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From Himalayas to the Arabsian Sea: Discovering River Indus as a Living Entity in Pakistan

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Abstract

The Indus valley constitutes a cultural and argicultural artery of Pakistan. The Indus River is becoming increasingly unpredictable due to extreme climatic conditions, conflict over water and river water mismanagement, including intensified monsoon rainfall, accelerated glacial metling and variations in Hamalayan snowfall, largely associated wth global warming. These interacting process appear to be amplifiying environmental instability and flood risks thereby threatening the lives of thousands of river-dependent communities. An in depth analysis explores the river system from its origin - tracing historical developments, exmines the impacts of climate change and regional conflict on this water system. The Indus River Basin is significant as it provides livelihood of farmers, fishers and cattle herders to Two major provinces of Punjab and Sindh. Through a post-modernist perspective, this paper conceptualise the Indus River as a *Living Entity*. This paper reconceptualize the River Indus as a living system and suggests that incorporating communitty-based knoweldge and engagement into river governance may contrbute to the development of more responsive and sustainable climate-adaptive governmental policies.

Key Words: Indus River, Pakistan, Decolonizing, Conflicts, Climate Change.

Introduction

The Indus River Basin is an artery of Pakistan, apart from being the main river basin system, it possesses cultural, economic and social significance, connecting a large section of the population. The water of the river Indus is a major life source for 80% population of Pakistan. These people have resided in their particular homes and communities for generations along the river banks. People are linked to the river not only for drinking water, that is used to attain livelihood and basic sustenance. Each population associates with this river as a major source of inspiration, to continue their lives watching the waters rise and fall in each season. The Indus basin is significant because it provides a perennial link of the Pakistani population whom after partition of the subcontinent accepted this land to be theirs by tracing ancient linages and cultural ties. Hence, cultural and social significance of the river Indus can be found in the feelings of belongingness that people associate to the river and these lands. These people have lived their lives along this ancient entity for millennia

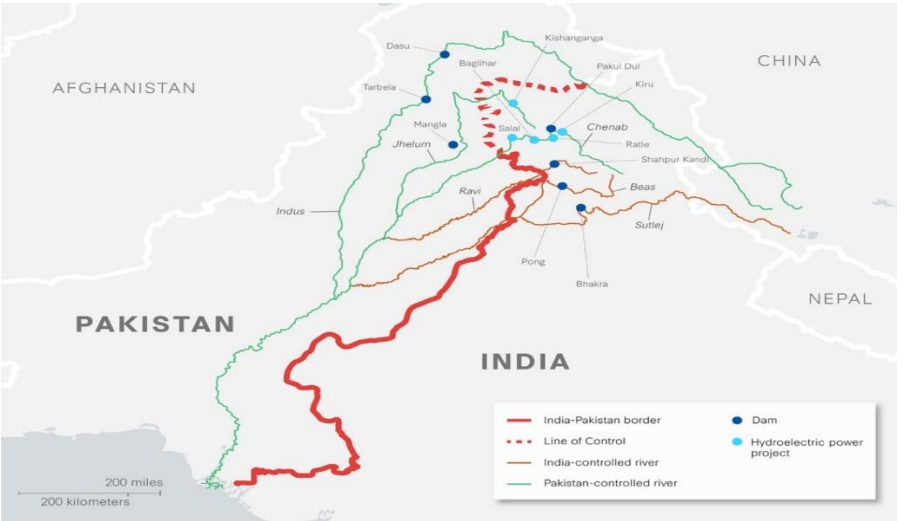
shaping and reshaping the communities surrounding it. Making the river Indus a wise old entity that flows as the heart of the nation.

The Indus River basin is not just a hydrological system but a deelpy embedded cultural, social, economic and politicial entity in Pakistan. The rivers mismanagement and overuse of water especially of groundwater, amid rising climate change stress, population pressure and outdated governance methods has pushed Pakistan to the brink of a water crisis. Addressing this challenge requires shifting from rigid modernist water governance to a more inclusive adaptive and relational framework that calls for a co-evolutionary and participatory understanding of human water relationships.

