International Journal of Science and Research (IJSR)
ISSN: 2319-7064
Impact Factor 2024: 7.101

Water Scarcity, Governance Challenges, and Conflict Dynamics in India's Security Landscape

Yogesh Nair

MSc, MPhil, and PhD in Defence and Strategic Studies
Post-Doctoral Studies, Department of Political Science, Bangalore University, Bengaluru, India

Abstract: ***This article examines India's water crisis as a multidimensional challenge shaped by historical dependence on river systems, rising demographic pressure, weak governance, and increasing climate variability. It analyzes how scarcity, pollution, and unequal distribution generate tensions at household, state, and national levels, reinforcing social inequality and political contestation. The study highlights the structural imbalance between water supply and demand, the role of institutional fragmentation, and the persistence of inter-state disputes over shared river basins. It also explores the links between water stress, economic stability, and national security, including its implications for military operations and regional strategy. By situating water conflicts within broader patterns of governance and development, the article argues for integrated, cooperative, and equitable management approaches to enhance resilience, reduce conflict, and support long-term stability.***

Keywords: Water scarcity, water governance, inter-state disputes, national security, climate stress

1. Introduction

Water has historically been central to the rise, prosperity, and long-term stability of civilizations. From the earliest human settlements, access to reliable water sources shaped where societies emerged, how they produced food, and how power was organized and exercised. In the Indian subcontinent, rivers such as the Indus, Ganga, Brahmaputra, Godavari, Krishna, and Cauvery have been far more than physical waterways. They have structured settlement patterns, sustained agrarian economies, influenced trade, and fostered cultural and religious identities that continue to define Indian society. These river systems enabled demographic growth and political consolidation, making water a foundational pillar of India's civilizational continuity. [1]

Paradoxically, despite this historical abundance and deep cultural reverence for water, contemporary India faces an increasingly severe water crisis. Widespread scarcity, declining water quality, and highly uneven distribution now characterize the country's hydrological landscape. Rapid urbanization, intensive agriculture, industrial demand, and climate-induced variability have placed unprecedented stress on both surface and groundwater resources. As a result, water has ceased to be merely an environmental or developmental challenge. It has become a potent source of social tension, political contestation, and strategic vulnerability, with direct implications for governance and stability. [2]

India's water-related conflicts unfold across multiple and interconnected scales. At the micro level, households and communities compete over access to drinking water and irrigation, often along lines of class, caste, and gender. At the sub-national level, disputes between states, particularly over inter-state river basins, have become persistent and politically charged, periodically erupting into protests, legal battles, and administrative paralysis. At the national level, water insecurity increasingly intersects with questions of economic growth, internal security, and regional diplomacy. These conflicts are further intensified by population growth, climate change-driven variability in monsoons, unsustainable extraction of groundwater, and chronic governance failures in water management institutions.

In this context, water scarcity functions as a powerful threat multiplier. It amplifies existing socio-economic inequalities, deepens political grievances, and heightens the risk of instability in already vulnerable regions. As competition over diminishing water resources intensifies, the potential for localized disputes to escalate into broader social unrest or strategic challenges grows. This article examines India's water crisis through domestic, sub-national, and national lenses, explores the relationship between water scarcity and conflict, and assesses the emerging implications for military operations and national security in an era of environmental stress.

1) India's Water Crisis

India possesses nearly 4 per cent of the world's freshwater resources while supporting over 17 per cent of the global population, creating a fundamental structural imbalance between supply and demand. This demographic pressure alone places immense strain on the country's water systems, particularly in densely populated urban centers and agriculturally intensive regions. As population growth, urbanization, and rising living standards continue to increase per capita water demand, the stress on both surface and groundwater resources has become increasingly unsustainable. [3]

Yet India's water crisis cannot be understood as a problem of scarcity alone. It is equally, if not more, a crisis of governance and management. Weak regulatory frameworks, fragmented institutional responsibilities, and inadequate enforcement have resulted in widespread over-extraction, especially of groundwater. At the same time, severe pollution from industrial effluents, agricultural runoff, and untreated urban sewage has rendered large portions of available water unfit for human consumption or productive use. Inefficient irrigation practices, water-intensive cropping patterns, and heavily subsidized pricing further exacerbate wastage, while stark regional and social disparities ensure that access to clean and reliable water remains deeply uneven. Taken together,

these factors reveal that India's water crisis is not simply about how much water exists, but about how it is governed, allocated, and used.

a) Domestic Level

At the domestic level, water scarcity has immediate and tangible consequences for household survival, health, and human dignity. For millions of Indian households, access to safe and reliable drinking water remains uncertain, particularly in rural areas and urban informal settlements where public infrastructure is either inadequate or absent. [4] Even in major metropolitan cities, water supply is often intermittent and uneven, compelling residents to rely on storage tanks, borewells, private water vendors, or shared community taps. These coping mechanisms not only increase household expenditure but also create daily uncertainty and dependency, turning access to water into a persistent source of stress.

