

INCLUSIVE AND SUSTAINABLE DEVELOPMENT PAPERS

Torque Communities

WATER RESOURCES AND WATER MANAGEMENT IN PAKISTAN

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PAPER INFO

Article History:

Received: 25 February 2021

Published: 11 September 2021

Keywords:

Water Security,
Water Resource Management,
Climate Change.

Editor: Twangar Kazmi

ABSTRACT

The rapid growth in consumption of natural resources, especially water, has generated a sense of urgency to improve water conservation policies. Water is crucial for life and every living being. With the rapid increase in population globally, an alarming future confronts the world. Pakistan is facing a water crisis due to mismanaged national policies on water and climate change along with scant best-practices. The agriculture sector is also highly affected due to soil erosion and salinity. Furthermore, unclean drinking water is also responsible for health-related diseases, especially among children and women. Realistically, water is an essential element that plays a crucial role in sustainable development. Climate change is responsible for various problems like water crisis, which not only effects agriculture but also human health, industrial mechanism, and economic growth.

Reference Guide:

Javed, R. (2021), Water Resources and Water Management in Pakistan, Inclusive and Sustainable Development Papers, Torque Communities, 1(1): pp.37-40. Available at: www.torquecommunities.org/publications

INTRODUCTION

It is not unusual to say that water is the primary necessity of life on earth. In addition to this, agrarian countries are highly dependent on water for economic and domestic purposes. But, in the industrialisation era, the need for water has increased with advancements in all sectors

of the economy. Historically, Pakistan and India have had water disputes which included a nine-year conflict ending in a series of negotiations between both countries and reaching an agreement named the "Indus Water treaty" facilitated by the World Bank's in 1960. Under this treaty, water availability was divided

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between them, in which Pakistan got rights over Indus, Chenab, and Jhelum, and India over Sutlej, Beas, and Ravi. (Anon., 2019). Over time, increasing population and industrialisation have created fluctuation in clean water supply and demand. However, once a water surplus country with water reserves is now facing a water crisis with water availability for about 1100 cubic meters. The emerging catastrophic climate change threats are severely damaging natural resources and the environment. A brief discussion of water resources and water management is presented in the following sections.

WATER RESOURCES OF PAKISTAN

Pakistan's total geographical area is 79.61 million hectares, out of which 22.05 million hectares area is used for cultivation. Because of the agricultural economic dependency of Pakistan, 19.02 million hectares of area is for irrigation. (Ayyaz Ahmad, 2007). The agriculture sector is considered as a backbone of Pakistan's economy because 90% of food production depends on it. More than 50% of the labour force is working in this sector, and constitutes almost 25% of the GDP. Moreover, the hydropower projects for electricity generation also depend upon water reservoirs.

In Pakistan, there are two types of water resources: natural and artificial. Natural resources contain rainfall, glaciers, lakes, ponds, wells, canals, etc. Artificial resources include surface water from rivers and rain, required for irrigation and stored in dams and reservoirs.

Rainfall: Pakistan is an arid to semi-arid zone country where the *Monsoon weather* showers 70% of rain from July to September. Most of this rainwater is lost by running off into the Indus plains to the sea.

The mean annual range of rain has shown variations, for example during the Kharif season 212 mm, and during Rabi season, only 53mm average rainfall is estimated. The data of 2020 shows that 38% of average rainfall was above the rainfall in Pakistan compared to the 1961-2010 data. (Department, 2020) The differences in rainfall patterns is indicative of climate change.

Surface Water Resources: In Pakistan, surface water resources are based on the Indus river basin and its tributaries. The Indus River's total length is 2900 km, and the drainage-area is approximately 966,000 sq km. (Majeed, 2002). These rivers flow individually, but they start rising during spring and summer because of the monsoon rainwater and melting glacier snow runoff into the lakes and rivers. The peak-flow months are from June to August, when monsoon season surrounds the subcontinent. Thus, it becomes necessary to store high-level water resources during this period for the later low-level water flow period. Hill-torrents are another source of surface water, but it is still not developed to its full potential.

