 1951 which pushed the country in the list of countries with water stress. Pakistan will be facing absolute water scarcity soon, as per the projections made by PCRWR, this will adversely affect the development of the country and make water an issue of strategic the water crisis in Pakistan is also stirred of great concern when it comes to the structural failures, and the governance failures of the country. According to the Food and Agriculture Organization (FAO), agriculture sector consumes the largest quantities of freshwater with over 90 percent of the water and at the same time, irrigation methods, pattern of crops in agriculture, and the uncontrolled mining of ground water are depleting the resource. Additionally, the rapid rise in population of over 240 million as per the World Bank has even enhanced the pressure of using water at homes and urban centers thereby straining the already limited resources.

The issue of climate change and environmental degradation is believed to be a huge threat and simultaneously a key driver to the water insecurity in Pakistan (Aslam et al., 2021). According to the reports of the Intergovernmental Panel on Climate Change (IPCC), Pakistan is prone to the effects of global warming, irregular rainfall, melting of glaciers in the Hindu Kush-Karakoram-Himalayan region, and increased frequency of floods and droughts. These climatic shifts have impacted the Indus River basin that sustains nearly 90 percent of the arable land in Pakistan destabilizing water accessibility, food security and economic stability. The Indus Waters Treaty of 1960 (the one that was assisted by World Bank) has been effective up to the present day in laying the groundwork of the regulatory framework in the water sharing between two countries but at the cost of the already tense relations between the countries over water due to the latest conflicts over hydropower projects in the upper part of India. Consequently, the water problem has been further integrated with the security factor, increasing the level of concern of the South-Asian population about the security of the region.

Water scarcity is thus one of the human security crises at the societal level. The UNICEF and WHO statistics indicate that millions of citizens in Pakistan lack access to drinking water. This, consequently, results in urban-rural migration, social inequality, and health problems of the population. All these consequences are harmful to the state capacity and social cohesion and that is why the idea that the water insecurity should be addressed in the framework of a broader security argument becomes even more solid.

The paper introduces water insecurity as a human security issue in Pakistan thereby putting it at the center of the evolving analysis of international security studies. The study by considering environmental, socio-economic, governance and geopolitical factors highlight the acute necessity to re-think the concept of water as a strategic security concern, which is at the core of long-term stability and resilience of Pakistan. The qualitative research design is adopted as it offers a deeper insight into the social, economic, political and environmental causes of the scarcity of water and their impacts on security. The study also uses secondary sources of data that comprised peer-reviewed journal articles, reports issued by government authorities and policy documents. These sources have contributed to the revelation of the water supply situation, the determinant role of population, climate change, depletion of the ground water and the socio-economic effects of water scarcity in the whole of Pakistan.

Literature Review

The water crisis in Pakistan is a human security problem and also contributes to the national security which is critically important and thus it is necessary to discuss it in terms of politics, society, and economy. The water scarcity in Pakistan is the most significant form of the resource scarcity and is caused by the climate change, rapid population growth, poor agricultural practices, groundwater over-extraction, and chronic government failures. Along with the interprovincial conflicts particularly between Sindh and Punjab, the research points out that the conflicts are mainly caused by unfair distribution of water, fragmented institutions, and the weakened ability of the Indus River System Authority (Aslam et al., 2022). It also places Pakistan's crisis in a regional context that is influenced by the pressures on the Indus Waters Treaty. The research brings to light that the declining per capita water availability, inefficient irrigation systems, and poor water quality are the threats to food security, energy production, and economic stability in Pakistan costing the country 6% of GDP annually. It also emphasizes the human side of the water issue, showing that it is women, marginalized groups, and rural people who are most affected, suffering from increased health risks, schooling dropouts, forced migration, and social turmoil. Without the large-scale change in institutions, climate-adaptive water governance, integrated water resource management, and reinvention of both national and transboundary cooperation, the water insecurity of Pakistan will continue to increase, therefore, it is a grave threat to the socio-economic and national security of the country in the long term. (Dr. Shahida Begum & Ahmed Ali, 2025)

