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Governance of Aquifer Depletion in Punjab, Pakistan

Causes, Impacts, Policy Failures, and Recommendations

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Introduction

Pakistan is the third-largest user of groundwater in the world with Punjab leading the consumption patterns out of all provinces. Of a total of over 1.2 million wells in the country, 85 per cent are located in Punjab. Reasons for this include the temporal and spatial variability of irrigation water along with the historical policies of various governments. For instance, policies and government-funded projects in the past encouraged groundwater pumping to control soil salinity levels. Since water tables were low, the cost of pumping was also low, while water quality was generally very high, pumping groundwater for agriculture became very popular among farmers.[1] Moreover, the subsidized cost of electricity and/or diesel in the past has further encouraged this method. Presently, over 76 per cent of the cultivated area is either entirely or partially dependent on groundwater in Punjab. This area is used to grow a wide variety of crops including rice, sugarcane, and cotton, or in other words, major water guzzlers.[2]

Despite the presence of the world's largest irrigation networks, Pakistan is highly dependent on its groundwater resources. Groundwater accounts for 70 per cent of the water domestically and more than 50 per cent for agriculture. At the current nonrenewable rate of extraction, Pakistan only has 25 years' worth of water left in its aquifers. The issue becomes even more critical in Punjab as it is the largest province of the country by population and is effectively where most of the country's food is grown. Threats to water availability in Punjab can thus have significant effects on the locals of the province as well as the economic and food security of the entire country. Recent attempts to better understand and manage groundwater have been made. However, the policies and laws around it at the moment are unclear and insufficient in tackling the breadth and severity of the crisis at hand.

Implications

As a result of the unchecked water extraction from the aquifers, water tables have been falling; the areas with groundwater tables between 0-150cm, decreased by 35 per cent in ten years (2008-10). A decline in the water table coincides with a decrease in water quality and an increase in the cost of water access.[3] As mentioned earlier, this can have devastating impacts on the food and economic security of the province and the country. Needless to say, the health and sanitation implications of this. It is expected that by 2025, water tables will decrease by as much as 20 per cent.[4] These changes not only affect the crop production capacity of the province as discussed but also the many urban residents of the province, especially Lahore, the provincial capital and the largest city of the province (by population).

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The average decline in groundwater levels in Lahore has gone from approximately 1ft/year in the 1960s to 3ft/year in 2013. The locals of the city are fearful of the impacts of such a continued decline, as seen in Karachi where water is being rationed and water mafias exploit resident desperation.[5]

Attempted Controls for Aquifer Water Extraction

As seen earlier, governmental interventions of the past and the perceptions of groundwater being thought of as an unlimited resource, directly contributed to groundwater extraction issues. Over the years, though, there have been moves to control the use of this resource. A permit system to control groundwater extraction was introduced in the 1980s. However, the large number and spread of wells along with complex sociocultural contexts made the permit system near impossible to function. Various ways of attempting to increase electricity tariffs over the years (as an indirect control for pump usage) have proven inadequate as most pumps are operated via diesel (85 per cent). Community governance has also been experimented with farmer organizations being formed. However, the focus of these remained on canal water distribution only.

Status of Water

Groundwater has mostly been viewed and perceived as a private good in the country, to be used and exploited by the owners of the land as they see fit. Old colonial laws have furthered this perception.[6] Court proceedings over the years have helped share some clarity on what water rights the public even has. In 1994, the supreme court of the country clarified that the constitution extends the right to a clean and healthy environment. It clarified that the clean right to water is a right of every person. Later in 2005, the courts spoke of groundwater by declaring it a national resource belonging to the entire society, hence, ordering the government to protect it.[7] Various legislations and court orders seem to be slightly contradictory in how we see groundwater and establish the ownership and rights associated with it.

