WATER RESOURCE MANAGEMENT IN PAKISTAN

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Abstract

Water, is one of the most significant natural resource available at the disposal of mankind. However, increasing global demands and a considerable decline in its availability due to mismanagement/misuse has culminated in an intricate scenario, in terms of water availability. The situation is considered to have serious implications for global peace being a glaring politico-economic issue of the current century. Consequent to an "irrational" partition of the sub-continent executed by the British, Pakistan has been "destined" to struggle for availability of requisite water from an upper riparian i.e. India. Similar issues exist in our Water related dealings with Afghanistan, to the West. Notwithstanding these facts, Pakistan's internal political decision making in terms of distribution, preservation and management of water resources has been wanting. The overall scenario has led to a situation where Pakistan is heading towards "dire scenario". This paper endeavors to analyse our existing water resources, its linkages with security, our issues related to water resource management both within the country and with our immediate neighbours. Viable recommendations on various fronts have also been proffered.

Keywords: Pakistan, India, Afghanistan, Security, Indus River System Authority (IRSA), Indus Water Treaty (IWT), Water Apportionment Accord (WAA).

Introduction

Importance of water, the most significant asset for existence of life, needs no further elucidation. With ever increasing world population, Global water demand has escalated to 6 times due to the population increase since the last century.[1] This increasing demand, once viewed in the context of dwindling natural resources and excessive wastage due to mismanagement, has caused an overall strain on availability of water. The situation is viewed by experts to have serious implications for global peace being a glaring politico-economic issue of the current century.

Pakistan, owing to a biased partition across the Indus Basin, inherited ingredients for potential water based conflicts. This unjustified distribution of water resources has, consequently, become major source of contention between India and Pakistan. Persistent inter provincial discord over water distribution, coupled with strained relations with Afghanistan on Kabul river waters are further aggravating the water resource management challenges for Pakistan. All these issues have direct bearing on the national coherence and, in turn, security of Pakistan.

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Sources of Water in Pakistan

Sources of water in Pakistan are distributed in two categories, i.e. Primary and Secondary. A brief account of each source is discussed below:-

Primary Sources

- **Rainfall**
  - Rainfall is an important primary source of water in Pakistan. However, quantum of rainfall for different regions is not symmetric which effects the water availability in that region.
  - "Monsoon" and "Western Disturbances" are two major contributors of rainfall in Pakistan. Monsoon spell is experienced in Summers whereas, Western Disturbances are responsible for rainfall in Winter.[2]
- **Glaciers:** Glaciers are another significant natural source of water for Pakistan. Mountain ranges like Himalayas, Karakoram and Hindukush, containing few of the largest pockets of ice on earth immensely contribute towards availability of water for Pakistan.

Secondary Sources

- **Surface Water:** In terms of surface water resources, Pakistan comprises of three hydrological regions i.e. Indus basin, Kharan closed basin and the Makran Coastal basin[3] which jointly contribute146 MAF of surface water to Pakistan. Pakistan has 143 large and small water storage reservoirs. Mangla, Tarbela and Chashma are super reservoirs with a joint storage capacity of 18.92 MAF, however, due to silting their storage capacity has been reduced by 22%.[4] Certain new dams like Diamer Bhasha, Dasu dams and a number of small dams are at various stages of completion.[5]
- **Ground Water:** Indus Basin's ground water aquifer in the sweet zone of the Indus Basin is a considerably large rechargeable secondary source of water for Pakistan. It has been catering for irrigation and domestic needs of this region for centuries.[6]

Existing Water Resources of Pakistan – An Analysis

- **Drastic Decline in Water Availability Vis a Vis Demands:** Availability of water for Pakistan has gone down drastically. From a water availability position of 5300 m3 at the time of independence in 1947, we have become a water scare country with current water availability at around 1000 m3. Similarly, rapidly growing population has also exerted pressure on available water resources. The data on water availability in Pakistan for 75 years.[7]
- **Decreasing Annual Rainfall:** Rainfall is one of the significant primary sources of water for Pakistan. However, in the last few years, the intensity of rainfall, especially in southern part (agriculture zone) of country has declined.[8]
- **Declining Storage Capacity of Existing Water Reservoirs:** These reservoirs store water, which is lifeline of the country's agriculture. As per statistics provided by WAPDA, these reservoirs have lost more than 22% of storage space

due to siltation and deforestation. If these causes are not controlled capacity of the dams is likely to be further reduced to 32% by the year 2025.

