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Causes of Water Scarcity in Pakistan and Remedies in the Light of Seerah al-Nabaviyyah

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ABSTRACT

Islam, as a comprehensive code of life, highlights the responsible stewardship of natural resources, including water. Water is indispensable for life and important to the creation and sustenance of life. The Quran referred the water as a symbol of life, purification, and blessing of Allah Almighty while water management holds a vital significance within Islamic teachings. Islamic principles and practices highlight the conservation, equitable distribution, and proper usage of water assets. The idea of *Khalifatullah-fil-Ardh and Amanah* is dominant to Islamic ethics, urging believers to act as custodians of the Earth's resources. This principle encompasses to water, inspiring responsible management to safeguard its obtainability for present and future generations. The last Apostle Muhammad ﷺ highlighted the just distribution of water, forbidding wastefulness even if by the side of a flowing river. The issue maybe recovered through proper management and techniques. By following the Sirah Al-Nabaviyyah along with modern water management practices, Pakistani society can overcome the scarcity of water and safeguard the availability of this valuable water reserves while upholding their ethical responsibilities. This article aims to highlight the reasons of scarcity of water in Pakistan and present the solutions in the light of the Sirah Al-Nabaviyyah.

Keywords: *Water Security, Contamination, Deplete, Water Table, Seerah*

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Mutual Development of paper

Pakistan, once water-abundant, now grapples with a severe water deficit, and the term "water crisis" has gained prominence. With an annual precipitation of less than 240MM, Pakistan ranks among the most arid countries globally. The nation heavily relies on the River Indus System for water requirements, and the per-capita surface water obtainability has drastically reduced from $5260m^3$ to $1000m^3$ annum from 1951 to 2016. Predictions indicate a further decline to $860m^3$ by 2025, transitioning the country from "water-stressed" to "water-scarce." This scarcity, exacerbated by population growth, urbanization, and industrialization, is causing profound economic, social, and security impacts. (NATIONAL WATER POLICY)

Pakistan's vulnerability is heightened due to its agrarian economy and reliance on hydropower energy needs commonly. Water scarcity adds strain to existing tensions with India, and internal concerns about water management pose urgent challenges. The potential for violent conflicts within the nation arises as water scarcity suspiciously affects the poor, who suffer the impact of correlated human development expenses. A dissatisfied and divided society becomes susceptible to exploit by various actors, including sub-nationalist separationists, radicals, and terrorists. The water crisis in Pakistan, therefore, extends beyond a resource issue to encompass broader societal, economic, and security implications. Pakistan possesses diverse water sources, including precipitation, glaciers, surface water, and groundwater, reflecting the varied landscape of the country. Despite abundant resources, Pakistan faces water shortages on a per-person basis, primarily due to a significant population increase, reaching nearly 241.49 million from its 1947 independence. (Gondal 2023) The distribution of precipitation varies widely across regions and time, with climate change estimated to raise the frequency of floods and droughts.

Major Facts about Pakistan's Water Possessions and Structure

Territorial Assets of Pakistan: Pakistan is located to the south of Himalayas Range, Karakoram Range, and Hindu Kush Range; Pakistan covers the expanse of 796096 km^2. Its borders include Afghanistan to the northwest, Iran to the west, China to the northeast, India to the east, and

the Indian Ocean to the south, resulting in a diverse topography that includes flat plains, arid deserts, towering mountains, and coastal areas.

