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"How water scarcity threatens food security and rural resilience in Afghanistan"

"We shall not defeat any of the infectious diseases that plague the developing world until we have also won the battle for safe drinking water, sanitation, and basic health care."
~Kofi Annan

1. Introduction

In the outskirts of Afghanistan a mother walks for hours each morning, not toward opportunity, but toward a well that may already be running dry. She carries an empty vessel and a quiet hope that today, unlike yesterday, there will be enough for her children who are waiting for her. Multiply her journey by millions and it will land you to the same situation faced by Afghanistan today. Afghanistan is confronting a water crisis of a scale and severity that threatens the very foundations of its society: its food supply, its economy, and the daily survival of its people. prolonged drought, accelerating climate change, unchecked population growth, decades of conflict, and chronic underinvestment in water infrastructure all these forces step by step climbed and now the country sits on the throne of water scarcity. The impact of water shortages is greatest on people who have the fewest resources to cope with them. In rural communities, water is not just a basic need it is essential for farming, livestock, and daily life. When access to safe and reliable water becomes difficult, the problems affect every part of life. Crop production decreases, livestock suffer, diseases can spread through unsafe water, and families face financial losses that are often difficult to recover from.

This paper examines Afghanistan's water scarcity as both a cause and a consequence of the country's broader fragility, tracing how climate stress, weak governance, and decades of underinvestment sustain a deepening cycle of scarcity and vulnerability. It weighs existing water management and conservation strategies against one another and recommends one feasible, sustainable, and context-appropriate approach to securing Afghanistan's water future.

2. National Context : Background of the Country and a Typical Family

Afghanistan, a nation of approximately 45 million people currently governed by the Islamic Emirate of Afghanistan. a unitary theocratic structure administered by the Taliban. For millions of Afghan households, water security is livelihood security**.** Afghanistan is a predominantly rural country. According to the Afghanistan Multiple Indicator Cluster Survey (MICS) 2022–23, 74.6% of the population lives in rural areas, while the average household contains 8.3 people. The country's water challenge is reflected in basic household services. According to UNICEF (2025) Around **31% of the population lacks access to basic drinking-water services, while more than 55% of households lack basic sanitation.** And on top of that 67% of Afghan households reported drought and water scarcity as a problem in 2025. The food security situation is equally serious. The World Food Programme estimates that **13.8 million people,**

nearly one third of the population, are projected to experience acute food insecurity in 2026, while millions of women and children are expected to require treatment for malnutrition.

2.1 Geography and a typical family

If we talk about Afghanistan's geography, about 70% of the terrain is mountainous covered by Hindu Kush, leaving only around 12% arable land and 6% cultivated annually (dominated by wheat, maize, rice, barley, potatoes, vegetables, fruits and nuts) More than 70% of workers depend on the informal sector, mainly subsistence farming and livestock, resulting in low purchase power. Social restrictions deepen these challenges. UNICEF reported in August 2026 that **more than 2.6 million Afghan girls have been denied secondary education since 2021(girls are prevented from continuing education after 6th)**. Restrictions on education and women's participation in the economy further reduce the ability of households and communities to build long term resilience. You might wonder how education is linked to water scarcity.

A typical family of Afghanistan depends on farming, an FAO household survey conducted in Afghanistan in 2023, the **mean reported cultivable area was about 0.90 hectares (2.23 acres)**. This can be compared with an average farm size of **5.3 acres in Pakistan in 2024**, while FAO estimates that small family farms in neighbouring Tajikistan averaged about **0.20 hectares (0.49 acres)**. Along with farming the people are also dependent upon livestock or informal work for income and food. Their diets commonly include **wheat-based bread and other cereals, rice, dairy products, vegetables and pulses**, although dietary diversity varies with income and food availability. (FAO) Housing and living conditions also vary, but rural households are more likely to face limited access to safe water, sanitation and essential services. Because water supports both **household needs and agricultural production**, shortages can directly affect a family's food, income, health and overall resilience. (UNICEF). All this conditions collectively contributes to child labour and early marriage. Although telecommunications remain relatively resilient, with millions of active SIM cards, Afghanistan's wider physical and social infrastructure remains weak. Addressing these challenges requires sustained humanitarian assistance, stronger food and water security, improved basic services, and greater protection of fundamental rights.