The burden of water scarcity is not distributed evenly within households or communities. Women and children are disproportionately affected, as they are typically responsible for securing water for domestic use. In rural India, women may spend several hours each day walking long distances to collect water, time that could otherwise be devoted to education, income-generating activities, or rest. This daily labor reinforces gendered inequalities and perpetuates cycles of economic and social disadvantage. Children, particularly girls, are often pulled out of school to assist with water collection, further entrenching intergenerational disparities. [5]

Water quality compounds these challenges. Widespread contamination from untreated sewage, industrial effluents, and agricultural runoff has rendered many surface and groundwater sources unsafe for consumption. As a result, households are exposed to waterborne diseases, malnutrition, and chronic health conditions, placing additional pressure on already strained healthcare systems and household finances. The health impacts of unsafe water disproportionately affect the poor, who lack access to purification technologies or alternative sources.

At this domestic scale, water stress frequently gives rise to micro-level conflicts. Disputes between neighbors, caste groups, or residents of informal settlements over access to wells, hand-pumps, or municipal pipelines are common, particularly during periods of acute scarcity. While such conflicts may not always escalate into overt violence, they steadily erode social cohesion, heighten everyday tensions, and reinforce existing structural inequalities. Over time, these localized struggles form the social foundation upon which larger and more visible water conflicts emerge.

b) Sub-National Level

Sub-national water conflicts, particularly those between Indian states, represent some of the most visible, enduring, and politically charged manifestations of India's water crisis. Although India's federal framework designates water largely as a state subject, most major river systems flow across multiple state boundaries. This fundamental mismatch between political jurisdiction and hydrological reality lies at the core of many inter-state disputes. [6] Rivers that sustain agriculture, industry, and urban populations in more than one state inevitably become arenas of competition, especially in a context of growing demand and declining availability.

The long-standing Cauvery water dispute between Karnataka and Tamil Nadu is emblematic of these dynamics. Rooted in colonial-era water-sharing agreements and shaped by competing agricultural needs, particularly for water-intensive crops, the conflict has persisted for decades despite the establishment of tribunals and repeated interventions by the Supreme Court. Legal judgments, rather than resolving the issue, have often triggered waves of public protest, political mobilization, and economic disruption in both states. Periodic unrest underscores not only the material importance of river water but also its symbolic and emotional significance in regional identity and electoral politics. [7]

Similar patterns can be observed in disputes over the Krishna, Godavari, Ravi-Beas, Yamuna, and Mahadayi river systems. These conflicts typically pit upstream states seeking to expand irrigation, hydropower, or urban supply against downstream states concerned about reduced flows and ecological degradation. Divergent development priorities, historical grievances, and competitive electoral incentives further complicate negotiations. During drought years, when river flows decline sharply, these tensions intensify, reinforcing perceptions of injustice and zero-sum competition among states.

Sub-national water conflicts also expose persistent weaknesses in India's water governance architecture. Inter-State Water Dispute Tribunals are frequently criticized for lengthy adjudication processes, contested findings, and limited enforcement capacity. [8] Even when legal resolutions are reached, they do not always translate into political compliance or social acceptance on the ground. The gap between judicial decisions and practical implementation highlights the limits of technocratic solutions in resolving deeply politicized and emotionally charged water disputes, and underscores the need for more cooperative, basin-level approaches to water governance.

c) National Level

At the national level, water scarcity increasingly intersects with economic planning, environmental sustainability, and political stability, making it a strategic issue rather than a sectoral concern. Rapid urbanization, industrial expansion, and agricultural intensification have sharply increased water demand across the country, while supply remains constrained by ecological limits, uneven rainfall patterns, and growing climate variability. The cumulative effect of these pressures is a widening gap between water demand and availability, with direct implications for food security, energy production, urban resilience, and economic growth.

Groundwater depletion represents one of the most severe and least visible dimensions of India's national water challenge. As the world's largest extractor of groundwater, India relies heavily on aquifers to sustain irrigation, drinking water supply, and industrial activity. [9] In many regions, groundwater is being withdrawn at rates far exceeding natural recharge, leading to falling water tables, deteriorating water quality, and increased energy consumption for pumping. This

"silent crisis" undermines long-term water security, disproportionately affects small farmers and rural communities, and increases dependence on already contested surface water sources, thereby intensifying inter-state and sectoral competition.