A) Rivers as Living Entities

Advocacy for recognizing rivers as living entities has increased, movements such as Rights of Nature work to granting ecosystems, natural entities and species inherent rights like human rights. This aim of this movement is to shift from the anthropocentric views to eco-centric approach, positioning nature as a legal subject New Zealand was the first country in 2017 to grant Whanganui River a legal personality. It recognized the river as an indivisible and living whole, forwarding the Maori Tribes concept *'iwi'* that symbolizing the relationship of man with nature. The court appointed a legal guardian to represent the river, this case set the precedent to recognize natural entities as legal persons (Bosselmann and Williams, 2025). Additionally, Australia recognizes rivers as ancestral person, in research published in Melbourne University, the researchers emphasize that Nature is a complex tapestry of ancestral relations interlinked among human and non-human world (Pelizzon, O'Donnell, & Poelina, 2021). In South Asia, Bangladesh's Supreme Court in 2019, granted legal personhood to all its rivers, including the Turag River. This provided rights to the rivers to be protected, preserved and resorted to ensure environmental safety standards. The court also assigned National River Commission (NRCC) as the rivers' legal guardian. Similarly, India also recognized the Ganges and Yumna rivers and their glaciers, as legal persons, along with the rights to be represented in legal proceedings. This also ensures protection from pollution and encroachments along the riverbanks (Islam 2020; Tuli and Siddiki, 2024). Additionally, this also highlights the cultural, social, economic and religious significance of these rivers who are not only a sources water and resources but are in fact co-inhabitants among communities. These decisions are monumental for the Rights of Nature movement, though some scholars debate the effectiveness of these decisions in the absence of legal frameworks to ensure practical applicability that saves rivers from extinction, pollution and climate change, emphasizing the right of flow (O'Donnell, 2021). Climate change acts as a threat multiplier highlighting existing water insecurities and geopolitical issues. This intersection of climate change, regional rivalry and hydropoltics represents a critical nexux in international relations. The IWT has long served as a diplomatic anchor between India and Pakistan. Researchers have used the context of securitiexation to describe this case, hydro-hegemony frmaework and environmental geopolitics. The constant availability of water is necessary for people and threat of cut off of this water by states like India, is considered as weaponsization of water. (Naseer, Ghalib and Khan, 2025).

Map 1: *Shows the River Indus Basin*



Source: https://www.csis.org/analysis/can-india-cut-pakistans-indus-river-lifeline

B) Hydrological significance of Indus River Basin

The Indus River and its groundwater resources are critical to Pakistan's water supply, but unsustainable extraction practices are pushing the country towards a severe water crisis with far reaching consequences for agriculture, the economy and food security. An assessment reveals that across the continent including Afghanistan, China, India and Pakistan the river Indus remains a major source of water. This area accounts for Pakistan's 96% of the country's total renewable water resources (Lytton, Ali, Garthwaite, Punthakey, & Saeed, 2021). Pakistan heavily relies on the Indus River as a single water source. According to an estimate the state of Pakistan is the 4th largest groundwater user in the world. India, United States and China precede Pakistan on the scale of water usage. Neighboring India draws 244.92 billion Cubic meters of water, using more groundwater than China and USA combined (Jovial, 2022). Estimates for Pakistan are not clear, but this rate of pumping groundwater is unsustainable, being at 4th place Pakistan is straining her groundwater resources with over use. The depletion of groundwater resources in Pakistan will critically affect the agricultural sector that is a back bone of the economy. Major crops such as wheat, rice, sugarcane and cotton are water thirsty plants farmers need water in huge supplies for a full harvest. These crops also fuel the economy of the state as sugar mills, rice huskers and textile industry also depend on the harvest of the crops in the country. Additionally, such a situation will result into a food shortage aggravating food insecurity in the country. Groundwater is used for 90% of domestic water in rural areas in Pakistan, from which 50% goes into agricultural use and the rest for domestic use. According to a World Bank report, "Pakistan is on the brink of a lengthy and severe groundwater crisis", since 2020. More than 70% of the drinking water in Pakistan comes from groundwater. Majority households have handpumps, motorized pumps or manually taking water from wells (World Bank, 2021).

Currently, several problems are at play, these include

a) Population growth

b) Demographic changes

c) Climate change.

This is grouped along with major outstanding issues with regards to the usage of surface water under the provisions of the Indus Water Treaty (1960) and the pumping of groundwater for domestic and industrial use in Pakistan. The combination of these challenges has made matters worse, exacerbated by slow policy responses and limited financial resources, inadequate planning and management has pushed Pakistan towards becoming a water scarce country.

Methodology and Research Design:

The study employs a postmodernist theoretical framework to conceptualize rivers especially the Indus as dynamic living entities rather than passive natural resources. Methodologically the research adopts a content analysis approach incorporating both primary and secondary data sources. The first objective is to critically examine the epistemological foundations of rivers, related knowledge systems with review to enhancing our understanding of river flows within their broader social cultural and ecological context. Secondly, the study investigates the multifaceted impacts of climate change on the industrial river which remains a critical source of livelihood for agrarian communities including farmers, fisherfolk and pastoralists across its basin. The research further identifies and analyzes the systematic challenges confronting the state of Pakistan in its efforts to formulate sustainable long term policy responses to acute water scarcity encompassing both surface and groundwater resources. A tabular description of the research design is providing in Table 1 below.