- **Climate Change Effects on Glaciers**: Studies on climate change indicate a rapid melting of glaciers. Pakistan, during last 40 years, has witnessed 0.76°C rise in overall temperature, which is quite high.[9] This ongoing gradual rise in temperature can trigger rapid loss of our glaciers, which is harmful for our water requirements.
- **Limited Storage Facility:** Pakistan's existing water storage capacity (10% of inflows) and per capita storage (below 100 m3) is far lesser than other arid countries in the world.
- **Tube Well Irrigation – A Serious Exploitation of Ground Water**: Severe water shortages have led to exponential growth of tube-well irrigation during last 50 years. More than 1.2 million tube-wells have been installed in Punjab alone.[10] This excessive usage of tube wells without any checks and balances from the government is causing excessive reduction in ground water availability.

Pakistan's Inter Provincial Water Management Challenges

Issues of water distribution amongst regions in Subcontinent have been arising long before partition. A number of committees were constituted by different Governments to resolve the issue; however, no permanent solution could be accrued. Significant ones are mentioned below:-

- **Tripartite Agreement & Indus Discharge Committee (1921):** The agreements were executed for settling claims for more waters between Punjab, Bahawalpur and Bikaner State.[11]
- **Rao Commission (1945):** Constituted to settle renewed water claims between Punjab and Sindh in the backdrop of Government of India Act, 1935.[12]
- Akhtar Hussain Committee (1968)
- Fazle-e-Akbar Committee (1970)
- Chief Justices Commission (1977)
- Haleem Commission (1983)

The Water Apportionment Accord (WAA), 1991

Water disputes between provinces started getting worsened after the commencement of the Tarbela Dam Project in 1977. However, an inter-provincial agreement took place on 16 March 1991.[13] This agreement has two important features:-

- Existing usage of Canal Water by each province was protected.
- Balance of river supplies (including flood surpluses) was apportioned.

Establishment of Indus River System Authority (IRSA)

In the backdrop of Water Accord of 1991, IRSA was established in 1993 for regulating and monitoring distribution of water sources of provinces in accordance with the accord.[14] It has representation of all provinces. IRSA is responsible for inter

provincial distribution of water whereas, distribution of water within the provinces is a provincial subject.

Causes of Inter Provincial Disputes after the Water Accord

Salient causes of concern amongst provinces even after signing of 1991 accord are appended below:-

- **Punjab and Sindh:** Most dominant inter provincial water issue lies between upper riparian Punjab and lower riparian Sindh.
  - **Less Allocation of Water:** Sindh accuses Punjab of gaining an additional 7.61 MAF water against established international norms and historical Sindh-Punjab Agreement of 1945.[15]
  - **Construction of New Storage Sites:** The biggest disagreement between Punjab, Sindh (including Khyber Pakhtunkhwa) lies in the clause pertaining to construction of new storage dams. Punjab interprets this clause in favor of constructing Kala Bagh Dam, however, Sindh and Khyber Pakhtunkhwa are against its construction.[16]
  - **Damage to Sindh's Mangrove Forests:** As per the agreement some fresh water should be allowed to go to the sea for maintaining ecological balance of Sindh's mangroves forests. However, Punjab is not adhering to this clause resulting in damage to these forests.[17]
  - **Distribution of Water during Shortage Periods:** Sindh and Punjab have differences over sharing of water during shortage periods. Punjab claims that it has already forgone 2.7% of its share based on a package deal wherein Punjab was to be allowed new construction. As construction of Kalabagh dam has not materialized, hence, no further reduction is acceptable to it.[18]
- **Balochistan and Khyber Pakhtunkhwa**. As a lower riparian of Sindh, Balochistan accused Sindh of using its share of allocated water. Similarly KPK insists that a considerable proportion of its water share is consumed by Punjab due to unauthorized irrigation of Kaccha areas.

Non Existence for a National Water Policy (NWP)

In a country like Pakistan, where availability of water is on a rapid decline whereas its demand is rising with each passing day, a National Water Policy is critical. The National Water Policy (NWP) draft was initially prepared in 2005 after a World Bank comprehensive policy study. A number of drafts have been prepared since then (2010, 12 and 15). However, in Apr 2018, Council of Common Interests has approved the National Water Charter that was signed by the four chief ministers. The first ever National Water Policy, which had faced delays for more than a decade, was finally approved after removal of provincial reservations over its language. The Centre and the provinces agreed under the policy that selection of water reservoirs would be made with consensus in line with the 1991 water apportionment accord and after thorough

examination of their impact on sea intrusion, environmental protection and provincial water rights to secure surplus water in the system.