As per Shahid Ahmad, Pakistan's geographical region, excluding the northern regions covers 79.61 million hectares (MHA). Approximately 72% of this land (57.07 MHA) has undergone surveying, while the remaining 28% awaits classification for land use. The surveyed area includes 22.05 MHA of cultivated land, 8.12 MHA of cultivable wasteland, 4.02 MHA of forested areas, and 22.88 MHA unsuitable for cultivation. (Ahmad, Land and Water Resources of Pakistan: A critical Assessment winter 2007)

Pakistan ranks among the top countries in terms of water availability, with only sixteen nations surpassing its water resources. Despite being the sixth-most populous globally, the country faces a significant challenge due to low per-person water availability, affecting only 10% of the global population having per capita less water shortage. The distribution of water resources in Pakistan involves three hydrologic units, with the majority (92%) located in the Indus Basin and the remaining 8% is Inland Drainage System. [1] Geographical constraints limit the transfer of water between these basins for technical and economic reasons. Rough estimates suggest that Pakistan's total renewable water resources amount to 229 BCM[2].

According to the World Bank Group's Water Global Practice paper, "Pakistan is often considered equally water threatened (short water obtainability per capita) and water-stressed (Substantial water extractions compared to the availability of water). However, the group challenges these suppositions by highlighting two overlooked aspects: the internal generation of 24% of water resources and the double-counting of groundwater withdrawals. The report argues that modifying for this repeat counting reveals a low alarming tension level of 60%, suggesting that while the country is facing scarcity of water, it may not be as severe as commonly supposed. (Young n.d.)

[1] Inland Drainage System is located in the region of the Kharan Desert system and the Makran coastal area.

[2] Billion Cubic Meter

Aquatic Treasures of Pakistan: A nation's overall water assets can be categorized into four main types: precipitation, glaciers and snow deposits, surface water resources, and underground water resources.

In Pakistan, precipitation varies significantly across regions and seasons. Areas like Baluchistan and Sind obtain less than hundred mm annually, while the northern mountains get over 1,500 mm. The National Water Policy states that mean annual precipitation ranges from under 100mm in parts of the Lower Indus Plain to over 750mm in the Upper Indus Plain. The northern glaciated zone contributes over 5,000 mm of snowfall, boosting the country's water resources. Rainfall is seasonal, with Western-Disturbances/winter rain season (December–March) and Monsoons (July–September) being crucial. Rabi (winter) rainfall ranges from 50mm in Sindh to 500mm in KPK, and Kharif (summer) rainfall varies from 50mm in Balochistan to 800mm in northern Punjab and KPK. (Ahmad, Land and Water Resources of Pakistan ------- A Critical Assessment 2007)

Precipitation decreases southward, impacting river courses, with more flows during Kharif than Rabi. Unpredictable rainfall, especially during monsoons, leads to wasted rainwater, causing destruction. Rainwater contributes only 13% to mean annual canal distractions. Ninety-two percent of Pakistan is semi-arid to arid, facing water scarcity. Climate change poses threats, affecting glaciers; increasing river flows initially, followed by a significant decrease. The variability of rainfall patterns may intensify, with a shift in the monsoonal zone causing floods. Pakistan's vulnerability to extreme weather events and erratic monsoons is acknowledged in the National Water Policy. (Ahmad, Land and Water Resources of Pakistan: A critical Assessment winter 2007)

Pakistan's northern areas host colossal perennial glaciers. These glaciers and seasonal snow act as substantial freshwater reservoirs, significantly contributing to the course of the River Indus. On the other hand, glaciated regions in northern regions and KPK hold the country's major frozen resources, assessed at nearly 2738km^3, approximately 16 times the average annual river flows. This immense ice reserve, home to four of the fourteen 8,000-meter mountain peaks, including K-2, plays a pivotal role in regulating water flows and serving as a vital reserve that nourishes the River Indus and tributaries. Pakistan has more glaciers as compare to any

other region, except the North and South Poles, which are major resources for the regulators of rivers. (Ahmed 2007)

The surface water resources of Pakistan consist of the Indus River and its tributaries. Extending over 2900km, the River Indus covers a drainage area of approximately 966000km². Under the IWT[3], India has the right to use the water from the three eastern rivers—Sutlej, Beas, and Ravi, while Pakistan has the rights to the three western rivers—Chenab, Jhelum, and Indus. The Indus is also joined by numerous big and small tributaries. (Kahlown 2003)