3. Challenge and the Impact:

Afghanistan is currently experiencing a profound hydrological crisis. Approximately 33 million Afghans are directly affected by severe water shortages. With an artificial water storage capacity of merely 140 cubic meters per capita each year (as per UNFCCC) it is among the lowest globally, Afghanistan is fundamentally unable to capture its own natural snowmelt and river flow. While the country naturally possesses substantial water resources through winter snowpack and river systems, these resources are highly vulnerable to uneven distribution, systemic institutional failures, and a rapidly changing climate. According to reports from UNICEF, a mere 20 percent of the population has access to a piped water supply, and one third of the country lacks access to even basic, safe drinking water. Overall, Afghanistan's water scarcity is worsening rapidly, driven by severe droughts, immense groundwater over abstraction, damaged infrastructure, and widespread resource mismanagement. Now let us dive deeper into the situation of the Afghanistan:

3.1. Primary Challenges and Systemic Drivers :

Climatic and Hydrological Shifts: Since 1950, Afghanistan has recorded a 1.8°C rise in mean annual temperatures. This warming has triggered elevated evaporative demands, intensified heatwaves, and

prolonged dry periods. The basin of the Kunduz River, for example, has seen a precipitation decrease of 30% since the 1960s. Consequently, historical dependence on winter snow and spring meltwater is no longer viable due to fundamentally altered runoff patterns and increasing glacier melt.

Infrastructural and Institutional Deficits: State investment in water management infrastructure stands at a nominal 0.05%. The over extraction of groundwater operates at a massive deficit. (approximately the amount of extraction is 3 times more than the groundwater recharge rate).
In Kabul alone, more water is drawn each year than is replenished, resulting in an estimated annual deficit of 76 million cubic meters. It is tapped by more than 100,000 unregulated wells across the city that are regularly deepened as the water table rapidly drops.

Ecological Degradation and Geohazards: An environmental crisis is also developing across Afghanistan. Rivers, lakes, and wetlands are drying up, causing the loss of many plants and animals. At the same time, excessive pumping of groundwater is causing the land above underground water reserves to slowly sink. In the Upper Kabul aquifer basin, the land has been reported to sink by as much as **5.3 centimetres per year**.(sourced from Meldebekova et al., 2020). This subsidence can damage roads, buildings and other infrastructure and may create a long term threat to the country's water security.

3.2. Multidimensional Impacts : The United Nations Children's Fund (UNICEF) has warned that without urgent action, Kabul could completely deplete its groundwater reserves by the year 2030. Even when water is secured, up to 80% of Kabul's available groundwater is unsafe, heavily contaminated by unmonitored sewage and chemical toxicity. Low income households face severe economic burdens, with potable water becoming increasingly expensive in a country where 85% of the population lives on less than a dollar a day. In rural regions, the impacts are devastating. Communities face total crop failures, massive livestock mortality, degrading irrigation networks, and the rapid spread of waterborne diseases. In 2022 alone, over 242,000 cases of acute watery diarrhea with dehydration were reported (according to WHO) in which children under five and females accounted for the vast majority of cases. Women and children bear the primary physical burden of traveling immense distances to collect water, a labor demand that directly suppresses school attendance and elevates public health risks. Furthermore, returning displaced persons and highly vulnerable demographics, including remote tribal communities like the Hazara and nomadic Kuchi pastoralists, lack the political leverage required to secure life saving water infrastructure.