The policy acknowledges the need to adopt the NWP with an initial target of increasing storage capacity from existing 14 Million Acre Feet (MAF) by immediately starting the construction of 6.4 MAF Diamer-Bhasha dam which had already been cleared by the CCI back in 2009.

Pakistan's International Water Related Issues

Context and Current Status of the Issues with India

- Pakistan and India have been embroiled in disputes over possession and utilization of water resources courtesy owing to a highly unjustified boundary demarcation process.
- The famous Indus Water Treaty enacted in 1960, lays down privileges and obligations of water resources for both the countries.
- Accordingly, 3 western rivers Indus, Jhelum and Chenab were given to Pakistan, while 3 Eastern Rivers i.e. Ravi, Beas and Sutlej were allocated to India.[19]

Implications of Indian Hydro–Misadventures on Security of Pakistan

Implications of Indian hydro projects for security of Pakistan are highlighted as under:-

- **Agricultural Implications**
  - Pakistan's agro based economy is entirely dependent upon our irrigation system, by building a large number of dams, India retains the initiative to control our waters as per its will.
  - Water requirement in agriculture is time sensitive. Hence, any move to stop or delay water once it is needed the most or releasing it once it is not required can inflict serious damage to our agriculture production.
- **Economic Repercussions**
  - Agriculture is backbone of our economy, any loss in our agriculture production will have direct impact on our economy.
  - By reducing inflows of Chenab River (Baghliar Dam), Jehlum River (Kishan Ganaga and Wullar Barrage) a considerable decline in water availability has been observed. This has direct linkages with reduction of cultivated area which, in turn, has serious economic implications.[20]
- **Defence Related Implications**
  - Indian water projects have serious implications for our defence and security. First line of our defenses is threatened by the Indian ability to control waters of Jhelum and Chenab rivers.
  - Blockade of water bodies emanating from these rivers can seriously threaten the viability of our defence.

- Similarly, in case of deliberate or unintentional malfunction / collapse of any hydraulic structure can result in massive disaster for our localities thereby threatening our very existence.

Water Issues with Afghanistan

The Kabul river basin covers areas of Pakistan and Afghanistan. It has been divided into 5 main regions. It originates from the Konar hydrologic region on the Pakistan side, it subsequently enters Afghanistan part of the Konar hydrological region and then again enters into Pakistan at Attock.[21] This arrangement provides Pakistan with a unique status i.e. both upper as well as lower riparian.

Pakistan's Concerns

- Owing to the peculiar security situation, issues over Durand Line and political instability of Afghanistan, the process of sharing waters from Kabul river has never been formalized. Non-availability of any such treaty is against national interest of Pakistan.
- A rapid decline in the availability of water from Kabul River has been witnessed in last few years. This has serious implications for agricultural and economic activities of the dependent regions. This has direct impact on Pakistan's economy.
- **Indian Involvement in Afghanistan's Water Resources:** The Afghan government, with the support of India is constructing 12 water projects (with max capacity 4.7 MAF) on Kabul river. This situation is likely to have adverse impact on Pakistan being a lower riparian. Traditional lack of interest on the part of Afghan government towards signing a treaty, once seen in the backdrop of current developments, can have disastrous effects on Pakistan's security.

Linkages of Water with Security

Owing to ever increasing global water scarcity, a fierce competition for control over sources of water has been in its full swing. Following points may provide some critical insight into the issue in Pakistan's context:-

- Fresh water forms only 2.8% of global water resources. This dwindling resource is getting scarce due to an ongoing rise in global population. Since water security directly impacts human security, it is a potential source of conflict.
- Researchers like Peter H. Gleick, have carried out analysis of water related disputes dating back to 3000 BC[22] and state that water issues can result in conflict between the states even if they have entered into formal agreements on the subject (Indo Pak Scenario).
- Categories of conflict arising due to (or involving) water resources are discussed below:-[23]
  - **Control of Water Resources (State and Non-State Actors)**: These occur once access to water is root cause of the problem.
  - **Political Tool (State and Non-State Actors):** These occur where water resources are used by a country for political goals.

- **Development Disputes**: These occur where development of new reservoirs is a source of internal / external disputes.
- **Military Tool (State Actors)**: These occur where water resources are used (likely to be used) by a country, as a weapon.