The vast Indus groundwater aquifer, encompassing around 16.7 million hectares of irrigable land, experienced a disruption in its hydrological balance due to rising water levels from canal irrigation system development. The freshwater reservoir within this aquifer is about 2,000 BCM. Presently, 67.8BCM is extracted for irrigation via 1 million tube wells, a practice considered over-mining with potential adverse effects, as per the (NWPP)[4]. Despite concerns, Ahmad argues that roughly an equal amount, almost 67.9BCM, is recharged annually in basin. Over-extraction is particularly severe in Balochistan, where groundwater use surpasses recharge, although a 2012 report by Friends of Democratic Pakistan suggests a nearly balanced groundwater situation. Recharge sources include rainfall (21%), canal leakage (45%), irrigation returns (26%), river recharge (6%), and return flows (2%). (Kahlown 2003)

The Indus Basin has witnessed numerous irrigation developments. Two pivotal events that have notably impacted basin flows are the establishment of the Indus Basin Irrigation System and the implementation of the IWT in 1960.

The ancient roots of the Indus civilization are grounded in irrigated agriculture, with the IBIS[5] serving as a critical element in Pakistan's economy. Originating from British irrigation expertise and expanded by Pakistani experts, IBIS is a gravity-run system that revolutionized irrigation

[3] The Indus Water Treaty: it is a water-sharing treaty between India and Pakistan, brokered by the World Bank, signed in 1960. It allocates the water of the Indus River System between the two countries, with India having control over the eastern rivers and Pakistan over the western rivers.

[4] National Water Policy of Pakistan

[5] Indus Basin Irrigation System

in the mid-19th century, replacing earlier inundation canals. The development continued with canals like UBDC (Upper Bari Doab Canal), Sirhind, Sidhnai, Lower Chenab, and Lower Jhelum, addressing water supply disparities. Despite the partition in 1947 and ensuing water disputes, Pakistan progressed with irrigation infrastructure, completing barrages and canals, leading to a comprehensive system by the 1950s. Between 1921 and 1946, the Indus Basin experienced an average inflow of 167 million acre-feet, and the interruption by India in 1948 triggered a global water dispute. (FRENKEN 2012)

The 1960 IWT successfully resolved the Indo-Pak hydro conflict, with Western powers, particularly the US, mediating and the World Bank providing financial support. The agreement led to extensive replacement work, including major dams like Mangla and Tarbela, completing the world's largest irrigation system by 1971. Tensions persist due to differing interpretations, especially regarding India's limited use of western rivers, and concerns arise about potential violations impacting Pakistan's water inflow and regional stability.

PAKISTAN'S WATER ASSETS MANAGEMENT: MAJOR ISSUES

Pakistan's water management faces challenges of unreasonable distribution, system losses, low irrigation efficiency, governance issues, imbalance of the availability and consumption of water, and inadequate storage. Despite precipitation variability, seasonal flows, and the risk of foreign interference, Pakistan's inadequate storage capacity is worsened by sedimentation. Additionally, the lack of noteworthy additions to storage exacerbates the problem. Massive water loss during supply is a serious concern, highlighting major issues discussed in subsequent sections.

Pakistan's storage capacity for irrigation is severely lacking compared to other nations, with only 30 days compared to 120–220 days in India, 500 days in South Africa, and 900 days in the United States. Similarly, the designed live storage capacity per person is significantly lower in Pakistan, with only 144 cubic meters compared to 6000, 5000 and 2200 cubic meters in the United States, Australia, and China, respectively. The seasonal flows of the Indus, with nearly 80% occurring in the Kharif season, necessitate adequate live storage for flood and drought mitigation.