In response, national-level initiatives such as the National Water Policy and large-scale proposals like river interlinking have sought to address regional imbalances and enhance water availability. These efforts reflect a recognition of water scarcity as a national development constraint. However, they have also generated significant debate over ecological consequences, displacement risks, federal consent, and long-term economic and environmental viability. Critics argue that technocratic and infrastructure-heavy solutions may overlook local hydrological realities and governance failures, while supporters view them as necessary interventions in the face of growing scarcity. [10]

At the national scale, therefore, water scarcity emerges as a complex governance challenge that demands coordination across ministries, states, and sectors. Effective responses require balancing developmental imperatives with ecological sustainability, reconciling federal interests, and integrating water management into broader national security and economic planning frameworks.

d) Water and Conflict

The relationship between water and conflict is complex, contingent, and fundamentally non-linear. Scarcity by itself does not automatically lead to violence; rather, it interacts with political, economic, social, and institutional conditions to shape the likelihood and form of conflict. [11] In societies where livelihoods are heavily dependent on water, such as agrarian or riverine economies, and where governance mechanisms are weak or exclusionary, water scarcity acts as a stress or that heightens the risk of unrest. Inequitable allocation, lack of transparency, and limited avenues for grievance redress can transform resource stress into open confrontation.

Water functions simultaneously as a necessary material and a powerful symbolic asset. Materially, control over water infrastructure viz., dams, canals, reservoirs, and distribution networks, translates directly into political authority and economic advantage, enabling states or groups to influence agricultural output, urban supply, and industrial activity. Symbolically, rivers are deeply embedded in cultural, historical, and religious identities, particularly in India, where water bodies are revered as sacred entities. As a result, disputes over water often acquire emotional and identity-driven dimensions, making compromise politically sensitive and socially stressed.

Scholars commonly distinguish between multiple forms of water-related conflict operating at different scales. These include intra-community conflicts over local water sources such as wells, tanks, and hand-pumps; inter-community and regional disputes arising from competing livelihoods and development priorities; inter-state conflicts mediated through legal, administrative, and political institutions; and strategic or security-related tensions in which water intersects with broader national interests and power calculations. [12] These categories are not discrete, and conflicts at one level often spill over into others, reinforcing cycles of tension.

Climate change further intensifies these dynamics by altering hydrological patterns and increasing the frequency of droughts, floods, and unpredictable rainfall. Such variability places additional strain on existing water-sharing agreements, infrastructure, and governance institutions, many of which were designed for more stable climatic conditions. As uncertainty grows and margins of surplus shrink, societies are more likely to shift from cooperative frameworks toward competitive and defensive approaches to water management, increasing the potential for conflict across multiple scales.

2) India and Water Conflict: Analysis

India's water conflicts are best understood not as isolated or episodic disputes, but as the cumulative outcomes of deep structural pressures interacting with persistent governance failures. Demographic growth, economic transformation, ecological degradation, and climate variability have collectively intensified stress on finite water resources. These pressures operate over long-time horizons, gradually eroding the resilience of both natural systems and social institutions.

When such structural stresses intersect with fragmented institutions, weak regulatory frameworks, and politicized decision-making, water scarcity is transformed into conflict. Inadequate planning, poor data transparency, and limited coordination across sectors and levels of government undermine the equitable allocation of water and weaken mechanisms for dispute resolution. As a result, grievances accumulate and disputes harden, whether at the level of households, communities, states, or the nation as a whole.

Mostly, water conflicts in India reflect broader challenges of governance and state capacity rather than merely hydrological shortages. Addressing them therefore requires not only technical solutions or additional infrastructure, but also institutional reform, cooperative federalism, and inclusive decision-making processes that can manage scarcity in a manner perceived as legitimate and fair.

a) Demand-Supply Imbalance

Population growth, rising per capita consumption, and the continued dominance of water-intensive agricultural practices have together driven a dramatic increase in water demand across India. As household needs expand with urbanization and changing lifestyles, and as industry and energy production place additional claims on limited resources, competition for water has become increasingly acute. At the same time, the supply of usable water is steadily shrinking. Large volumes of surface water and groundwater are rendered unusable each year due to pollution from untreated sewage, industrial discharge, and agricultural chemicals, while unchecked over-extraction continues to deplete aquifers and reduce river flows. [13]

Agriculture remains the single largest source of pressure, accounting for nearly 80 percent of freshwater use nationwide. Much of this water is consumed through inefficient irrigation methods such as flood irrigation, which result in significant losses through evaporation and runoff. Water-intensive cropping patterns, encouraged by subsidies

and procurement policies, further exacerbate the imbalance between demand and availability. Together, these trends highlight how India's water crisis is driven not only by rising demand, but by systemic inefficiencies in how water is allocated and used.

b) Inequitable Distribution

Water allocation in India is shaped less by principles of equity or sustainability and more by a complex legacy of historical agreements, political bargaining, and geographic advantage. Many existing water-sharing arrangements reflect colonial-era treaties or early post-independence compromises that did not anticipate present-day demographic pressures, climatic variability, or developmental demands. As a result, allocation patterns often privilege certain regions and actors while marginalizing others.