The types of conflicts mentioned above, once seen in the context of Pakistan's water issues with its neighbors and provinces are fully relevant and have the potential of transforming into armed conflicts.

Way Forward – National Level Actions

Need for Immediate Implementation of National Water Policy

All stake holders in Pakistan i.e. Provinces as well as Federal Government, needs to implement newly approved National Water Policy. Recent measures like decision by the Federal Government and Honorable Supreme of Pakistan to undertake fundraising for much- needed construction of Diamer – Bhasha and Mohmand Dam, has witnessed support from all segments of the society, both in the country and abroad. Similarly, proposals like establishing a mechanism to seek investments for construction of these dams through Public – Private Partnership basis may also be given due consideration to expedite the long awaited process.

Promoting Inter-Provincial Water Cooperation

In view of numerous challenges posed to our national cohesion, Inter provincial harmony on the distribution of water resources is extremely important at point in time. Few of the recommended steps are appended below:-

- **Establishment of an Effective Conflict Resolution Mechanism:** An effective, independent and empowered "**Conflict Resolution Framework**" over the water disputes be established at "IRSA" level with equal representation of all provinces. It should have another organ "**Technical Council**" comprising of top national experts in the field to resolve conflicting issues.
- **Consensus on Development of New Water Storage Reservoirs:** Construction of new water reservoirs and expedition of ongoing projects be undertaken at top priority. However, all this be done while taking all provinces into confidence. An effort be made to restart an "objective" debate over construction of Kalabagh dam at national level involving legislative assemblies, intelligentsia, media and all stakeholders to find out the solution to the problem. The option of hiring an international team of specialists for carrying out an impartial analysis of the process may also be considered.
- **Strengthening and Empowering of IRSA:** Although IRSA has effectively played the role of a Confidence Building Measure (CBM) in distribution and management of water resources amongst the provinces, however, its role in terms of conflict resolution has been below par. The reason behind it lies with dominance of bigger provinces in Council of Common Interest (CCI) which is the sole authority for deciding such issues. It is suggested that a Third Party (preferably International) be hired for a comprehensive analysis of IRSA's role.

- **Establishment of a Well Defined Legal Framework:** Legal cover to most of the water rights, allocation of resources, distribution, pricing and conservation at provincial level is inadequate. There is a need to integrate more than 24 different kinds of provincial legislations into a comprehensive document. This effort will help in clearly defining water rights of each province duly supported by adequate legal cover based on the ground realities.
- **Monitoring and Evaluation of Water Usage:** Use of technology like GIS and Telemetry system can help identify the areas where water is being used excessively or being misused. Similarly, quantum of water in/outflows, if monitored by a third party can reduce the trust deficit amongst the provinces.
- **Allowing Provinces to Market Excess Water:** A provision be added in Water Accord of 1991, wherein the provinces may be allowed to sell their extra water. This initiative is likely to have a double advantage i.e. on one side it will encourage provinces to conserve water and on the other hand they will earn extra revenue as a result of this conservation.

Population Management as a Means of Managing Water

As discussed earlier, per capita water availability in Pakistan is decreasing with ever increasing population. As per Official statistics of Census 2017, Pakistan's population has jumped to 207million.[24] Efforts to control the population growth rate should be enhanced in order to manage the availability of water resources for the current and future generations of Pakistan.

Efficient Supply Side Water Management

The concept of supply side water management deals with the processes involved with creation of new and restoration/upkeep of existing water projects. Suggested actions in this regards are appended below:-

- **Rainwater Harvesting:** Pakistan utilizes only 20% of the rainwater which is its primary water source. Advanced countries use up to 98% of the rainwater for different purposes. Efforts should be made Government level to invest in this great venture for ensuring availability of requisite amount of water.
- **Re-Use of Waste Water:** As of now, Pakistan is reusing only 1% of sewage/industrial waste water after treatment. Strict enforcement mechanisms on the industries should be put in place by the governments to ensure installation of treatment plants can contribute in both ways i.e. recycling of water thus increasing its availability for usage.
- **Mechanism to Manage Number of Tube Wells:** Installation of massive number of tube wells, especially in Punjab, has adversely affected the groundwater availability. The government needs to strictly regulate the installation of tube wells by analyzing the user requirements as well as groundwater availability in that area.