Systematic review and analysis of the water resources management in Pakistan shows the weak water governance, with almost 79% of drinking water contaminated and groundwater overexploitation aggravating the crisis. The research points out to various structural and environmental problems, such as the rapid increase in population, urbanization, and inefficient agricultural practices, besides the lack of proper irrigation infrastructure, as well as poorly maintained dams and reservoirs, water pollution coming from both industrial and domestic waste, and climate change leading to heat waves, droughts, and melting of glaciers (Qureshi & Ashraf, 2019). The research shows that there are wide discrepancies in the enforcement of water laws, poor inter-agency coordination, different regulations in different provinces, and lack of water resources monitoring, which all together make it difficult to achieve fair water distribution and sustainable management (Janjua et. al., 2021). It points out the socio-economic aspect of the problem, showing that the lack of water security has the most impact on the rural population, industrial sectors, public health, and agricultural productivity. This factor, in turn, increases the difficulty regarding food insecurity, economic harm, and increased social vulnerability (Qureshi et. al., 2021).

Water insecurity is recognized as a major issue for mankind and the environment, and it directly influences economic progress. The unpredictable monsoons, the rapid melting of glaciers, and the inefficient methods of water use along with urbanization are some of the problems that have made the situation worse. India-Pakistan tensions over the Indus Waters Treaty have further complicated things. Because there is less water available, people in different parts of the world suffer from different problems like malnutrition, less food, not enough energy, and diseases mainly in the rural areas, among the poor, and especially in the case of children under five years old. There is a huge difference between the provinces, with Punjab having problems of water and poor crops, and Sindh being prone to both floods and droughts, Balochistan's water tables are going down while its population is under economic pressures, and Khyber Pakhtunkhwa has both agricultural and hydropower drawbacks. Traditional security views are not enough to deal with such issues which, rather, emphasize the necessity of multilayered governance, climate solidarity water management, stakeholders' engagement, infrastructure and technology solutions, and regional cooperation for water allocation. Hence, water is considered that resource which is crucial for the long-term socio-economic stability, human security, and geopolitical resilience of the region (Solangi et al., 2025; Mumtaz et al., 2025).

The water insecurity of Pakistan is a complex problem that involves several environmental, political, legal, ethical, and socio-economic factors. The country uses surface water as well as groundwater to such an extent that 73% of its irrigated areas depend on groundwater. As a result, Pakistan has become the third largest consumer of groundwater in the world. Water is the main reason of agricultural production which is using approximately 80% of total water resources; such as 1 kg of rice consumes 4,000 litres of water which is very little compared to the rice export value. Climate change is anticipated to increase water demand by 5 to 15% by 2047 and also impact the frequency and severity of droughts, floods, GLOFs, and saltwater intrusion. Moreover, hydro-political tensions with India and Afghanistan, along with internal disputes over allocation, governance weaknesses, and corruption, complicate water management even more. The socio-economic consequences are very serious: 80% of the population is supplied with contaminated water, which is the main reason for waterborne diseases that account for 33% of deaths; also, there is a loss of GDP, reduced crop yields, internal migration, and by 2060, there is a possibility that part of Karachi will go underwater as a result of coastal submersion. Therefore, among the various measures to mitigate those water-related problems and consequently secure water for Pakistan, which is the basis of human security and the long-term stability of the nation, are Integrated Water Resources Management (IWRM), participation of stakeholders, hydro-diplomacy, conflict management through allocation models, public-private partnerships, policy reform, and awareness campaigns. (Aslam, 2022; Safia Mansoor, 2025).

The water crisis in Pakistan is depicted by this research as a problem of governance and the socio-political environment mainly, not just as a resource shortage, and it puts the midstream inequality, political patronage, and antiquated legal frameworks among others as the prime movers of water insecurity. In the course of the inquiry into Pakistan's groundwater extraction, it is shown that in 1960, only 8% of the total water for agriculture was drawn from underground sources, and there existed about 30,000 private tube wells, which had increased to 300,000 by 1996, with the majority of the water being drawn from the system by 2006, i.e., 60% all this was made possible due to a lack of regulators in the sector. Water consumption among different users varies greatly and heavily, with agriculture taking up about 80% of the total water supply; besides, almost 33% of the cropped area is under waterlogging and soil salinity, thus the total agricultural production is reduced by 25% and the food security of the rapidly growing population is at stake. The economic

repercussions are huge; agriculture alone contributes about 21% to the GDP, and the labor force is composed of 44% of the workers in the sector, while its contribution to exports is as high as 65%; in drought years, losses are estimated to be around PKR 90 billion, and there are already declining agricultural exports, which, in turn, threaten the reserves of foreign currency and the economic situation in the country. Among others, the study brings out the politics between provinces, and says that there has been a conflict over water distribution between Punjab and Sindh ever since 1945, which has been aggravated by government centralization, politicization of dams (e.g., Tarbela and Kalabagh), and the belief that the distribution is skewed in favour of one province, which in turn causes internal tensions.