Table 1: *Describing the Research Design of the Study*

Research Design	Objectives	Evidence	Analysis
Theoretical Foundation	To decontsruct the Hydaulic mission and modernist water paradigm.	Scholarly literatire on the Hydrosocial Cycle and Postmodernism	Postmodernist Dialectical Approach.
Policy and Legal Concent Analysis	The evalute the evolution of Water Governance from the colonial to Contemporary crisis.	National Water Policy (2018) National Water Policy (2018)), Indus Water Treaty (1960) and Provincial Acts (2005- 2020)	Qualitative Content Analysis.
Socio-Cultural Synthesis	To document the river as a living entity through community and indigenous lens.	Folklore (Sohni Mahiwal), Local poetry and Ethnogrpahic reports on riverine communities and people.	Community engagement modeling to decolonise.
Comparative Jurisprudence	To bechmarkthe rights of nature against international legal personhood precedents.	Legal Cases from New Zealand, Bangladesh and India.	Legal Analysis.
Risk Assesment	To quantify the climate change and ground water delpetion.	World Bank reports, PCRWR data and Climate related statistics.	Climate Impact Assessment.

Source: ***Complied by the author.***

Theoretical Perspective to Understanding Water Useage

Modernism emerged in response to enlightenment in the 19th century, changing the relationship of Humans and Nature. By the mid 19th century, the urban sector emerged largely in response to excessive industrialization due to the industrial revolution. During the early century, the population grew at an exponential rate, with increased pressure on cities and urban areas as people shifted away from rural agricultural professions to become the urban industrial labor force. This led to a crowded urban sector, populated cities functioning with non–existent governing institutions and rising demands for basic needs such as water for household and insutral use. People managed their water needs individually with temporary solutions and limited availability. City-people used local wells, rainwater, tanks,

streams or rivers to meet their water needs. Wastewater was disposed of in backyards, cesspools and streets, a common feature in residentials or industrial areas in that time. However, the early 19th century was different from the mid 19th century in many ways, the modern cities engaged in the 'hydraulic mission'. Water supply became a prerequisite for public health, food, security, economic growth and general progress meeting domestic and industrial needs. The water availability and usage increased and changed respectively as cities improved infrastructure. This rapidly changing urban and industrial environment began in the western states but it quickly caught on to the colonial states as well (Franco- torres, 2021). Hence this wave of change was experienced by all states as the ripple effect of modernization. The ruling elites adopted a life style that the ruled masses also envisioned.

a) The Modernist Hydro-Social Contract

Modernist thought in the 20th century saw water as quantifiable, ahistorial entity, something that can be measured and controlled for human benefit. In their paper, 'The Hydrosocial Cycle: Defining and Mobilizing a relational-dialectial approach to Water', the authors emphasize that the water cycle diagram is devoid of people, reflecting a modernist perspective (Jamie and Budds, 2011). The hydro-modernist project in Australia where large scale irrigation and hydroclic projects where seen as tools of nation building and transforming the environment. Daniel (2024), research cites the issues of salinization that show that human do not have ful control over nature. Jamie and Budds (2011) also advocate for the 'resocializations of water' through the concept of the hydrosocial cycle, it reintroduces the social elements like power and politics in water management and distribution.

The Hobbesian "hydro-social contract" is based on a governance model that creates a social contract among the state, people and water. This hydro-social contract is explained by Franco- Torress (2021) as the authors quote Tortun and Mesimer (2002), this social contract empowers a central authority to control and provide for a basic commodity that is water. A commodity that became a necessity in each and every social that emerged. According to Hobbes's doctrine citizens renounce their rights and empower that central authority to the paternalist government. Similarly, the modern water paradigm, the provision of water to the people is the responsibility of their government. Making the government accountable for the basic commodity. The authority that was empowered by the people ended up practicing racial discrimination, caste privileges and social stratification choosing to whom the water as a basic necessity will be provided and who will be deprived. This became a point of origin for major and small conflict in several communities. The hydro-social contract is a major management and governance mechanism in a democratic or authoritarian set up, through which the needs of the community are provided.

This hydro-social contract though promising and convenient has resulted into injustice among communities, provinces and states. With several communities fighting to the provision of water in quantities that would meet their basic sustenance needs.

b*) Post-Modernist approach on changing needs*

Post Modernism emerged due to a growing social dissatisfaction and feeling of social decay that was experienced in the 1960's – 1970's. During that time several social and political changes were taking place protests against wars, racial, gender,

and class discrimination, general discontent against the government by minority groups. This era brought international issues such as oil crisis, economic recession, environmental crisis and nuclear proliferation. This era experienced AIDS as a major health crisis. Post Modernism highlighted everything modernism masked. Post modernists see conventional notions of truth and reality, highlighting that there is no objective truth. Such thinking rejects objectivity and realism, truth can be found by people themselves not essentially by employing the scientific method and using "Common Sense". Post Modern philosophy has its origin in the works of Michel Foucault (1926-1984) and Jacques Derrida (1930-2004). Their work greatly influenced the humanities, also focusing on art, gender studies and women. The post-modernist approach challenges modernity, the objectives realities and scientific facts it creates space for questions, criticism and most importantly change.