However, Pakistan's current storage capacity, about 15% of annual river flows, is insufficient, leading to a projected shortfall unless capacity is increased by 22 BCM by 2025 to meet agriculture demands. (Ahmad, Land and Water Resources of Pakistan ------- A Critical Assessment 2007)

Despite the benefits of dams in regulating seasonal flows and mitigating floods, Pakistan has not built any new dams since the construction of Tarbela Dam in 1976.[6] A more alarming problem involves the substantial reduction in storage capacity within Pakistan's dams, primarily attributed to sedimentation and silting. This issue is particularly evident in Tarbela Dam, which has experienced a 33% decrease in gross storage over less than four decades. The swift sedimentation not only constrains reservoir capacity but also necessitates an urgent improvement in storage capacity to meet the escalating demands of urban and industrial areas. Additionally, in the Indus Basin, there exists no alternative water source that can be readily utilized to fulfill the increasing water needs. (Hathaway 2009)

In times of drought, ensuring minimum flows necessitates a regulatory storage mechanism upstream. Recognizing this, the National Water Policy 2018 emphasizes the importance of extra storing facilities, equally large and small, and deems it necessary to stock spare rainwater. (NATIONAL WATER POLICY 2018)

Despite the evident advantages of dams, some, including experts like Michael Kugelman opposes the construction of new dams. They argue that dams are costly, unproductive, and environmentally unfriendly, suggesting that Pakistan's water issues stem from wasteful practices. Emphasizing water conservation and efficient conveyance, they contend that dams merely store water without producing it. Others, like Hassan Abbas, attribute Pakistan's problems to water consumption patterns, advocating proper aquifer management over the construction of large reservoirs. Opposition to new dams also arises from inter-provincial rivalries, mistrust in water distribution, and concerns about the impact on

[6] Numerous mega dams are presently being constructed in Pakistan, reflecting the nation's dedication to improving water resources and energy generation. Notably, ongoing projects like the Diamer-Bhasha and Mohmand Dams, although still incomplete, aspire to alleviate water scarcity challenges and make substantial contributions to Pakistan's power infrastructure.

local communities' hydropower profits. Mustafa suggests that the lack of consensus, particularly on projects like Kalabagh Dam, is more political than technical. In essence, there are conflicting views on dam construction in Pakistan, with one set favoring it and the other opposing it. Nevertheless, statistical evidence highlights Pakistan's grossly inadequate storage capacity. (Hathaway 2009)

While the advantages of dams are apparent, there is resistance to building new ones from specific groups, including experts. Michael Kugelman, for instance, contends that dams are expensive, unproductive, and environmentally detrimental. He argues that Pakistan's water challenges stem from inefficient water practices, highlighting the importance of water conservation and efficient conveyance to crucial areas. Likewise, Hassan Abbas proposes that Pakistan's issues are tied to water consumption patterns, advocating for effective aquifer management instead of constructing large reservoirs. (Abbas 2018)

Opposition to new dams is also fueled by inter-provincial rivalries, mistrust in water distribution, and concerns about hydropower profits for local communities affected by past projects. Mustafa believes that the lack of consensus on dam issues, especially regarding the Kalabagh Dam, is more political than technical. (Mustafa 2010) In short, there are conflicting views on dam construction in Pakistan, with one set of opinions favoring it and another opposing it. Nevertheless, statistics underscore that Pakistan's storage capacity is severely inadequate.

The IBIS, described as a "gravity run system with minimum management and operational requirements," experiences significant water losses. The system operates on a constant water supply rather than tailoring it to the actual crop requirements. Despite substantial investment, the IBIS, affected by age and historical neglect, is not in optimal condition. According to Qureshi, delayed care and deficiency of recovery have led to canals' delivery capacity being 30% lower than designed. Seepage and leakage contribute to substantial water losses, with the Ministry-of-Water in Pakistan acknowledging that "almost half of the water diverted from the Indus system doesn't reach the farm." The period from April to July sees the highest losses when the rivers typically rise. Ahmad notes that after the construction of Tarbela Dam, IBIS losses were around 64%, accounting

for 82.5 to 84 billion cubic meters (BCM). (Ahmad, Land and Water Resources of Pakistan: A critical Assessment winter 2007)