On the outside, there are transboundary issues with both India and Afghanistan that are mentioned: the projects that are built by India in the upper regions and the growth of the population are putting pressure on the water supply of Pakistan while the hydroelectric plants built by Afghanistan on the Kabul River, with the backing of India, are making it difficult for the water to flow downstream, and the per capita water availability in Pakistan has declined from 2,172 m^3 in 1990 to just over 1,000 m^3 in recent years, The country is thus placed very close to the condition of extreme water scarcity. The research underlines the fact that Pakistan's National Water Security Policy (2018–2023) merges human security notions with water governance such as the issuance of permits for the construction of the Diamer-Bhasha and Dasu Dams, and the establishment of a National Water Council, water conservation activities, and regional cooperation through hydro-diplomacy. It is further recommended that the implementation of Integrated Water Resources Management (IWRM) be coupled with basin-wide strategies, legal and institutional reforms to give agencies such as the IRSA more power, better data collection and monitoring, public education campaigns, international cooperation, climate change adaptation, and investment in research and innovations. The research asserts that the country will be threatened by serious socio-economic instability, food insecurity, internal political tensions, and a higher risk of transboundary conflicts if the government does not reform its water management taking into account sustainability, infrastructure, and access policies. It has heeded that good water management arguably is a national and a non-traditional security issue that is necessary for long-term stability, resilience, and regional cooperation. (Amjad, 2025)

Water insecurity on a global scale is a major health crisis and a huge socio-economic problem that especially hits the poorer countries the hardest and Pakistan's case is alarming even when the country has the Indus River and about 5,000 glaciers. The present water storage in the country is only enough for 30 days, and the per capita water supply is expected to drop to below 500 m^3 in 2025. The agricultural sector consumes 97% of the water, leaving only a little bit of 3% for city and industry consumption. Reasons behind the water scarcity are population increase, industrial development, poor management, and climate change. The process of groundwater extraction is becoming more rapid, the efficiency level of irrigation methods is low, and the practice of growing traditional crops further leads to the depletion of water resources. Insecurity of water has been associated with many critical health problems, and it has already led to child deaths, malnutrition, and the spread of illnesses in one part; while in another, the impacts are felt through the sectors of agriculture, hydroelectric production, and the insecurity of economic resources. The government and the private sector are already implementing different technologies like drip and sprinkler irrigation, the Diamer-Bhasha Dam, rainwater harvesting, and desalination plants, but the inefficient distribution of water, lack of funding, and climatic changes are still the major factors that limit the successfulness of these measures (Ahmad et al., 2022; Baocheng et al., 2024).

The governance and institutional frameworks play a vital role. Groundwater extraction has been unregulated historically, leading to severe depletion, while agricultural water use is still the largest and interprovincial conflicts over distribution are still going on. The issue of water rivers with India and Afghanistan has also continued to add pressure on the water resources. The National Water Security Policy (2018-2023) of Pakistan seeks to marry human security principles with water governance through dams, National Water Council establishment, water conservation, and regional hydro-diplomacy. The application of IWRM along with basin-wide approaches, legal and institutional reforms, strengthening of agency power, data gathering, public education, international collaboration, and adaptation to climate changes is absolutely necessary. If not, the problems of socio-economic instability, food insecurity, political tensions, and transboundary conflict will all get worse, making water management worst issue. The water shortage in Pakistan is also related to hydro-political conflicts, especially with India. However, while quantitative studies indicate that water scarcity alone does not have any statistical connection with the intensity of the conflict, it is rather the political framing, perceptions, and mistrust that escalate the tensions. Moreover, the Indus Waters Treaty and public discourse, which include political and media narratives, impact the securitization of water and rally support for infrastructure projects like the Diamer-Bhasha Dam. Thus, effective water management, basin-wide cooperation, and diplomacy become indispensable for conflict prevention and stability. (Afzal et al., 2025).

