Challenges of Lower Indus Basin - Indus Delta

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Abstract

The Indus Basin (IB) comprises seven major rivers, namely: Indus, Kabul, Jhelum, Chenab, Ravi, Sutlej and Bias. Due to upstream storages and diversion activities in the Upper Indus Basin (UIB), there has been a steady decline in the water outflow to the Lower Indus Basin (LIB), the Indus delta, and the Arabian Sea. This has created a huge water shortage problem in the LIB, resulting in devastating economic and ecological losses, coupled with socio-political problems for the people of LIB. This paper briefly focuses on LIB challenges of IB and Indus Delta, including the impact of climate change caused by global, regional and national phenomena. In conclusion, the key recommendations submitted are: to conserve, preserve and develop water resources along with developing a Water Charter agreed by all stake holders. This will strengthen Pakistan, based on coordinated actions as well as lay a sound basis for a Knowledge Society that can respond to natural and human challenges faced by ~ 229 million population.

Key words: Lower Indus Basin, Indus Delta, Water shortage, Water distribution challenges

1. Introduction

The Lower Indus Basin (LIB) has not received the attention it deserves and its impact on a large population of the Indus Basin (IB) is severely affected by climate change. The mighty Indus flows from the mountains of southwestern Tibet through Ladakh to Pakistan and drains into the Arabian Sea. The journey of over 3,000 km of the Indus River provides millions of people the natural gift of water to sustain human life as well as to other living beings, including other living species and plants within the ecosystem. IB is shared between Pakistan ~ 47%, India 39%, China 8%, Afghanistan 6%. In 1960, the World Bank (WB) facilitated the division of Indus water between Pakistan and India by inking the Indus Water Treaty (IWT), which has survived wars between the two countries. The treaty needs review to incorporate ground water and environmental considerations, especially due to climate change, as well as incorporate mechanisms for fast actions for

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dispute resolution. Subsequently, a Water Apportionment Accord (WAA) was signed in 1991 between our four provinces, Balochistan, Khyber Pakhtunkhwa (KP), Punjab, and Sindh, for distribution of the Indus water; which too requires updating.

Indus Basin is identified as Upper Indus Basin (UIB) in the mountain ranges, and Lower Indus Basin (LIB) in the plains of Pakistan north of the Arabian Sea. In Pakistan, the Indus flows from mountainous Gilgit Baltistan, through Khyber Pakhtunkhwa and Punjab to Sindh. In Sindh, LIB culminates in the Thatta district where it descends into the Arabian Sea alongside its delta.

The Indus Delta hosts the largest arid mangrove forest in the world and is home to many birds and fishes, including the Indus Dolphins. It is adjoining the mega city of Karachi with ~22 million population with 2 major ports - Karachi and Bin Qasim, home to the bulk of industries since the inception of Pakistan in 1947, and the commercial hub since the colonial British period, current Overseas Investors Chamber of Commerce and Industries was known as Karachi Chamber of Commerce and banking hub of the country where almost all banks are headquartered. Due to upstream storages and diversion activities in the upper basin, there has been a steady decline in the water outflow to the lower basin, the Indus delta, and the Arabian Sea. This creates a huge water shortage problem in the lower basin, resulting in devastating economic, social, and ecological losses. National Aeronautics and Space Administration (NASA) of the United States of America (USA) and a panel of other USA governmental agencies project that the rise in ocean height in the next 30 years could equal the total rise seen over the past 100 years, with sea level to rise by 30 cm by 2050. This can impact the rich biodiversity of the delta, requiring urgent actions to save the 1000 km coastline, with ~250 km in Sindh and ~750 km in Balochistan where the large and strategic Gwadar port is being developed.

Despite many strengths of Pakistan, like 1960 IWT with India and 1991 WAA between the four provinces; several ace institutions like Pakistan Water & Power Development Authority (WAPDA), Indus River System Authority (IRSA), Pakistan Meteorological Department (PMD), Pakistan Space and Upper Atmosphere Research Commission (SUPARCO), Pakistan Council of Scientific and Industrial Research (PCSIR), Pakistan Council of Research in Water Resources (PCRWR), Global Change Impact Studies Centre (GCISC), US-Pakistan Center for Advanced Studies in Water at Jamshoro (USPCAS-W) and many Agricultural and Engineering Universities; National Institute of Oceanography (NIO); global and regional institutions working in Pakistan, such

as: International Union for Conservation of Nature (IUCN), World Wildlife Fund (WWF), International Water Management Institute (IWMI), International Centre for Integrated Mountain Development (ICIMOD); many recognized scientists and distinguished water experts; hundreds of ongoing water projects; the challenges both natural and man-made remain to the detriment of the people of Pakistan.