Postmodern is also termed as neo-tribalism. This perspective gives rise to the want of self-sufficiency among communities. These new communities or tribes are different groups of people coming together abased on needs. These are also those communities that are coming together as a result of years of desperation and deceit. The unison of such communities multicultural ethnically associated is due to the changed perspectives on future communities. (Plachciak, 2010; Cook and Bakker, 2012). The changing characters of societies raises several concerns. People are now holding governments constantly accountable for their basic wellbeing and health. The climate change regime acknowledges that the North is responsible for global warming whereas South is suffering the effects of that change. This important link is real and prevalent, we do live in an interconnected world, where our actions in one part of the world is bound to effect people in other parts of the world. "The unhealthiness of our world today is in direct proportion to our inability to see it as a whole" (Plachciak, 2010). Based on perception of the people, the south sees itself behind the global north, the believe that the northern states do not take into account the global south possess rights and duties in the international system. Environmental issues faced by the global south arise due to industrial advancement experienced by the global north. The system is based on an imbalance of natural resource use, this imbalance needs to be addressed and eliminated.

These scholars support the approach that sustainable development is a solution to the problems of modern civilization. It is an umbrella term in which a variety of features and efforts come under. Sterling (2003) and Blewitt (2010) state that, "nature should not be seen as a passive resource". They contend that nature should be seen as a dynamic partner, an equal partner (Gilligan, 2012). Developing and implying a more holistic approach to environment and its sustainability can lead the world into a greener future. The waste of natural resources, excessive environmental pollution, growth of human population, rapid urbanization, unfulfilled basic needs, global destabilization of natural system all of this combined have had a huge effect on the Earth's climate and atmosphere all these are bound to affect human life.

Indus River's British Colonial Legacy and the Implication of Indus Water Treaty 1960

The river Indus acts as an artery of Pakistan with dams, barrages and canals built on the river since the 1900's. The British saw huge potential in this land as they embarked on this project to bring water to the lands of the Sindh and Punjab to grow

cash crops such as indigo, wheat rice and cotton the colonial state dream was the "taming the Indus" has become harder to execute this modernist mind set needs to be abandoned in Pakistan today (Hannies, 2023).

a) British Irrigation Works

Following the modernist framework of the time the British saw potential in the Indus basin region. The British arrival in the subcontinent had far reaching impacts, the colonial masters wanted to reshape the landscape to create a lucrative economic entity. The technological advancement of the West also found its way to the South through colonization. The British brought with them ideas and intentions to the transformation of the irrigation system of the river indus. They wanted to harness the power of the flowing water as did their predecessors. The system of Inundation canals existed before the British arrived in the subcontinent in the 18th and 19th century. The Mughal Empire, The Sikh Raj and the efforts of the Amirs of Sindh and Nawab of Bahawalpur were evident to bring water of the Indus to their lands.

b) Communalism affected by Colonialism

Canal construction was always considered a communal affair. It linked and created more communities. The colonial era changed that trend as the British took control of the subcontinent, they built canals for all seasons and open millions of acres of land for agriculture and settlements. The British understood that canal building, political control and agricultural settlements as a way of establishing authority in the state. The people being divided and weak followed the path Thomas Hobbes had also envisioned, that the people yield their power to the state (Gilmartin, 1994; Gilmartin 2003). Over time the exploitation and changes in the natural path ways of the river has created many issues. The meddling of the path of River Indus has become a major threat today with communities settled on river lands and near river banks. "For many years the water of the Indus did not reach the Arabian sea", the floods of 2010 showed evidently that the current development model of the river Indus is unsustainable (Mustafa, 2022).

Indus Water Treaty 1960 A Source of Cooperation and Conflict

As a result of the Radcliff award the international boundaries of India and Pakistan were drawn. After this division India became the Upper riparian state and Pakistan became a lower riparian state. After partition India suspended all water supply to Pakistan threatening her agriculture and agrarian infrastructure. Pakistan in response approached the international community and eventually after a decade of strained relations and rivalry India and Pakistan sat at the forum of World Bank and signed what became known as the Indus Water Treaty (IWT). World Bank became a mediator in the conflict. Eastern rivers were allocated to India these are Ravi, Sutlej and Bias while Pakistan was allocated Sindh, Chenab and Jhelum (Shahzad, 2016). This treaty is considered a success story catering to vast population and the use of water.This treaty has political and hydrological significance as it also manages relations among India and Pakistan.