The case of Mardan, Khyber Pakhtunkhwa, illustrates one such urban water security challenge. The scenario there brings out the increasing and complicated effects of the change of land, the rise in population, the decrease in the groundwater level, and the change in climate. Over the last thirty years' urban territories grew 10 times bigger, and the areas covered by trees and bare soil reduced. The rate of groundwater extraction was one foot per year, the average temperature increased, and rainfall decreased. This situation of combined pressures forced Mardan to change from "relatively invulnerable" to "very vulnerable" with regard to the security of municipal water, thus indicating the need for urban planning, water supply networks, and GIS/RS-based monitoring to overcome the integrated vulnerabilities. (Kamran et al., 2024)

Water management across borders is still a key factor for Pakistan's stability. The Indus Waters Treaty (1960) has been a dispute resolution mechanism with India over water since the very beginning, partitioning the rivers between the two countries as per their needs and creating the Permanent Indus Commission. Hydropower and irrigation projects have been the source of conflicts and thus necessitated arbitration and collaboration. The multi-million-dollar projects like the Diamer-Bhasha Dam partnership with China have shown the strategic value of waterworks for power, agriculture, and jobs. Therefore, effective diplomacy, good treaty compliance, and proactive conflict mitigation are all necessary to turn water into a non-traditional security resource with impacts that are both domestic and regional. Although past research has deeply investigated the water insecurity issue in Pakistan, it usually involves an isolated dimension including climate change effects, groundwater poverty, inefficiencies in agriculture, interprovincial conflicts, or transboundary conflicts. Not many studies however offer an in-depth comprehension of water insecurity as a non-traditional security challenge that assimilates the environmental, social, economic and political aspect. Specifically, little is known about the human and socio-economic effects on vulnerable groups of people, such as women, rural communities, and marginalized groups. Moreover, though there are policy recommendations, there is scanty research integrating scientific, governance, and human-centered breadth to suggest feasible, integrated measures of sustainable water management. The present research fills these gaps by applying the human security framework and looking at the impacts of water insecurity on the Pakistani society,

economy and national resilience and the importance of a holistic, climate adaptive, and people-oriented solutions to reversing this growing menace. Water insecurity is regarded to be a human security threat that affects the operation of the state in a number of ways. In Pakistan, water scarcity that has been experienced has now escalated to security issues despite the fact that it was an issue of development in the first place and is largely attributed to the changes in climatic conditions, high population rate, and poor water management systems and conflicts with other nations over river waters. The supply of water has been reduced to the extent that it has impacted negatively on the agricultural sector, power generation, health and well-being of the people and rural regions where majority relies on agricultural sector as the source of their livelihood, and this is very vital in the stability of the economy and the cohesiveness of the society.

Through the human security framework, the paper has described the situation of water insecurity in Pakistan as a complex and multidimensional threat, hence threatening human well-being and progress, thus its relevance of handling as a non-traditional security issue. The paper posits that water scarcity is not an environmental challenge alone considering the Human security framework as a guideline, but a multifaceted challenge consisting of various aspects, amongst which are climate change, bad governance, and population increase. This paradigm yields to allow the whole span of analysis to be carried out on the short-term impacts up to broader socio-political and economic consequences. To sum up on the proposed methodology, this is an integrative and comprehensive methodology that can help the decision-makers comprehend how to address the water insecurity and how to strengthen Pakistan.

Key Findings

Water insecurity as an unconventional security menace

The shortage of water in Pakistan is not only an ecological issue; it was turning into a non-traditional security threat that is very pressing. It interferes and even breaks the entire cycle of life, economy, and societal life. Excesses like climate change and the burst in population are over-utilizing ground water, and inefficient irrigation mechanisms, in combination with urbanization of the rapid type and the ineffectiveness of the government, all these factors all combine to make water stress one of the main concerns not only to the basic needs of people but also to the stability of the nation.

The regional and provincial differences

There is no uniformity in water problems in all the provinces of Pakistan; instead, it is different. Punjab has to struggle with agricultural and industrial water needs and Sindh has to be concerned with floods and drought as well as international conflicts; Balochistan is already being severely affected by very dry climate and lack of groundwater; Khyber Pakhtunkhwa and its city of Mardan are experiencing a surge in population and hence shortage in water supply of the households. These disparities indicate that there is a necessity of intensive collaboration between the government and the citizens in the development of solutions that are region-specific and national policies.