The contents of this chapter were presented earlier at the Indus Water Webinar Series organized by the National Centre of Excellence in Geology, University of Peshawar. However, later unprecedented monsoon rains and floods came in, thus they are briefly mentioned here. The disastrous impact of devastating floods of monsoon caused the displacement of over 33 million people, ~ 1200 deaths, thousands of injuries to people, inundated agricultural lands resulting in washing away of standing crops, drowning of thousands of livestock, destruction of millions of *kat ha* poor homes as well as private and government buildings, and so on. The quantum of damage estimated so far at the beginning of September 2022, is US$ 10 billion.

2. Challenges and Recommendations

Challenges and recommendations are many due to the complexity of water distribution and compounded by climate change. Here are the key recommendations:

1. Pakistan is among the ten worst climate-affected countries globally which, during the last 10 years. has added just one percent of emissions as compared to the rest of the world impacting global warming. It faces issues of climate change and global warming but does not engage much in rain harvesting.
2. Implementation of the April 2018 National Water Policy needs to be strengthened by improved coordination between the provinces. Timely updating of water policy is required to meet the emerging realities and situations. Given climate change, updating the Policy is mandatory since a static situation will mean the loss of emerging opportunities;
3. A uniform institutional mechanism is very much needed. If a Water Commission is in place in KP and Punjab, the Sindh and Balochistan provinces must follow suit by establishing their Water Commissions which must be done with the highest priority due to recent rains and floods causing monumental losses.
4. The convergence of science, engineering, and technology needs to be recognized to update the policies. This must be coupled with appropriate funding allocation.

5. Projects must be well coordinated between various stakeholders to avoid duplication for reduced funding requirements with increased yields for fast execution. The delay in implementing the agreed national projects costs the country heavily, not only in terms of its direct benefits related to water and energy but tremendously in indirect benefits. One major project, the Diamer-Basha Dam, which was unanimously recommended by the Parliamentary Committee on Water Resources and adopted by the Senate in 2004, is moving at a snail's pace. We can well imagine the non-availability of hydel - the cheapest source of much-needed energy, lack of necessary water storage, escalating costs in raising structures then and now, adverse impact on life under water shortage, and the loss of economic opportunities for the people of Pakistan. (*Reference: PCWR, Diamer-Basha Dam Report)*
6. Quality of water needs a close watch due to the chemical discharge of industrial, agricultural and human wastes into the water. Industries and municipalities that are discharging their chemicals and effluence in public water systems as well as rivers and sea should remember SDG Goal 14 to avoid any negative impact on "Life below Water" to save marine life, fishing business and adverse impact on commercial and defense vessels. (*Reference: Senate Defence Committee Report)*
7. The country faces challenges in water resource management, clean energy for sustainable development and efficient food production. Climate change brings in an additional challenge, triggering floods including glacial lake outburst floods (GLOF), and sea-level rise with their disastrous impact on people.
8. Water is central to the Water-Food-Energy Nexus due to 95% of water usage in Pakistan by the agriculture sector which provides food to people. Therefore, an in-depth understanding of this Nexus is needed, which requires simultaneous focus on each of the three Nexus elements. However, all the efforts will succeed only if the population growth is controlled.
9. In 1947 Pakistan was born with West and East Pakistan. Later, in 1971, East Pakistan became an independent country named Bangladesh, while West Pakistan continued as Pakistan - where the Indus flows. The population of western Pakistan in 1947 was ~34 million which increased to ~58 million in 1971, and was ~142 million at the end of the century, and now stands at ~ 229 million. Pakistan is categorized as being close to water scarcity level with per capita availability of less than 1,000 cubic meters. This demands close watch on population management by putting an end to foreign inward migration as well as educating citizens on controlling family size for not

only food and energy supply, especially now with global and national stress times, but to also contain expenses for provisioning of housing, medical and other civic facilities.

10. Migration from the Indus Delta has taken place due to resource degradation with large exodus of people. Hundreds of thousands have been displaced and hundreds of villages have been depopulated. Therefore, actions on mitigation of climate impact and adaptation shall greatly help meet the climate migration challenge.
11. The economy of the delta consists of agriculture and fishing. In the delta region, rice, oil seed crops and fruits, such as coconut, banana, and papaya, are grown. Mangrove-dependent fish, shrimp and mud crabs are sources of export earnings. The delta also used to have large pastures for livestock grazing. It is common knowledge that the lack of proper pricing and taxation is at the heart of the water economy's dysfunction. But for water pricing to work, a proper system of measurement across the irrigation system down to the farm is required. Pakistan cabinet in 2002, on the recommendation of the writer, decided that a telemetry system be installed for the purpose. *(Reference: Senate Defence Committee Report on Telemetry).* Aggressive attention by the government and parliament is urgently called to oversee the currently installed Telemetry System at all points of water distribution in UIB and LIB of the country and ensure information from India in its UIB points. This will also ensure the successful implementation of IWT.
12. Lastly, water losses and leakages can be addressed with a focus on the 5 I's related to water - Inventory, Institutions, Infrastructure, Information and Investment. The Inventory of our estimated 7,250 glaciers; rivers mainly Indus, Kabul and Jhelum; storages like Tarbela and Mangla dams; canals and tributaries and losses in transmission of water must be kept under radar for the water management. The institutions relating to water, mentioned earlier where research is carried and water subjects are taught, need necessary investment. The infrastructure of water, which includes the Indus Basin Irrigation System - the largest contiguous irrigation system in the world with dams, barrages and canals, installation of telemetry needs total review and upgrade to transmit water without currently unacceptable losses and leakages, which is a subject of separate discussion. Information on databases and access by citizens is a legal right and governments need to respond to all citizens' requests for water data, especially to media for their better reporting in editorials and news analysis. Adequate investment is

needed in all the above areas, especially in human resource development and research.