Even though Pakistan has the fourth largest groundwater aquifer in the world, one of the largest irrigation systems in the world, the country is still facing a decline in per capita availability of water. Pakistan relies heavily on the river Indus and it's tributaries Jhelum, Chenab, Ravi, Beas and Sutlej for water resources. The rivers of the Indus Basin contribute to over 175 BCM per annum of water resources. With

17Mha cropland irrigated by the Indus basin irrigation system (IBIS) that is largest contagious system in the world i.e., 5700 kilometers long.

The water from the Indus River in governed under the Indus Water Treaty (IWT) hence this water system is subject to various restrictions. It is divided for usage between India and Pakistan. Marred with international political issues, the Indus water treaty (IWT) has become an additional bone of contention between India and Pakistan. The Indian side continues to build dams in violation of a the IWT. India wants to amend the IWT for quicker bilateral disputes resolution. Whereas Pakistan being a lower riparian state highlights the violations due to the design of the KishanGana and Ratle projects being constructed on Jhelum and Chenab respectively. Both sides failed to find an amicable solution (Sheikh 2023; Shahzad, 2016). River indus is a central arterty for the dailylives (Sarwar, 2025) of the people, the 'Living Indus Inititaves', describes this as a river that gives life to the cultures of the land. These cultural lives incldue the folklore like Sohni-Mahiwal, Poestry of Ashu Lal, breathing life into the people (Afia , 2024).

The rivalry of India and Pakistan over IWT needs to be addressed as quickly as possible. Due to extreme climatic conditions faced by South Asia both countries will face similar effects. The (Janjua and Apperley, 2021; Khan, 2025)urgent matter facing Pakistan is the depletion of the groundwater resources. That is also an important and major resource that is shared by India on the side of Punjab. According to Mathur, in the Diplomat, IWT has come under pressure because of climate change. "IWT should be updated to include climate change related data-sharing and divisions of "traceable goods" for the river system". Projections indicate that by 2023 the Indus River basin likely to face a water deficit of 50 Percent. Climate change has also lead to droughts and floods in both countries. Unpredictable floods and increased rainfall have already affected the agricultural output. The decline of water quality will further lead to health risks and reduced biodiversity. The writer suggests that "the IWT should essentially building and strengthening data collection streams and monetary quantification of water resources" (Mathur, 2023).

The IWT solved the water conflict till 1999, when India declared the intention to construct Baglehar Dam on River Chenab disregarding Pakistan's objections to the design as the quantity of water in Chenab would be affected. The judgement by world bank in this case did not prevent the completion of this dam by India. Indian Dam construction is bound to lead to a major water crisis in Pakistan as it decreases the amount of water coming in to the country. This is a basic human rights violation of the Pakistani people. The main issue of the water conflict between Pakistan and India is related to "human right to access water" (Qureshi, 2017). "Water wars" are not likely in the future maybe because they haven't been fought in the past. However, the deterioration of relations among states like India and Pakistan that already have outstanding issues since 1947 with a variety of political, social and strategic conflicts can became a major concern for south asian states (Hannies, 2023).

a) *Surface Water and Groundwater in Pakistan*

This river system due to its vast coverage of area has surface water system that is significant for seepage water that recharges the aquifer by adding other underlying

groundwater system. This acts as a major freshwater reservoir in the country and constitutes a transboundary resource that gets shared by the countries of the Indus basin region. Pakistan started extensive groundwater after pumping first in 1960's along the river Indus. This began as a solution to lower the water table to reduce waterlogging and land salination. By 1960 the Indus Water treaty had also been signed, restricting the use of river water. The process of drilling ground water and expansion of its use has led to unsustainable practices and increased risk of salination. By 2050 per capita available water will go down from 1100 cubic meters water to 90 cubic meters. Increased use by the industrial sector will also stress the water demand. The industrials and domestic demands will likely slip away the water from the industrial sector (Lytton, Ali, Garthwaite, Punthakey, & Saeed, 2021).

b) *Groundwater use in Pakistan*

Groundwater contributes to 60% of the total supplies at the farm gate. However, this resource is deteriorating as groundwater overdraft, salinity and water logging, over use and exploitation have led to depletion. Pakistan Council on research in Water Resources (PCRWR) predicted that by 2025, the country would breach the absolute water – scarcity threshold. The research on Pakistan's water sector, including surface and ground water suggest that Pakistan's water sector faces numerous challenges that are multidimensional, with management and governance issues at the core of the problem (National Water Conservation Strategy for Pakistan 2023-27, 2023). In Pakistan 'Rain Harvesting' is also being adopted, the use of rainwater for recharge is also being adopted in many cities including Islamabad and Karachi.

