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National Water Policy and Its Likely Effects on Urban Water Management

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ABSTRACT
This paper addresses critical aspects of urban water management in the context of Pakistan, focusing on fundamental principles and key factors essential for achieving sustainable water services. The primary objective is to establish parameters that ensure access to affordable drinking water meeting national quality standards. The research addresses four key questions, including an assessment of the current state of urban water management in Pakistan. The study emphasizes the role of the National Water Policy, delineating its tri-dimensional strategy for urban water management. Furthermore, it critically examines areas where the policy falls short in addressing urban water management challenges, offering recommendations for future courses of action. A central theme in the paper underscores the analysis of the pervasive lack of water and sanitation access for millions in Pakistan, attributing it to deficiencies in institutional structures, regulations, and management. Effective and sustainable water services, according to the study, hinge upon robust governance, regulatory frameworks, and decisive leadership. The research not only seeks to inform policymakers but also aims to inspire researchers and scholars to contribute extensively to addressing the water challenges faced by Pakistan. It advocates for a comprehensive and concerted effort in various capacities to ensure a water-secure future. The paper concludes with the hope that its insights and recommendations will garner attention from all stakeholders involved in the urban water management discourse.

KEYWORDS: Urban Water Management, National Water Policy, Sustainable Water Service.

1. INTRODUCTION
Water distinguishes our planet from all the others we know about. While the global supply of available freshwater is more than adequate to meet all current and foreseeable water demands, its spatial and temporal distributions are not.(De Marsily, 2021) There are many regions where freshwater resources are inadequate to meet domestic, economic, and environmental needs. In such regions, lack of adequate clean water to meet human drinking water and sanitation needs, is indeed a constraint on human health and productivity.(Guppy et al., 2017) How best to meet the challenges of changing and uncertain future climate, rapidly growing population driving increased social and economic development, globalization, and urbanization requires research in all aspects of water management. This paper identifies the issues facing water managers today, likely impact of newly

adopted National Water Policy (NWP) on Urban Water Management (UWM), lacuna in NWP for in regard of UWM, and what measures can be adopted for effective UWM that may be adopted to create a more sustainable and desirable future. This academic investigation critically examines the impact of Pakistan's National Water Policy (NWP) on urban water management, with a focused exploration of equity, effectiveness, and long-term fiscal viability. Employing a mixed-methods approach involving literature review, quantitative analysis, and qualitative stakeholder interviews, the research aims to uncover discrepancies between policy objectives and actual outcomes. By scrutinizing urban water distribution, infrastructure quality, and financial aspects, the study seeks to pinpoint areas necessitating improvement. The aim is to provide targeted recommendations for refining the NWP, addressing identified shortcomings, and proposing practical strategies to enhance equity, effectiveness, and fiscal sustainability in Pakistan's urban water systems.

1.1. Problem Statement

Pakistan is currently facing a severe water crisis, transitioning from water-stressed to water-scarce. This situation is primarily attributed to factors such as unfair water allocation and inadequate government oversight. Therefore, cities like Karachi are frequently experiencing water shortages. Furthermore, the country is projected to have a 31million-acre-foot deficit by 2025, which is a dire situation since there is only a 30-day water storage capacity and $22 billion in losses.(Kb-060-Water-Crisis-in-Pakistan-Manifestation-Causes-and-the-Way-Forward, n.d.)To address these problems, the National Water Policy (NWP) was introduced; however, it received criticism for being too general and lacking detailed strategies, particularly in terms of urban water management. This research aims to evaluate the NWP's impact and identify its shortcomings. Efficient urban water systems should ensure equity, effectiveness, and long-term cost recovery. The study will evaluate the current state of Pakistan's urban water management and pinpoint areas for improvement in the NWP.

1.2. Literature Review

Water is the fundamental and constitutional right of all citizens. As mentioned in Article 9 And 14 of the Constitution of Islamic Republic of Pakistan.(the constitution of the Islamic republic of Pakistan national assembly of Pakistan, n.d.) Article 9 interpreted in Shehla Zia Case. the court declared that every citizen has the right to unpolluted water, environment and clean atmosphere, and court decided that right to life means right to quality of life.(Zia_v.Wapda_transcript, n.d.) Under provision of Article 38(d) of the Constitution, it is the primary duty of Government to provide people necessities of life, which includes unpolluted water for their consumption. The Sind High Court held that right to unpolluted water is a right of every citizen of Pakistan wherever he lived. In judgment the Word "life" had to be given an extended meaning and could not be restricted to vegetative life or mere animal existence.(Qaiser Javed Mian LLB, n.d.). It is imperative to consider both the amount and caliber of water available; however, the level of storage in the nation is seriously lacking, with its capability to store Indus water amounting to as little as 30-50 days of river inflow during both wet and dry years.(No. 6032 India, Pakistan and International Bank for Reconstruction and Development Inde, Pakistan Et Banque International Pour La Reconstruction Et Le Development, N.D.) In addition, the efficiency and productivity of water utilization is extremely low due to the minimal cost of water. The quality of