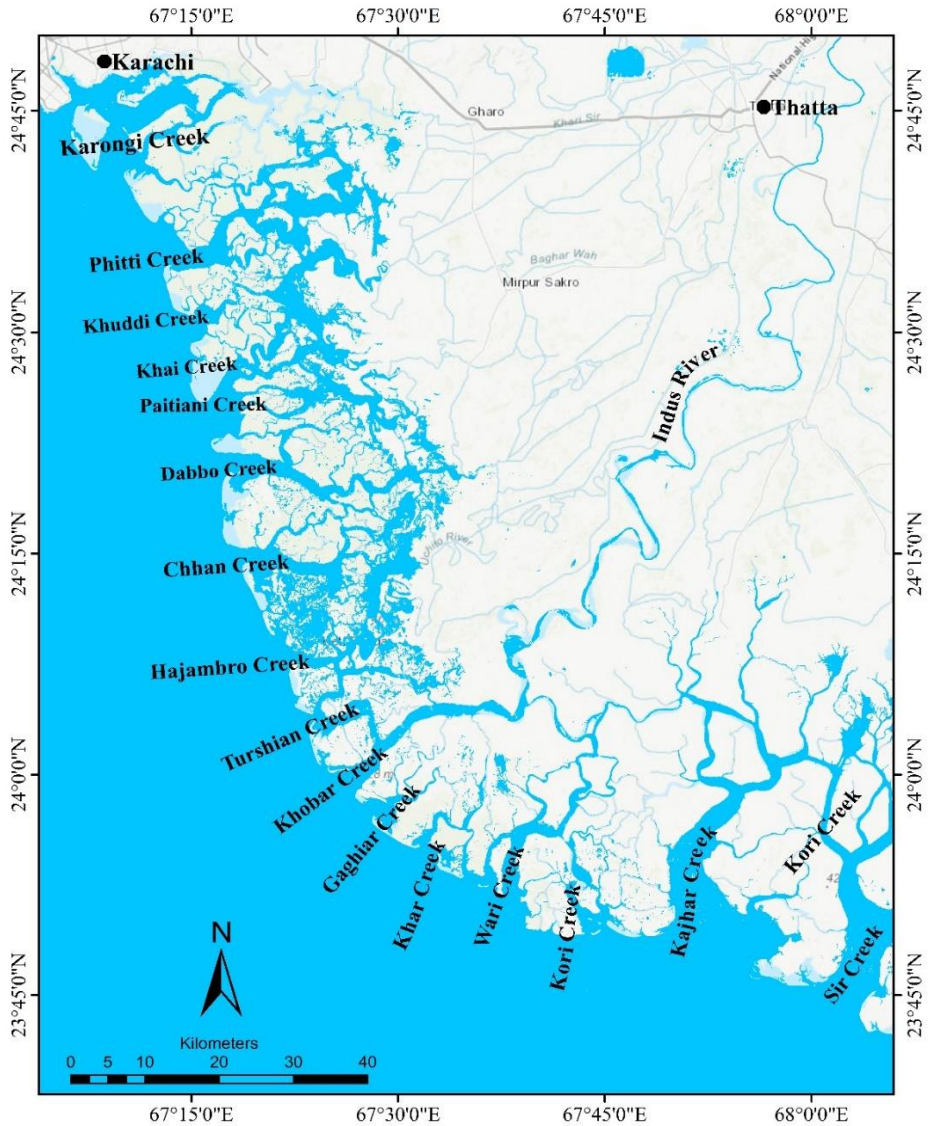

Figure 1. Indus delta and creeks.

3. Conclusions and Way Forward

Pakistan can be saved and strengthened by conserving, preserving and developing water resources. I believe like many that Pakistan does not have a problem with water; but that of management and governance of water; it does not need any policies in addition to the current policies, but what we need is the execution of all

these policies; it does not need any more water laws, but implementation of the existing laws; it does not need any new water goals as we were amongst the first countries to sign the global Sustainable Development Goals (SDGs); but what we need is to walk the talk. I suggest that all stakeholders unite to agree on a Water Charter as part of the Economy Charter and take coordinated actions that will not only address the challenges but also lay a sound basis to build a Knowledge Society with coordinated planning, merit-based execution and regular monitoring of our scarce water. Indus upstream and downstream are interconnected and intertwined, as such a holistic view of water and its environment must be undertaken to create awareness and programs.

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