Upstream states typically exercise disproportionate control over shared river systems, as their geographic position allows them to regulate flows through dams, barrages, and diversion projects. Downstream regions, by contrast, remain structurally vulnerable to both natural variability and upstream decision-making, fostering perceptions of injustice and dependence. These asymmetries frequently fuel inter-state tensions, particularly during periods of scarcity.

Within states, similar inequities are evident. Urban centers, driven by political influence, economic importance, and population density, are often prioritized in water distribution over rural and peri-urban areas. This urban bias deepens existing socio-economic divides, leaving agrarian communities and informal settlements with unreliable or unsafe water access. [14] Such patterns of allocation reinforce structural inequalities and underscore how water governance in India mirrors broader disparities in power and development.

c) Climate Change as a Stress Multiplier

Changes in monsoon patterns, glacier retreat in the Himalayan region, and the increasing frequency and intensity of extreme weather events have significantly destabilized India's hydrological systems. Rainfall is becoming more erratic, with longer dry spells punctuated by short episodes of intense precipitation, reducing natural recharge and increasing runoff rather than usable storage. At the same time, the retreat of Himalayan glaciers threatens the long-term reliability of river flows in northern India, particularly during the dry season, when meltwater plays a critical buffering role. [15]

These climatic shifts undermine traditional water-sharing arrangements and planning assumptions that were based on relatively stable and predictable hydrological conditions. Agreements and infrastructure designed around historical flow patterns are increasingly mismatched with present realities, creating uncertainty and mistrust among water users and governing authorities. As variability increases and buffers shrink, competition over water intensifies across sectors and regions, pushing states, communities, and institutions toward defensive strategies rather than cooperative management.

d) Pollution and Ecological Degradation

Pollution significantly diminishes the effective availability of freshwater in India, turning what may appear abundant into a resource that is often unsafe or unusable. Rivers such as the Ganga and Yamuna, which carry immense cultural, religious, and historical significance, are simultaneously burdened by untreated sewage, industrial effluents, and agricultural runoff. This contamination not only threatens public health but also undermines livelihoods that depend on fishing, agriculture, and tourism. Ecological degradation, manifested through eutrophication, loss of biodiversity, and siltation, further reduces the capacity of these water systems to provide reliable and clean water, effectively transforming abundance into scarcity. [16]

The consequences of such degradation are profound. As clean water sources become increasingly limited, competition intensifies among households, communities, states, and economic sectors, often exacerbating existing social and regional inequalities. This creates a self-reinforcing cycle in which scarcity drives conflict, which in turn hampers cooperative management and effective governance, further constraining water availability. Collectively, these dynamics pose a serious challenge to India's social cohesion, economic development, and long-term resilience, highlighting the urgent need for integrated approaches that address both quantity and quality of water.

3) Effects on Conduct of Military Operations

Geographic disposition of China vis-a-vis India, India with regard to Pakistan and likewise some other countries provide these states control of crucial water sources; a potential weapon in their hand to make the adversary relent and exert pressures. Further, changes in river flows and glacier-fed systems affect infrastructure planning and troop sustainability. Shared river basins with neighboring countries further complicate strategic calculations. [17] In addition, during water crises, the armed forces are often deployed for relief operations, including water transport and purification. While these roles enhance human security, they also divert resources from core defense functions and highlight the security implications of environmental stress. [18, 19] Hence, conduct of military operation in such a scenario becomes water centric with both sides leveraging their operations around control of water sources. With changing concept of warfare where economies of the country are targeted to cripple the enemy rather than destruction of military might; the weapon of water control is an effective tool with riparian countries to create mayhem and achieve desired result. While the principles of conduct of warfare may not change, military operations in a scenario of water crisis will require special consideration in terms of attainment of strategic objective(s). Some of the issues that merits attentions are:

- Operations are likely to be launched primarily to capture water sources or Headworks controlling the flow of water. It may be to release water pressures/ stresses on own side exerted by the adversary by blocking/ shutting down of source(s) of water.
- Overcoming denial tactics of the enemy such as massive flooding of areas to block own advance. Targeting of scarce portable water sources, storage container, pipelines including strategic bombing of water infrastructure with an aim to create impact on the civilian population besides

increasing the administrative hassles of the armed forces. Hence security of water infrastructure, from conventional as well as terrorist strike, also becomes a parameter of paramount importance.