Social-economic and human security impacts

Water crisis has adverse effects on livelihood, health, agriculture and energy. The rural places are normally badly hit and children and women are the most affected. Being the most vulnerable population in these communities, they are at risk of being malnourished, migrating and falling ill. On the economy front, crop yields are also decreasing, which causes the GDP to diminish, and the problem of food security becoming serious, thereby demonstrating how interdependent water insecurity and human and economic stability in the nation are.

Policymaking and governance issues

The situation has been aggravated by the bad governance and policy problems. The management of water is extremely complex as a result of fragmentations of legislation, lack of enforcement of the legislation, inter-provincial conflicts, and political interferences. The case is complicated by the tensions that exist between India and Afghanistan in the context of water rights. Policy measures such as the National Water Security Policy have been implemented but the implementation hurdles alongside scarcity of climate-adaptive strategies are slowing down the progress.

Desperate necessity of combined solutions

A combination of solutions is necessary in order to solve the case of water insecurity in Pakistan. The most prominent measures are the inclusion of the practice of Integrated Water Resources Management (IWRM), climate-resilient constructions, engagement of the stakeholders, and collaboration of the various regions. The technological investment into the monitoring, informing people, and viewing water as a strategically significant resource will contribute to the safeguarding of human security, the stability of the economy, and the sustainable national health.

Recommendations

The water insecurity issue in Pakistan needs a multimodal approach, which consists of policy, technology, and assistance of society. Firstly, the government must adopt Integrated Water Resources Management (IWRM) as a guideline in every province and this will involve the protection of the environment and also balanced water distribution among various sectors and the regions. The use of enhanced implementation of water regulations, enhanced interaction between different agencies, and policies sensitive to climate will also be beneficial, fortifying the governance in that manner, certainly. It involves technological upgrade and investment in infrastructural development that will lead to the next big thing in the face of quality and quantity of water supply. Such strategies as increasing reservoirs, the efficiency of irrigation, updating the water supply system, and control by GIS and remote sensing would help to minimize the losses of water and another benefit of predicting the lack. More so, the minor measures such as rainwater collection, desalination and water recycling efforts in urban settings can also provide immediate relief. In addition, public awareness, stakeholder involvement, and regional collaboration will assume the priorities. By educating the communities on the importance of water conservation, inclusion of the local stakeholders in decision making, and the need to find diplomatic solutions with India and Afghanistan on the use of the common water resources, the conflicts will be reduced and sustainability will be achieved in the long run. By coming into terms with the concept of water as a strategic and socio-economic resource, the resilience and human security of Pakistan in the context of climate and population pressures will be made stronger.

Conclusion

The water insecurity in Pakistan has negatively impacted the human security in Pakistan, the state, citizens and the economy are all being impacted by the water insecurity in Pakistan. The paper acknowledges the contribution by the climate change, population growth, improper irrigation, wastage of underground water, urban sprawl, and the poor governance in establishing a multi-layered water crisis. The issues vary between provinces, with Punjab becoming the center of the agriculture and industry crisis and Sindh being forced to deal with floods, droughts, and water distribution inequity at the same time, Balochistan is also a typical desert region and has to contend with water depletion at the same time, cities, such as, Mardan are already struggling with the

number of people moving in and the lack of water being distributed to the city. There are massive socio-economic effects. The most affected are the poorest which comprise of the rural areas, women, and children all who are languishing with malnutrition, water borne illnesses, migration, and disruption of education and livelihood. Water scarcity resulting in starvation in agricultural yields has a direct impact on food security, GDP, and the economy of the nation. The crisis is also compounded by less production of hydropower in the energy sector. Besides these, there are governance gaps, inter-provincial squabbles, political interference and the water rights squabble with India and Afghanistan which are putting additional strain to the already overstretched water systems in Pakistan.

The paper underscores the reality that security structures founded on the classical ideas cannot be placed to address the issue of water insecurity. It is the combined and multi-layered solutions that should be designed on the sound governance, climate-responsive policies, and technological inventions and infrastructural development that will rescue the day. The stakeholder involvement, enhancement of public awareness and regional cooperation are also very essential. With the appreciation of water as a strategic and socio-economic resource, the resilience of Pakistan will be enhanced, human well-being achieved and long-term socio-political and economic stability will be provided. Unless addressed through timely and concerted efforts, water insecurity will continue to pose serious threats to the development, human security and national cohesiveness of the nation.

Conflict of Interest

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