the water is also a major concern; in urban areas, waste from sewers and industries is normally merged and treated inadequately, and only a few plants are operating. Sewage, industrial and agricultural byproducts are ultimately emptied into freshwater sources such as tributaries of rivers and canals, which are also used for cropland in rural areas. As water contains a variety of debasing elements including bacteria, heavy metals, and nitrogenous compounds, it isn't unexpected that the dirt and harvests are also affected. Studies conducted by the Pakistan Agricultural Research Council (PARC) and many other parties have determined the produce to be unfit for human and animal consumption.(Rasheed et al., n.d.). The country relies heavily on the glaciers melting and the monsoon rains to obtain water, which then runs to the seas via rivers, with a lot of seepage in the ground. Rocks or aquifers take in and keep this water supply. However, due to the meagre rainfalls in numerous areas, surface water is absent or challenging to obtain. A report by the Asian Development Bank stated that the nation's storage capacity is only 30 days of supply, which is a lot lower than the 1,000-day suggested amount for countries with the same climate conditions as Pakistan.(Development Bank, 2024).

Pakistan is facing acute water shortage.(Akbar et al., 2021) Currently, there are two main sources of Pakistan i.e., surface water and ground water. Surface water has three hydrologic units namely Indus Basin River, Closed Basin, Kharan Dessert and Makaran Coastal Basin, each having water flow of 141 MAF, 4.5 MAF and 0.7 MAF respectively.(Ahmad et al., 2000) Including both the sources of water, Pakistan has approximately 250 MAF of water. Out of it 172 MAF is used for agriculture. Shortage of water stems from the fact that 36 MAF water goes to the sea every year. About 50% gets wasted in water channels.(Pakistan’s Water Economy Running Dry by John Brisco (2005) (PDF), n.d.) In order to solve the issue of shortage of water, water management as well as water development authority need to focus on increasing storage capacity of water through dams.(Nazir Tarar, n.d.)

It is pertinent to mention that Pakistan is not a water scarce country by hydrological definition. It is water management rather than water availability that is the core of water crises.(Siegmann & Shezad, 2006) Due to bad management, institutional constraints, and inability of water users to pay for the water maintenance, only 45% of cultivable land is cultivated.(Kamal, n.d.) Water management issues include efficient use of available surface water, watershed degradation, and wastage of heavy flood water, population growth and urbanization. To sensitize the government investment in knowledge construction is necessary and taking this issue to upper echelon for policy formulation and implementation. To formulate the policy directions there are recommendations of changing cropping patterns, defining cropping zones. Regulation on water extraction, drip irrigation and sprinkler irrigation can save water. Develop groundwater database and develop information for the conjunctive use of surface and ground water.(Zaqoot et al., 2009)

Pakistan is dealing with a major issue pertaining to the quality of water, with potential negative effects for public health. Management and inspection of drinking water do not reach satisfactory levels, while coliforms, chemicals and pesticides are frequently responsible for the contamination of water from sources such as groundwater and surface water in various sections of the country. Furthermore, the standards defined by the World Health Organization for drinking water quality are not propagated on a regular basis.(Gleick, 2002) The poor quality of water is mainly caused by

our own activities, such as haphazard disposal of municipal and industrial waste, and the inappropriate use of agrochemicals in agriculture. This raises an array of health risks as it leads to an increase in microbial and chemical contamination.(Adeel Alvi, 2016).

Urban water management constitutes a pivotal concern in Pakistan, where a mere fraction of the available water is deemed potable, compelling 16 million individuals to depend on contaminated sources (FAO, n.d.). The compromise of drinking water quality is exacerbated by inadequate handling and storage practices in households. On a global scale, the confluence of mismanagement, environmental degradation, and climate change contributes to the scarcity of water resources. The implementation of point-of-use disinfection strategies, as proposed by Clasen & Haller (n.d.), has been identified as efficacious in reducing diarrheal episodes by 45%. Academic discourse underscores the precarious state of water management in Pakistan, forecasting a profound water scarcity crisis by 2025. The endorsement of large dam construction for water storage by the Chief Executive and Chief Justice of Pakistan underscores the imperative nature of addressing water mismanagement as a foremost priority in the country.(Water Sector Task Force, n.d.)

To address this issue the developed countries of the world have employed certain techniques to improve UWM. For example, different models or approaches have been employed by Australia in its urban centers for sustainable urban water management (SUWM).(Taylor, 2007) Research was conducted to identify similarities and differences among models to set a universal benchmark for SUWM, but it couldn't do so due to different trajectories followed by the cities.