This lost water contributes to groundwater recharge, prompting the installation of numerous tube wells for exploitation. Kugleman echo similar observations, stating that "two-thirds is lost due to poor transmission and seepage in the canal system." Additionally, the low fees paid by irrigation users contribute to insufficient funds for necessary repairs and replacements within the system. (FRENKEN 2012) The water dispute between Pakistan and India was resolved through the IWT in 1960. The treaty allocated the three eastern rivers to India and the three western rivers to Pakistan, with limited use by India. However, differing interpretations of the treaty's provisions have led to objections from Pakistan regarding Indian projects like Baglihar, Kishenganga, and Wuler, believed to violate the treaty. Ongoing conflicts and proposed projects on India's side continue to strain river flows into Pakistan.

Beyond India, Afghanistan's potential construction of storage facilities along the Kabul River, contributing 25BCM on average to the Indus, poses a threat to Pakistan's water flows. (Qureshi 2011) The unresolved issues with both neighbors raise the risk of reduced water availability in Pakistan, leading to conflicts, especially in regions facing water stress and where water is a matter of national security. India's substantial water demands may drive it to undertake projects that could violate the treaty, impacting water flows into Pakistan and causing significant economic and security consequences.

Climate change poses a substantial and imminent external threat to Pakistan's water sector. The country is identified as one of the most vulnerable regions globally, facing increased risks of frequent and intense floods, prolonged droughts, and potential melting of the Himalayan Ice cap. The impact of climate change is expected to escalate variability in inflows, leading to more severe floods and droughts. Rising temperatures are projected to increase water demand by 5 to 15% by the mid-century, with precipitation shifting from snow to rain, elevating the risk of floods. The accelerated melting of glaciers, a vital water source for the Indus, is anticipated due to climate warming. While there may be short-term positive effects, such as increased river flows, the long-term consequences, including reduced flows, could intensify water-related

challenges and jeopardize water security in Pakistan. (NATIONAL WATER POLICY 2018)

Despite water scarcity, Pakistan inefficiently utilizes this valuable resource, with irrational distribution among user sectors lacking proper priorities. Water productivity is crucial for all nations, especially for those facing scarcity. Pakistan ranks eighth lowest globally, generating only US$ 1.38 per cubic meter of withdrawn water. Inefficient irrigation practices contribute to wastage. Both the state and individuals exacerbate the crisis, with the former underpricing the resource and the latter unknowingly or knowingly wasting it. (Hathaway 2009)

While the rest of the world adopts modern irrigation techniques, Pakistan persists with the ancient flood irrigation system, an impractical luxury given its impending water crisis. The country often overlooks the water's value, focusing on land productivity instead. Farmers typically apply water to unleveled bunded units, leading to prolonged irrigation events, poor water uniformity, and over-irrigation. Studies reveal lower crop productivity and irrigation efficiency, with wheat productivity in Pakistan lagging significantly behind India and California. The choice of water-intensive crops, such as rice and sugarcane, exacerbates the issue. Sugarcane, for instance, requires seven times more water than wheat. Traditional planting methods, particularly for rice, further intensify water usage. Despite being a major rice exporter, Pakistan's agricultural practices contribute to substantial water losses, with only 10% allocated to high-value crops. (Kahlown 2003)

Enhancements in irrigation networks and water availability have primarily favored water-intensive crops, particularly rice and sugarcane. However, this reliance puts substantial pressure on groundwater resources, with tube wells supplying nearly 70% of water in rice-growing regions. Pearce aptly notes that when it comes to the consequences of excessive water use for irrigation, Pakistan serves as a prime example, encapsulating both the benefits and risks. (Pearce 2006)