Only recently, efforts to legislate the rights and governance mechanisms around water have surfaced. After the first national water policy on the water was developed in 2018, Punjab followed suit with its Punjab water act in 2019. With the new act, a water licensing regime is to be established.[8] This changes its status as a private good towards a more state-controlled resource. The act also allows for payment for water (including groundwater) delivery services. It is unclear at this stage if this would allow better regulation of the already existing private actors or if it is a transition towards the feared privatization.

Governance and Institutions

Over the years, different governance mechanisms seem to be largely contradictory as well. The national agency, Water and Power Development Authority (WAPDA) had "control" over groundwater resources in all provinces. At the provincial level, this authority is also with the Punjab Irrigation Department, while Public Health Engineering Departments (PHEDs) in rural areas and Water and Sanitation Agencies (WASAs) in cities look after the resource. Unclear definitions of authority vs control vs interest of these governing bodies cause the mismanagement or no-management of this precious resource.[9]

In Lahore, as a result of a petition filed by a resident about the unavailability of clean water.[10], a judicial commission was formed by the court. With the elevated level of status and

authority of the judiciary, the commission was able to launch several projects that aimed to reuse, conserve and store water. At the same time, the commission channeled judicial activism to ensure action from many government agencies in charge of the city waters while also penalizing non-compliant industrial, commercial, and even residential water consumers.[11] By coordinating the work of many agencies across the sector and merging that with the authoritative backing of the courts, the commission has been able to move at an unconventionally fast speed and generate encouraging results.[12]

Way Forward

The judicial water commission has proven that with coordination and clarity of authority, at least low-hanging fruits in the policy sphere can be implemented and initiated at a rapid pace. It has also shown that if agencies make groundwater a priority, they can benefit from the existing laws and policies in place today. Now, there is a need to institutionalize this effort. There is a need to clarify the responsibilities and jurisdiction of agencies along with increasing the accountability of these agencies. This is necessary for long-term capacity building and action. With regards to governance, laws, and institutions, some gaps need extensive governmental input. Moreover, there is a need for deep legislation that removes legal contradictions and clearly explains the nature of water. Questions like "who owns water, who has the right to its use, and can it be priced" need public and legislative debates before being etched into law.

It seems to be clear that the current water crisis of groundwater in Pakistan, and especially Punjab, is partially a crisis of mismanagement or rather, the absence of it. Therefore, while a physical, chemical, and operational approach needs to be applied in finding solutions, we strongly recommend that there needs to be a focus on empowering the managers of water so they can do better today with what they have.

Policy Recommendations

- As mentioned above, significant efforts **in defining the nature of groundwater, empowering institutions, and developing** capacity need to be prioritized. Additionally, all government departments should be made aware of what role they can and should play to protect this vital resource.
- Any new and old **policy must be viewed from an equity lens**. There should be clarity on how policies like a permit system or increased electricity tariffs can unequally affect all, especially the most marginalized (e.g., a small holding female farmer in a place with no access to surface irrigation).
- Water or water-service **privatization needs to be monitored**. Be it systematic and formal or informal, privatization can lead to abrupt changes in the well-being of residents. Therefore, any law or policy that favors privatization should be examined in detail before being approved.
- In parallel to policymaking, the **gaps in the knowledge and modeling of underground water need to be addressed**. Research institutions must partner with the local government bodies to prepare models that can better quantify and predict underground water availability. (E.g., studies like Hassan et al 2017 need to be conducted).

- **Supply-side** issues with surface water should be addressed. With **better surface water management** (e.g., irrigation water allocation restructuring), **improved water storage, and increased rainwater harvesting**, pressures on groundwater usage can be relieved.
- Similarly, on the **demand side,** pressure can be relieved by ensuring **efficient water use**. E.g., more crop per drop for farmers and less wastage in domestic settings. Since **agriculture drives underground water consumption**, all innovations that involve crops consuming less water must be popularized.
- **Aquifer recharge** also needs more focus and careful study.[13] Based on locational and physical contexts, techniques that improve soil water absorption and seepage must be utilized. At locations where artificial aquifer recharge is feasible, **trial projects should be conducted** before adoption and scaling up.

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