From 1976 to 2006, groundwater has been used to irrigation from 25.6 to 50.3 MAF. Pakistan has made significant progress in tube well technology such as local drilling machines, cost effective strainers, multi-bore skimming. The private sector has installed tube wells all over the country. If the existing water infrastructure is not improved water will become scarce. By addressing impact of population growth and climate change the burden of water can be shared. Information sharing has become a much-needed mechanism to ensure a sustainable future (Ahmad, 2012).

Indus Valley Civilization and People Today

The Indus Valley Civilization is one of the earliest Urban settlements in the Indian Subcontinent. The Indus Valley region is home to ancient civilizations. There are four such settlements Harappa, Rigveda, Mohenjo-Daro in Pakistan Lothal and Kalibangan. These settlements tell stories of a glorious past of the people of the sub-continent. This civilization of multicultural as they established overseas trade. This civilization introduced a pattern of urban development in the region, they had surplus food production in Indus basin as the soil condition was good for agriculture. Their main yield it has been described from wheat, barley and cotton as their cash crops two granaries were found in Mohenjo-Daro and Harappa. The second feature of this civilization is craftsmanship. Copper was available in Baluchistan and neighboring Rajasthan; they used this metal for industrial and commercial development. Tools of carpentry were also found. There were more than 1400 towns and cities in the Indus Valley region. The biggest were Harappa and Mohenjo-Daro. According to estimates, 80,000 people lived in these cities. This ancient land is considered to be a peaceful one as fewer weapon have been found in excavations (Dani and Thapar, 1996).

a) People living along River Indus

This area is home to 183 million people, that is 87 % of Pakistan's population, this area accounts for 96 % of the country's total renewable water resources (Lytton, Ali, Garthwaite, Punthakey, & Saeed, 2021). Modern day Indus Valley civilization has several notable features, in the upper reaches of the Indus several ethnic and linguistic communities reside, Tibeatan, Ladakhi and Balti people live who have strong linkages to Central Asia. Pastoralism is a local economy. These Indus valley inhabitants speak Indo-European languages from the Kashmiri region onwards including Pashto, Punjabi, Lahnda, Sindhi, Urdu and related dialects. Moreover, the river Indus basin is home to more than 300 million people across Afghanistan, China, India and Pakistan. Folklore is rich with stories of the Indus like Sassi Punu, Soni Mahiwal and Sorath Rai Diyach, famously known as the seven queens of Sindh. Their stories of resilience as heroic women have been carried as tales an folklores over centuries. These women became cultural icons for people. Similarly, women fisherman community pay a significant role in the local economy of the Indus. Men and women have their daily lives and sustenance attached to the river Indus, small village communities have been drying up near the indus. Creating food shortages for the people who live on fishes and small agricultural, without the water from the Indus. Even drinking water has run dry in some areas. This has also led to unemployment. (Hafeez, 2019).

b) Effects of Climate change on the people of the Indus basin

Climate change has an adverse effect on the Indus River system. Erratic events such as drying canals, droughts, floods and excessive rainfalls have resulted into fears of large-scale migration, disruption in agricultural supplies and energy shortages. There are several health risks and reduced biodiversity is involved. Indus basin has the largest natural recharge making is self-sustaining given the right climatic conditions.

The river Indus receives a wide range of industrial water, organic matter and ions such as sodium, potassium, calcium, magnesium, carbonates, bicarbonates and chloride. Thermal plants near the Indus cause sudden increases in the surface water temperature that harm marine life as well. The effects of river pollution on human health are under researched in Pakistan.

Major cities are facing a threatful situation the water table of Lahore is falling at a rate of 30 centimeters per year in the central city, with a rapidly growing urban pollution. Karachi, Hyderabad, Faisalabad is also facing similar situation. Regional climatic conditions have also been deteriorating. The Asian brown cloud is causing glaciers to melt. The fast pace of glaciers melting and extreme warm temperatures may lead to a serious minimization of river flow in some areas and increased flow in extreme weather events. Improved river Indus management will have a direct impact on the health of the people of Pakistan (Pappas, 2011).

Decolonizing Water Via Community Engagement in Pakistan

Our perception towards the use of water has to change. The use of water as an infinite resource has only damaged this basic necessity. The use, conservation and management of water is necessary for every state. Irrespectively of abundance or scarcity. Several scholars are of the opinion that we need to decolonize water.

According to Danial Hannies (2023) and Daanish Mustafa (2022), Pakistan needs to decolonize her approach on water. The waste water management system needs to be improved, better local drainage and nature-based solutions. The approach to water management needs to decolonized and must include a vital link that is the role of community and people's engagement. Re-forestation and improved agricultural parties should also be included in that list. The policy of national-scale adaptation to climate change must be improvised. According to Hannies Pakistan has played a vital role in highlighting the role of rich countries in the climate disaster, emphasizing their debt towards the global south.