- Raising of Commando battalions copiously armed to carry out swift and surgical operations to capture Headworks and Water Control Points as also establishment of Airborne Brigades/Divisions for sustenance of operations assumes importance.
- Setting up Engineer brigades fully equipped to overcome flooding schemes of the enemy and to be able to handle the stupendous upheaval likely to be created by enemy action.
- Focus on filtration and purification of brackish/ contaminated water, storage containers; water discipline and management of water for sustenance of men, animal and machine will have to be factored during planning of such operation.

Besides the aspects highlighted above there are many issues affecting conduct of military operations in a water stress environment which need to be analysed and planned in detail by military planners and strategists. A thought of water crisis scenario controlled by a hostile state may alarm the policy makers but existence of such a threat and adversaries need to be realised soon and steps taken to overcome such eventualities including an all-out war.

2. Conclusion

Water conflicts in India cannot be understood merely as isolated environmental problems; they are deeply enmeshed with broader issues of social equity, political stability, economic development, and national security. Scarcity at the household level affects livelihoods, health, and human dignity, while competition between communities and states can spark prolonged disputes with economic and political ramifications. At the national and strategic levels, water stress intersects with energy production, food security, urban planning, and regional stability, making it a critical factor in India's overall security landscape. In this sense, water is not just a physical resource, it is a social, political, and strategic asset whose management reflects the health and resilience of the nation itself.

Addressing these multifaceted challenges requires a fundamental shift from reactive, short-term crisis management toward proactive, integrated water governance. This entails strengthening institutions at all levels, improving coordination across ministries and states, and fostering cooperative federalism that balances upstream and downstream interests. It also requires improving efficiency in water use, particularly in agriculture, restoring degraded ecosystems, and building resilience to the impacts of climate change. Equally important is reframing water not simply as a commodity to be controlled or contested, but as a shared foundation for societal well-being, ecological sustainability, and peaceful coexistence.

If India can translate its water conflicts into opportunities for collaboration through joint management of river basins, equitable allocation policies, and participatory decision-making, it has the potential to safeguard not only its environmental future but also its social cohesion, economic prosperity, and strategic security. By treating water as a bridge rather than a barrier, India can transform a source of tension into a catalyst for sustainable development and long-term national stability.

References

[1] Briscoe, John and Malik, R. P. S. (2006), India's Water Economy, Oxford University Press.
[2] Homer-Dixon, Thomas (1999), Environment, Scarcity, and Violence, Princeton University Press.
[3] World Bank (2018), Groundwater Governance in India, World Bank.
[4] United Nations Development Programme (UNDP) (2006), Human Development Report, UNDP.
[5] Iyer, Ramaswamy R. (2003), Water: Perspectives, Issues, Concerns, Sage Publications.
[6] Government of India (1950), Constitution of India, Article 262.
[7] Supreme Court of India (n.d.), Cauvery Water Dispute Judgments, Supreme Court of India.
[8] Central Water Commission (2021), Water Resources of India, Government of India.
[9] NITI Aayog (2019), Composite Water Management Index, Government of India.
[10] Government of India (2012), National Water Policy, Government of India.
[11] Gleick, Peter H. (1993), "Water and Conflict," International Security, 18(1): 79–112.
[12] Wolf, Aaron T. (2007), Shared Waters: Conflict and Cooperation, United Nations University Press.
[13] Food and Agriculture Organization (FAO) (2016), Water and Agriculture in South Asia, FAO.
[14] Narain, Sunita (2012), "Water Crisis in India," Economic and Political Weekly, 47(26): 38–45.
[15] UNESCO (2020), World Water Development Report, UNESCO.
[16] D'Souza, Rohan (2006), "Colonial Hydrology in India," History Compass, 4(4): 621–628.
[17] Swain, Ashok (2008), "Water Security and National Security," Water International, 33(2): 183–194.
[18] Panda, Ankit (2018), "Water Security and National Security in India," Journal of Defence Studies, 12(3): 1–20.

Author Profile

Yogesh Nair, an Army Officer holds an MSc, MPhil, and PhD in Defence and Strategic Studies. He has published numerous articles on National Security and Environmental issues in various professional journals. Currently he is pursuing his post-doctoral studies at Department of Political Science, Bangalore University, Bengaluru.