2. RESEARCH METHODOLOGY

A qualitative has been employed for the completion of this research article. Pakistan lacks very robust academic research in this field. Hence, reliance is made on the policy documents, articles, reports of UN and world best practices in the field of UWM. The concept of IUWM is novel and unique, therefore, parameters set by this concept are used to evaluate existing policy and practices in respect of NWP in general and UWM. Conclusions are drawn based on comparative analysis of both policy and practice in this field. The topic has been divided into four parts. In section one it is highlighted that what is the current state of Pakistan's Urban Water Management. Whereas second section focused on how Pakistan's National Water Policy successfully aids in adequate urban water management. Furthermore, third section of our research primarily focused on the areas in which Pakistan's National Water Policy lacks with respect to Urban Water Management. The last section lays down what should be the objectives of Urban Water Management. Subsequently findings were drawn after thorough deliberation and analysis of all the research questions. Finally, based on this analysis some implementable recommendations are suggested followed by conclusion.

2.1. First Section: Current State of Pakistan's Urban Water Management

The escalating demand for water in Pakistan, driven by population growth and rapid urbanization, has led to a heightened reliance on groundwater resources, with over 60% of water extraction occurring from underground reservoirs. Notably, there are no prescribed limits on drilling, and the absence of private groundwater management has allowed unchecked installation of tube wells,

disregarding potential adverse impacts on the resource (Rafiq & Shahzad, 2016). Although groundwater management policies have been initiated at the federal and provincial levels, local government participation remains minimal. The utilization of groundwater, often characterized by increased salinity and sodicity, poses a significant threat to both soil and groundwater quality.

Moreover, concerns persist regarding the quality of drinking water in Pakistan, where only 20% of the population has access to pure and safe drinking water. Industrialization, rapid urbanization, and population growth have exacerbated stress on water resources, resulting in the introduction of impurities, encompassing physical, biological, and chemical contaminants. Urban areas in Pakistan, in particular, grapple with pathogen contamination, contributing to endemic diarrheal fatalities (Azizullah et al., 2011).

Inefficient disposal of hazardous wastewater emerges as another critical issue in urban centers, exemplified by the fact that out of numerous industries producing hazardous wastewater in Lahore, only a scant few adhere to proper treatment protocols (Murtaza & Zia, n.d.).

The regulatory landscape concerning groundwater usage in Pakistan is found to be inadequate, rooted in the failure to establish clear property rights. This lack of distinct rights impedes effective management of groundwater extraction (Qureshi, n.d.).

Lastly, the financial sustainability of water management is underscored by the overlooked challenge of non-revenue water (NRW), referring to water drawn from distribution networks without corresponding revenue collection. NRW is attributed to both physical losses, such as leaks or tank overflow, and apparent losses arising from billing errors or unauthorized consumption. In Pakistan, the NRW rate is notably high, reaching up to 75% in Gujranwala, posing substantial financial challenges (Qureshi, n.d.).

2.2. Second Section: Areas in which Pakistan's NWP lacks with respect to UWM

The assessment of the National Water Policy's (NWP) adequacy in addressing Urban Water Management (UWM) is imperative through the lens of Integrated Urban Water Management (IUWM). Encompassing facets of water supply, demand, stormwater, wastewater, and stakeholder engagement, IUWM addresses multifaceted challenges such as cost sustainability, urbanization, climate change, safe drinking water accessibility, and inefficient water management. Significantly, effective water pricing is underscored as vital for sustainability, demand reduction, and the proper differentiation of clean and treated water. However, a notable deficiency in the NWP lies in its lack of coordination with pivotal ministries, such as those pertaining to human rights and health. Moreover, the policy overlooks the diverse socio-economic ramifications, stormwater drainage intricacies, and the evolving water treatment mechanisms in urban areas. The proposed solution advocates for a localized, city-led water planning approach tailored to the unique needs of specific urban areas. Critically, the NWP falls short in providing provisions for public participation and delineating comprehensive investment strategies, thereby jeopardizing the availability of adequate funding for essential water infrastructure. Furthermore, the absence of specific UWM targets in the NWP for the period 2018-2030 necessitates a revision to align the policy with the defined goals of urban water management and corresponding investment requisites. (Government of Pakistan Ministry of Water Resources National Water Policy, 2018)