According to Climate Change Minister Sherry Rehman, "climate colonialism" has had a huge impact on countries like Pakistan and others in the south that were previously colonized. This stands true for the climate disaster that Pakistan is currently experiencing right now with extreme weather events (Hannies, 2023). The floods of 2022 affected 30-50 million people, they led to the death of more than 1,100 people. These floods were caused not only by the extreme moonsoon events accodring to Daanish Mustafa a professor at the Department of Critical Geography at Kings College London, stipulates that floods ,"are equally a function of infrastructual and engineering choices by certain developmental imagninaries, which are certainly not indigenous to Pakistan". He is also of the opinion at Pakistan beeds to decolonise its water policy, also decolonizing public imgination. The pereception regarding the provision, availblity, use and water management of the public also needs to be changed (Mustafa, 2022)

The people of Sindh also see the river as a living entity. Muhammad Ali Shah Commenting on the threats to livelihood due to the declining waters of the river Indus states that, "I do not consider the Indus River a commodity. It's a living entity like a human being. You cannot chain a river with dams. this is a controlled river which does not reach the end, so it is dying"(Hafeez, 2019).

Consequently, adopting a more holistic approach on climate change the postmodernism approaches offer a perspective that focuses on decentralizing the use of water by the states and people. The decolonizing of water also reveals a similar mindset where people should not see water only as a commodity but a way life, looking at rivers not as a resource but a lining entity. The rivers have a natural path upon which they travel down to the seas. Tampering with these paths will only lead to chaos and plunder as river not at stagnant being they live and breathe. Revealing the entire eco-system that surrounds them is dependent on the life of the river. The river Indus in one such river that has been around for centuries, it lives on in real time. Breathing life into the communities that settle around the river.

a) Strategic approaches to managing Groundwater in Pakistan

Pakistan needs a policy framework and legislation that supports the implementation of institutional reforms. There are several steps that must be taken that include resource management, to learn from the experiences of similar geological systems. There are several countries in the world that have adapted to the growing needs of water that include this list such as Turkey, China, South Africa, and Brazil. Pakistan can learn and instate similar system and frameworks to ensure a better handling and management of water. According to Lytton, Ali, Garthwaite, Punthakey and Saeed in the World Bank report, there have been several recommendations for Pakistan these broadly include institutional reforms, conjunctive management and

waterlogging, managing salinity and depletion, to gather data for integrated basin planning and resource modeling and managing ground water quality. These recommendations also include community engagement. This is a significant aspect one that needs equal attention with the policy framework (Lytton, Ali, Garthwaite, Punthakey, & Saeed, 2021). Keeping in view the various predicaments, several the World Bank reports make suggestions such as to adopt a conjunctive planning and management of surface and groundwater, to ensure sustainable ground water use and improving equity in water access. Both anthropogenic and natural factors need to be considered, that effect the spatial and temporal availability of ground water in the Indus Basin region.

b) Alternative views on Climate change and water scarcity

There are varying views about the correlation between declining water availability in Pakistan and climate change. Scholars like Daanish Mustafa in his research tilted 'Hydropolitics in Pakistan's Indus Basin' 2010, refutes the argument that absolute population growth is responsible for resource scarcity. According to his report publish the United States Institute of Peace, environmental degradation, resource scarcity and recourse security are all socially constructed ideas. The report offers insight that the water problem of South Asia results largely from poor water management, this water mismanagement coupled with international and subnational hydro-politics create major hurdles towards effective policy making. The report declares that there is enough water in the basin to provide for the livelihood of its residents, if managed efficiently then higher availability of water can be achieved (Mustafa, 2010). Such views debate the correlation of Climate change and its effects of water resoucres, but it stands true that better water management can secure this basic commodity for future generations. The need of the time is to adress the crisis not to blame eachother for it.

Water Management in Pakistan the Need for A Collective Approach

Recognizing the need to address the issue of water scarcity in the country, the government of Pakistan has adopted various policies to implement an effective management system. As the debate on water management and use has intensified in Pakistan over the years. Extreme heat waves, droughts and floods have all triggered the debate for a sustainable future. The fact that most people have to buy drinkable and daily use water from the water tank mafia has painted a gruesome picture of the future. Given the attempt to handle the water crisis still lacks effective implementation the government has launched various initiatives under the legistaive framework of the acts mentioned in Table 2.