Regulating the Demand Side Water Management

This concept entails mostly regulating actions are user end. These actions are far more economical and less time consuming than the "Supply Side" options. Few of the examples are appended below:-

- **Linking Research and Development in Technology with Water Management:** Steps in this regards are appended below:-
  - A department be added under IRSA which should be equipped with requisite technology to share important data pertaining to weather forecasting, appropriate cropping patterns, and other related information.
  - Crops requiring lesser water may replace high water consuming crops.
  - Mobile applications should be developed by local universities to deliver information to agriculturalists regarding what to plant, timings, quantities and suitable markets for its sale.
- **A System of Financial Incentives / Penalties:** A framework be evolved at the Federal level (under IRSA) entailing systematic pattern of financial incentives as well as penalties for water usage. Details are appended below:-
  - **Incentives**
    - Agriculture sector can get subsidies on LASER land levelling, installation of drip irrigation and improving field/farm infrastructure aimed at water conservation.
    - Domestic users may get subsides on using new water efficient fittings in household usage like washrooms, kitchens and replacing leaking pipes etc.
    - Industrial sector can be given payback options in case a substantial reduction in water usage is observed. Incentives may increase if their treatment plants are working efficiently.
    - Education institutes be given specific areas for running awareness campaigns about water conservation. They may be given special incentives / grants in case of reduction in water usage in their respective area.
  - **Penalties**
    - Agriculture sector may receive financial penalties for excessive / misuse or wastage of water of canals or tube wells.
    - Domestic users can be imposed penalties on wasting water in the form of leakages excessive usage for floor washing, gardening.
    - Industrial sectors be imposed penalties for wastage / excessive usage of water and non-treatment of wasted water.

Recommendations on Regional Issues

Constructive Multi-Track Water Diplomacy

Aggressive and extensive diplomatic moves need to be executed to inform international community about the severity of the water challenges confronted by

Pakistan and their impact on our survival. This region may not be considered as nuclear flash point but a potential conflict on Water cannot be ruled out. If successful, this step will be very beneficial in bringing India on negotiating terms.

Revisiting the Indus Water Treaty (IWT) with India

Time has come for revisiting IWT due to the frequent rise of queries for which treaty has no explanation. Negotiations on IWT should be delinked from all other bilateral disputes where both sides show a sign of statesmanship. Few of the anomalies in IWT which need revisiting are as under:-

- IWT was based on the flows of 1960's where water availability and demand was not that critical issue as it has become nowadays.
- Global warming is likely to accelerate glacier melt and the treaty does not cater for the disposal of this additional water.
- Due to low electricity tariffs, extensive installation of Tube wells in Indian Punjab is draining Pakistan's underwater aquifer.
- As per International River laws, a specific amount of water to maintain environmental flows is mandatory, which is not being followed by India.

Initiation of Bilateral Confidence Building Measures (CBMs)

There are a number of steps which both countries can take to improve the overall water situation in the region. Few of these CBMs are given below:-

- **Real Time Data Sharing:** A real time monitoring system based on Satellite Imaging and Geographical Imaging System (GIS) be installed at requisite locations. Installation and Monitoring by third party can also be considered.
- **Timely and Accurate Information Regarding Indian Projects:** Delayed and often inaccurate information on the construction of Indian hydropower projects on western rivers is one of the biggest source of mistrust between both the countries. In order to address the issue India may resort to sharing timely and accurate information about the proposed projects to address Pakistan's apprehensions.
- **Protection of Glaciers:** Effects of Climate Change aggravated by human activities are rapid melting in these great sources of ice. Any significant damage to these glaciers will result in an existential threat for both the neighbours. It is, therefore, important for both the neighbours to declare all glaciers (especially Siachin) as demilitarized zones to prevent them from further damage.

Water Treaty with Afghanistan

Pakistan does not have any water sharing agreement with Afghanistan. It is recommended that the government should ink a Water Agreement with Afghanistan. Any delay in the process will deprive Pakistan with its precious water due to ongoing power projects in Afghanistan with the help of India.

Conclusion

Linkages of water with security are historically and empirically established. Pakistan being a lower riparian state of Indus River Basin, has been a sufferer of riparian exploitation by India. With each passing day, water requirements of Pakistan are increasing due to huge dependence on agriculture, rapidly growing population and rising urbanization. The situation with Afghanistan has also been strained due to gradual decline in River Kabul's water to Pakistan. A holistic approach entailing measures at domestic as well as regional level is necessary to ensure economic viability and security of Pakistan.

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