Groundwater Resources: In Pakistan, the primary groundwater resource exists in the Indus plain, extending from the Himalayan foothills to the Arabian Sea and getting stored in alluvial deposits. The total Plain area is 1600 km long, covering 21 Mha and becoming the irrigation system's resource. (ibid).

For better food production, Pakistan is in severe need to advance its national water irrigation system by every 15 years. Despite the availability of natural resources of water and fertile land for crop production, many food commodities are being imported by the government.

WATER SCARCITY

Pakistan's economy is highly dependent on the agriculture sector; likewise, approximately 95% of water is being used for agriculture purposes, along with the fact that 60% population is also involved in agriculture and livestock. According to The Pakistan Council of Research in Water Resources' report, Pakistan may run out of water by 2025 if it does not take adequate measures to preserve water resources. Over 80% of drinking water is contaminated, causing water-borne diseases. Furthermore, water scarcity directly affects Pakistan's economy by losing up to 1.44% of GDP. (Kundi, 2017). With time, water demand will continuously increase due to the rising population and industrial growth and thus a disequilibrium in the water supply and demand is setting in. Despite having the largest glaciers globally, Pakistan faces a water crisis and stands at the 36th number amongst the most water-stressed states.

WATER MANAGEMENT

Pakistan's malpractice in storing water and complex transboundary relations has affected the availability of water resources. Failed attempts of drafting the national water policy draft in 2002 also halted the application of water management policies due to the lack of consensus among the federating units. The authoritarian regimes in Pakistan had created civil-military dominance in Punjab that aggravated distrust with other provinces. Even the construction of dams such as the Kalabagh dam was halted by some federating units on the account of national security risks and high construction costs. Provincial governments- Sindh, Balochistan, and Khyber Pakhtunkhwa, are raising concerns that the actual problem is water management rather than water shortage. Other concerns include flooding in the districts of Nowshera and Peshawar, the

danger of waterlogging and salinity, submergence of fertile land, and dislocation of the population living in Pabi, Swat, and Mardan.

On the other hand, Punjab is the most populated province with a higher contribution to national agriculture products, demanding water reservoirs and the dam's construction. In this case, the other provinces are highly criticising Punjab's 150 years old canal system, which according to them is becoming the reason for water wastage.

The lack of political will, disintegrated policies, rampant corruption, and the potential to resolve the water crisis may lead to poverty and starvation. (Awan, 2020)

CLIMATE CHANGE EFFECTS

The Intergovernmental Panel on Climate Change (IPCC) had published a list of states most affected by climate change. This list includes Pakistan on the 8th rank, given the number of climate change-induced natural disasters in 2015 alone, i.e., worst heat waves in Karachi, tornado in Peshawar, glacial outburst in Chitral, and avalanche in Naran mine, to name a few. (Khan, 2018) According to the Global Climate Risk Index 2020, Pakistan stands on 5th rank due to calamitous environmental issues. Pakistan has approximately 3044 glacial lakes and 7000 glaciers. Extreme weather events like rising temperatures, cloudbursts and GLOFS, directly affect the natural environment and population; 36 glacial lakes are in danger. Pakistan's hydrologic resources are prone to vulnerable climate change effects, a direct source of melting glaciers and rising sea levels, changing rainfall patterns, increasing saltwater intrusion in coastal areas, and rising temperatures.

CONCLUSION

In the era of the climate crisis, Pakistan needs to adopt water efficient best practices by looking at examples across the world. Pakistan is an agricultural country with water resources, but a sustainable water management system is still required to meet economic, social, and agrarian development.

The government should invest in farmers, especially small-scale farmers to accelerate a sustainable irrigation system overcoming the existing barriers and making climate-smart irrigation economically, environmentally, and socially sustainable. A few steps that can aid in developing a sustainable water management include:

- 1) Adoption of an integrated water management approach,
- 2) Containing environmental degradation and deforestation,
- 3) Institutional strengthening of relevant government departments including human resource development,
- 4) Investing on the improvement of water quality and access to every person, especially women,
- 5) Improving the sanitation system and educating people about the necessity of water and linkages between hygiene and health.

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