Table 2: *Desrcing the legislative evolution to handle water management.*

National Acts	Key Features - Groundwater Manageemnt	Ket Features - Undergroudn water Management
KPK Water Act 2020	Established the KWA (Khyber Pakhtunkhwa Water Authority) to manage aquifiers and mandated the mapping of ground water basins.	Indtroduces strict lisencing for tube wells and provide 'water conservations zones' where drilling is restricted.
National Water Policy 2018	Prioritizes the recharge of aquifiers and emphasizes the nexus between water, food and energy secuirty.	Proposes the regulations of groundwater pumping through legal frameworks and the introduction of a water tax Abiana) for extraction.
Punjab Water Policy	Focuses on preventing salt water intrusion into freshwater aquifiers	Madates the regulation of all private tube wells.
KPK Drinking Water Policy 2015	Highlights the need of protection zones around drinking water tube wells to prevent intrusion of pollutants.	Emphasise the installzation of filtrations plants and hand pumps
Punjab Drinking Water Policy 2011	Highlights the ned for protection zones around drinking water.	Sets standards for the depth and design of undergorund water extraction points to ensure safe drinking water.
National Policy 2005	Emphasizes integrated management of water resources and protection of wetlands that recharge the groundwater.	Promotes rainwater harvesting as a method to restore underground water levels.

Source: *Complied by the author by analysis the acts and legilations.*

It is important to highlight that Pakistan is a single basin counrty. Keeping this in view, the latest National Water Policy (2018) suggests that the principles of integrated and unified planning must be empolyed. The policy measures adopted will be in line with the National Climate Change Policy in 2012. This framework will also promote irrigation effiency and rain-fed agriculture. In the same way safe and clean drinking water will also be ensured in urban and rural areas of the country. The government of Pakistan has been focused on bring forward legislation to manage the water crisis in the country. The construction of dams such as Diamer-Bhasha Dam, Dasu and Kalabagh dam have become a major bone of contention among the people and provinces.

The multiplicity of the challanges that include climate change, population growth, demographic change along with outstanding issues such as the transboudry water dispute with India have all contributed to problem of water scarcity in the country. In additon to the state level efforts, the people of the counrty also needs to actively

participate in the process of saving clean water and ensuring availability for all. Large scale public awareness campaigns should be launched to educate people of the use of water. Public gatherings, electroinc media campaigns and print media campaigns should be launched with intentions of highlighting the efficient use of water in the country.

Globally, conservation of water and efficient use of water should be highlighted. The conservation and efficient use of water resources including surface water and groundwater is a matter of concern for all states. Given the urgency of the matter the international community should collectively take steps to ensure a sustainable future for everyone. This has also been highlighted in the Susutainable Developemnt Goals (SDG's) on the agenda are 17 goals. There is Goal 3 - Good Health and Well-being, Goal 6 - Clean Water and Sanitation, Goal 11 – Sustainable Cities and Communities , Goal 13 – Climate Action, Goal 14 – Life below water and the final being Goal 17 - Partnership for the Goals. All these are linked to the provision of water for a sustainable and healthy future. Hence its high time to take a more informed and organized approach to deal with the states dealing with water scarcity in the world.

Conclusion

The scarce availability of surface water and groundwater is becoming a major threat to sustability Pakistan. The Indus Basin River System has a natural recharge system having the ability to store groundwater. This makes the river a unique water resource for Pakistan, as it receives nourishment from the glaciers in Himalayas. This major source of nourishment of the river is highly threatened by the climate change and global wamring, due to reseeding glaciers and excessive melting of ice. Many scholars debate that climate change is not to blame for the unavailability of water in the Indus River Basin. This debate points to one major fact that groundwater resources are in fact depleting in Pakistan as the surface water is vulnerable to climatic conditions. Essentially, Pakistan needs to conserve water resources and to manage both surface and groundwater simultaneously. The reason for this conservation is simple, the constant availability of water for future generations.

The Indus Water Treaty (1960), though constantly threatened by India allows for the flow of eastern rivers of the Indus. However, several issues have created hurdles for the sufficient and smooth flow of water from India towards Pakistan. The challenges to the water resources of Pakistan are manageable only if a multi-dimensional and conjunctive approach is adopted. Large scale diplomatic efforts are need to manage the problem at a state level.

The Indus valley civilization was self-sustaining. Even today, resilient people and strong lands, generations of people are affected by climate change as extreme and adverse conditions challenge people. People cannot be left to deal with chance events due to climatic conditions. The idea of community engagement as envisioned in the postmodernists arguments and decolonizing water are very important. Pakistan needs to engage her communities and people to educate them on water management and use. Talking about a future with efficient and just use of resources will lead to sustainable development.

All states of the world must adopt similar policies and decolonize the way they think of water and see the rivers and streams not as static entities but as dynamic living

entities. Rivers and freshwater resources are become scarce in the whole world. It's better to effectively manage the available water resources and secure a more sustainable future. In this pursuit of SDG's is also there as it allows for the fulfillment of theses global goals that can only be accomplished if people and their states come together.

Conflict of Interest

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