2.3. Third Section: How does NWP Assist UWM?

The National Water Policy (NWP) marks a historic milestone in addressing the prolonged and persistent water crisis, representing a significant step forward, particularly considering historical disputes between provinces hindering the formulation of such policies in the past. This 41-page document appears promising, encompassing a comprehensive overview of relevant issues and making commendable efforts to address concerns raised by various stakeholders. The policy signifies a paradigm shift in water resource management, aiming to tackle national and provincial water challenges, including the perpetual decline and deteriorating condition of water, which poses a threat to the health and prosperity of the rapidly growing population. The NWP recognizes the impact of climate change, aligning with the National Climate Change Policy (2012), addressing severe weather changes, droughts, floods, heatwaves, rising sea levels, and depleting aquifers. The policy advocates for the enhancement of the country's storage capacity through dam construction, rehabilitation of water infrastructure, regulation of groundwater extraction, and efficient agricultural water use. Notably, the policy sets clear priorities for consumptive and non-consumptive water use, prioritizing Drinking and Sanitation at the top, which is crucial for advancing the objectives of Urban Water Management. The policy focuses on providing clean drinking water and sanitation services to both urban and rural populations, emphasizing clarity in policy objectives to facilitate legislative and policy reviews. Financial sustainability in urban water supply and sanitation systems is a central goal, involving measures such as reducing theft and wastage, metering, and tariff revision. The policy also addresses water quality in reservoirs, treatment of sewage water, and the elimination of Non-revenue Water through coordinated strategies. The inclusion of these aspects reflects a forward-looking approach to achieving the set objectives. The NWP identifies unattended areas in Urban Water Management, recognizing potential deficiencies at the national level, and aims to streamline priorities for timely goal achievement. Notably, the NWP stands as the first water policy born out of consensus among national political leaders, representing a national agreement on this contentious issue.

2.4. Fourth Section: Objectives of UWM

It is essential to prioritize objectives of UWM into the following categories.

- Availability of Drinking water
- Availability of Water for Sanitation
- Addressing water pollution and preserving the coral reefs of the country

Ensuring the affordability, availability, accessibility, and quality of drinking water is imperative, yet Pakistan's water infrastructure faces alarming challenges. The country's vulnerability to climate change and the projected water scarcity by 2025 underscore the need for environmental considerations in the political agenda, notably exemplified in Karachi's exploitation by a lucrative tanker mafia. Rapid urbanization compounds mismanagement, posing challenges for effective city and town governance. Urban areas contend with water scarcity, funding limitations, service provider capacity constraints, non-revenue water issues, intermittent supply, poor water quality, and inadequate sewerage networks.

Addressing these challenges requires a shift from predominantly demand-side strategies to a balanced consideration of the supply side. Sustainable urban water management, covering demand,

supply, human resources, and wastewater aspects, emerges as a comprehensive approach. Governance improvements, adopting a corporate approach, and regulating water agencies are vital. Emphasizing self-reliance, revenue generation, and effective cash flow management is essential, coupled with capacity building for a competent workforce to attract external expertise and finance. Supply management involves increasing production capacity, enhancing distribution network efficiency, developing new water sources, expanding coverage, ensuring continuous supply, metering, and improving water quality. Diversification of water sources is crucial to mitigate negative effects of groundwater depletion. Demand-side management focuses on reducing per capita water consumption through public education, conservation practices, pricing mechanisms, and incentives for reduced consumption. Wastewater management is integral, requiring discouragement of water bodies as dumping sites and implementation of laws penalizing untreated wastewater discharge.

In summary, a holistic approach encompassing both supply and demand management, along with improved governance and wastewater treatment, is essential for sustainable urban water management in Pakistan.

3. CONCLUSION AND FINDINGS

Incorporating key elements into the National Water Policy would significantly enhance its effectiveness in achieving urban water management objectives. First and foremost, the policy should comprehensively address Resource Planning, particularly in response to demographic shifts towards eastern provinces driven by water availability. Detailed provisions for resource planning are essential to prevent resource depletion and overpopulation, notably in urban centers like Lahore. Sustainable Cost Recovery constitutes another vital aspect, necessitating clear guidelines within the policy. Ensuring cost recovery at sustainable levels is critical for widespread access to freshwater and sanitation services. The strategic use of water pricing as a demand-management tool is crucial for mitigating losses and curbing excessive water consumption.

Balanced Water Allocation is imperative in the face of escalating conflicts among water users due to increased pressure on existing water resources. A well-crafted water policy should articulate a transparent framework for water allocation, delicately balancing considerations of equity and efficiency. Furthermore, the policy should elucidate the concept of a sustainable scale of human water use to establish equilibrium within the system. Additionally, the policy should extensively address Climate Resilient Water Management (CRWM), recognizing the impact of climate change on the water cycle. CRWM measures, such as drip-irrigation and laser land-leveling, are crucial for reducing vulnerability to climate change effects. The policy should emphasize the importance of maintaining standardized national information systems to facilitate effective CRWM implementation.

Integration of these components into the National Water Policy would not only enhance its comprehensiveness but also fortify its ability to address the multifaceted challenges associated with urban water management.

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