The existing water consumption patterns are irrational, unsustainable, and exacerbating water scarcity on multiple fronts. Agriculture, surpassing its fair share, consumes an excessive amount of water. Within agriculture, the distribution of water is skewed, with 80% allocated to irrigate agriculture,

contributing only 37% to the economy, compared to the 58% contributed by livestock. This imbalance impedes innovation and encourages farmers to choose unsuitable crop varieties. Flood irrigation prevails in Pakistan, with little adoption of efficient techniques like micro-irrigation. As the population and economy grow, pressures over water allocation will escalate amongst various agricultural sections and sectors. Despite evident shortages, water is wasted recklessly, especially by those not paying for it, leading to underpriced water and wasteful practices. Limited and outdated information about water resources contributes to the lack of awareness and the absence of water reuse or recycling concepts in the country. Pakistan mirrors Sandra Postel's observation that, for many, water simply flows without much thought beyond the immediate point of contact. (Postel 2013)

Underground water constitutes a crucial part of the planet's water resources and should only be extracted under dire circumstances. In Pakistan, however, there are no restrictions on extracting underground water, and it is considered a limitless gift. Qureshi highlights the unrestricted installation of tube wells, allowing individuals to extract any amount of water without considering the repercussions on the resource or others. Initially, tube well usage helped counter waterlogging and salinity, but the unregulated trend led to a drastic increase, from 10,000 in 1960 to over one million by 2007. Between 1965 and 2000, groundwater extraction surged from 10BCM to 69BCM. Presently, 80% of groundwater exploitation in Pakistan occurs in the private sector, profoundly impacting water tables and accessibility. Despite evidence of overexploitation, the unregulated extraction has negatively influenced groundwater quality in some areas. A World Bank report notes that groundwater now fulfills almost half of all irrigation needs in Pakistan. The installation of extra tube-wells, despite clear signs of overexploitation, is alarming; contributing to a yearly accumulation of around 20million tons of salt and risking complete depletion of Punjab aquifers within 50 to 100 years if the current rate persists. This is a perilous forecast, especially considering that Punjab's groundwater state is relatively better than the rest of the country. (Qureshi 2011)

Pakistan's water management lacks strategic intelligence. The utilization of an outdated and rigid irrigation system tainted by corrupt

practices and inefficiencies points to administrative hurdles, governance shortcomings, and skewed priorities.

Pakistan's mismanagement of water resources is evident in its adherence to the inflexible irrigation delivery system known as Warabandi. This system, originating during British rule, aimed to distribute water equitably based on fixed weekly rotations proportional to farm size. However, the allocation is based on farm size rather than crop choice, a practice developed during a time of low agricultural intensity and abundant water. Given the current scarcity and increased agricultural intensity, its continued adoption poses a serious issue.

In Pakistan's irrigation system, water follows a sequence from barrage to main canal, branch canals, distributaries, minors, sub-minors, and water courses. Under the Warabandi system, each farmer receives water on a specific day, regardless of actual water quantity or crop watering needs. Flat-fee agricultural water pricing, regardless of usage, encourages flooding fields and allowing excess runoff. Additionally, the system favors upstream users over downstream ones, and those with more land can secure more water through bribery. In certain cases, this benefits a few users at the expense of others.

Over time, Pakistan has prioritized supply management over demand management, with water being a highly subsidized commodity. The lack of awareness about the true value of water among users serves as a significant barrier to transitioning to demand management. Kugelman consistently highlights crisis-like situations where water demand surpasses supply, leading to excessive withdrawals from reservoirs and reaching dead levels. This mismanagement often results in pumping 55 MAF of groundwater through tube wells, exceeding the water available from canals to meet cropping requirements. With projected population growth, water supplies are estimated to need an annual growth of almost 10% to meet food requirements. The absence of additional water, coupled with the imperative to satisfy food needs, underscores that poor demand management will further exacerbate an already precarious situation. (Hathaway 2009)

The intricacies and absence of coordination among various institutions tasked with water management at different levels contribute

to numerous adverse effects. As outlined in a World Bank report, the manner in which Pakistan manages its water resources is characterized by non-transparency, monopolies, individual discretions, and corrupt practices. This often results in an unfair distribution of water, subpar technical performance, and a prevailing atmosphere of mistrust and conflict from the provincial level down to the water course. The report underscores the gross inadequacy of infrastructure for collecting, storing, sharing, and analyzing hydro-meteorological data and information. The lack of robust water accounting methods not only leads to inaccurate and erroneous water data but also impedes effective planning.

The inefficiency of these institutions stems from duplicated efforts, a lack of clear legal mandates, and ambiguity in roles. Citizens play minimal roles in water data collection and analysis, a practice encouraged globally and particularly beneficial for enhanced groundwater management in Pakistan. Despite numerous public sector, academic, and research institutions, as well as national organizations, there is no unified national regulatory framework addressing groundwater and its utilization.

What raises significant concern is the insufficient government response in addressing the reform of this dysfunctional system. Moreover, there is a lack of a regulatory framework to control water wastage, coupled with inadequate oversight on the discharge of industrial and household pollutants, exacerbating the contamination of water sources. The existing administrative vacuums, governance shortcomings, and a persistent reluctance to confront these realities have exacerbated the water situation. This situation is likely to worsen as the resource becomes scarcer, and the number of users continues to grow.

Although familiar with both floods and droughts, Pakistan does not possess a well-established mechanism for effectively managing. Historical records demonstrate that floods, the most frequent and damaging natural hazard in Pakistan, have affected large populations, with the 2010 flood alone impacting 20 million people. (Hathaway 2009) The country lacks strong flood forecasting methods for well-timed and accurate predictions, as well as sufficient mitigating measures like reservoirs. Consequently, floods result in widespread destruction of infrastructure along their path to the sea, leading to ongoing water losses even after the floods subside.

In short, while there is some acknowledgment in Pakistan about storage insufficiency, there is still inaction and apparent apathy toward increasing storage capacity. Many rightly believe that Pakistan requires enhancing storing volume, but a misconception exists that supplementary storage alone will resolve totally water security issues. The most concerning thing is the lack of awareness regarding Pakistan's inefficient handling of its water resources. The current crisis primarily results from inadequate management and wasteful practices rather than a deficiency of reservoirs. Pakistan's handling of water lacks intelligence, and longtime negligence has placed the infrastructure of water at hazard. The crisis involves various actors, including the state for its indifference, individuals for participating in careless activities. In spite of these challenges, there are indications of optimism. The considerable water wastage because incorrect selections, indecision, and government mishandling suggests a secreted potential for positive change. Humans can undo past mistakes and make the right decisions to address the water crisis.

Directional Insights from the Seerat Al-Nabi ﷺ Perspective

Allah, the Almighty, has bestowed upon humanity the noble status of being the vicegerents on Earth, as mentioned in the Holy Quran. It is also a requirement to be vicegerent that human being should settle this land of Allah and be blessed by it rather than wasting it. Allah has granted this exalted position and has guided us with the following instructions: "*And He it is who has made you (His) vicegerents in the earth, and has exalted some of you in the ranks over others, that He may try you in what He has given you. Surely your Lord is swift in inflicting punishment, and surly He is the most Forgiving, the Ever-Merciful (as well).*" (Al-Quran, 5:165)

Allah Almighty has strictly forbidden wasteful extravagance of His blessings without reason and said, *"O Descendants of Adam! Adorn yourself when you go to the mosque, and eat and drink, and do not cross limits; indeed He does not like the transgressors".* (Al-Quran, 7:31)

The Prophet Muhammad ﷺ describes this eternal duty of humanity Abu Saeed Al-Khudri (رضی اللہ عنہ) reported: Messenger of Allah (ﷺ) said: "The world is sweet and green (alluring); and verily, Allah is making you to succeed each other, generations after generations in it in order to see how

you act. So beware of this world and beware of women". [Muslim] (Riyad as-Salihin: 458) (htt3)

In order to address the aforementioned issues, we turn to the teachings of the Last Apostle Muhammad ﷺ, and then, insight of his guidance, we examine the recommendations for addressing water scarcity issues in Pakistan. The teachings of Prophet Muhammad ﷺ include guidance on various aspects of life, including the conservation and responsible use of water. There are general teachings that emphasize the importance of conserving resources and avoiding wastefulness. Water, being a precious resource, is mentioned in several hadiths in the context of preservation. Prophet Muhammad emphasized the avoidance of extravagance and wastefulness. Wasting water, especially in a region where water scarcity is a concern, goes against these principles.

i. 'Abdullah Bin 'Amr Bin al-Aas said that the Prophet came upon Sa'ad when he was performing ablution and asked, "What is the meaning of this extravagance, Sa'ad?" He replied, "Is there extravagance in ablution?" He said, "Yes, even if you are beside a flowing river." (htt1) (Mishkat Al-Masabih:427)

ii. It was narrated from Jabir that: "The Messenger of Allah forbade urinating into standing water." (htt2) (Sunan-Ibn-Majah:343)

iii. Narrated Jabir ibn Abdullah, "The Prophet (ﷺ) used to take a bath with a sa' (of water) and perform ablution with a mudd (of water)". (Dawud n.d.)

Conclusive Findings and Practical Recommendations

Addressing water scarcity in Pakistan requires a multifaceted approach that considers the interconnected nature of the underlying causes. The following analysis explores potential remedies for the causes of water scarcity in Pakistan, incorporating a range of solutions from policy interventions to technological advancements.

i. *Appropriate use of water in agriculture*: It is necessary to use modern methods of irrigation in agriculture, like drip irrigation system and sprinkler irrigation system, instead of traditional flood irrigation system to reduce the wastage of water and the

farmers should also be taught about modern methods of irrigation

ii. *Water Smart Crop Selection:* Such crops should be promoted which can flourish according to the regional soil and climate and instead of those crops which require more water. Instead of water intensive crops, the farmers should pay their attentions to crops give more productions with relatively less water.

iii. *Improvement and Construction of new Water Reservoirs:* The upgrading of water reservoirs and construction of new water infrastructure, like dams, barrages, and etc. are highly required for improving water capacity in the country.

iv. *Proper regulating groundwater supervision:* The Government should regulate the policies about the extraction of groundwater and introduce the groundwater recharge mechanism by promoting sustainable groundwater practices.

v. *Ambient of Water quality*: The government should enforce strict environmental policies and promote ecofriendly industrial activities to prevent water pollution.

vi. *Legislation and Law implementation:* By promoting the water management departments, government should improve the inter-provincial management and introduce the legislation regarding water management.

vii. *Public Contribution and awareness*: Local communities must be involved in water management activities and they should be well aware about the safeguarding of water reserves.

viii. *Research and innovation*: Sustained investment in study and exploration of water conserving technologies, crops diversities, and water handling approaches can be proved long lasting solutions for water shortage.

ix. *International cooperation*: International communities can help to resolve the transboundary water disputes.

x. *Cooperative diplomacy*: Pakistan faces significant water challenges, exacerbated by tense relations with neighboring states. The Indus River, a lifeline for Pakistan, originates in India. Disputes over water-sharing agreements, like the Indus Water Treaty, create geopolitical tensions. Upstream dam construction in India impacts downstream water flow, affecting Pakistan's agriculture. Additionally, climate change amplifies water stress. Collaborative diplomacy and adherence to established treaties are essential for sustainable water management ensuring regional stability and addressing the shared challenges of water scarcity in South Asia.

To control the shortage of water, a holistic and integrated approach is needed in Pakistan that depends on the association of different participants as the Federal Government, Provincial-Governments, local bodies, native and international communities, and international institutions to safeguard sustainable water management for generations.

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