If we make a flowchart of the impacts it will look like this:

Severe Water Scarcity → Disproportionate Burden on Women & Girls → Suppression of Education & Economic Participation → Eroded Community Resilience & Human Capital → Impaired Adaptive Capacity & Ineffective Crisis Response → Exacerbated Water Scarcity

4. Exploring Solutions :

Historically, various local solutions have been tested in Afghanistan with mixed outcomes, providing critical lessons for future policy design. Large scale state initiatives have predominantly focused on centralized mega infrastructure, such as the proposed Balkhab River Dam, designed to hold 197.9 million cubic meters of storage and generate 25.4 megawatts of hydropower. However, such capital intensive projects frequently face decades of delay and fail to reach remote populations. On a decentralized level, international non governmental organizations and entities like UNICEF installed extensive solar powered water systems between 2016 and 2024. Despite representing an investment of roughly $60 million and

reaching over 800,000 people, field data indicates that only 30% of these solar systems remain operational today (UNICEF). This highlights a critical limitation: top down technological solutions frequently fail due to a lack of community led maintenance and extended repair downtime. Conversely, the rehabilitation of indigenous *karez* systems traditional underground local canals has proven highly effective and sustainable due to their zero energy requirements and minimal evaporation rates.

4.1. Regional Comparisons: Lessons from Central Asia:

Water does not stop at the border, so Afghanistan must look at its neighbors. Right now, the government is building the massive Qosh Tepa Canal to pull 10 billion cubic meters of water from the shared Amu Darya River. While this aims to turn deserts into farmland, neighboring countries like Uzbekistan and Turkmenistan are terrified they will lose up to 15 percent of their river flow, which could easily spark a regional conflict. The lesson here is that taking water unilaterally is not a long term solution. Instead, Afghanistan should look at Tajikistan, which successfully worked with international banks to fix up old irrigation systems across 100,000 hectares to stop leaks. We should also learn from Iran. After Iran pumped too much groundwater and dried out its lakes, the government had to force farmers to switch to crops that survive on less water. Afghanistan must do the exact same thing before it is too late.

4.2. Evaluating Three Feasible Solutions Based on these lessons, there are three main solutions we can adapt:

1. **Rehabilitating Karez Networks and Building Check Dams:** Using local labor to dig small absorption wells and fix underground canals allows villages to capture snowmelt locally with zero electricity costs.
2. **Crop Switching and Drip Irrigation:** Transitioning farmers away from thirsty crops and using simple drip irrigation tubing can save the 50 percent of water that is currently wasted in open fields.
3. **Transboundary Water Treaties:** Instead of causing regional fights over the Qosh Tepa Canal, Afghanistan needs to sign legal agreements with Uzbekistan and Turkmenistan to share the Amu Darya River fairly.

While these three steps will not solve the entire infrastructure deficit overnight, they are affordable, culturally accepted, and completely possible to start right now.

5. Recommendation: A Community Led WASH and Aquifer Recharge Initiative:

5.1. The Proposed Plan of Action: To secure Afghanistan's water future, I recommend a decentralized Water, Sanitation, and Hygiene (WASH) initiative paired with localized aquifer recharge. Instead of waiting for large scale government dams that take decades to build, this plan focuses on practical, community level steps. First, international groups like UNICEF will provide the initial funding and technical tools to install small scale, solar powered water pumps in rural villages. Second, communities will revive traditional *karez* (underground canal) systems and build small stone check dams using *ashar*, a traditional Afghan form of collective community labor. These small dams will capture the seasonal snowmelt from the Hindu Kush mountains, allowing it to soak into the earth and naturally refill depleted groundwater levels.

5.2. Impact and Sustainability : The main goal of this approach is to restore safe drinking water while ensuring the systems run long term. By bringing piped, solar powered water directly into villages, we

remove the massive physical burden placed on women and girls who currently walk hours each day to fetch water. This will directly improve girls' school attendance and reduce deadly outbreaks of waterborne diseases. Financially and environmentally, this plan is highly sustainable. The *karez* systems use zero electricity and prevent water from evaporating in the summer heat. For the solar pumps, local mechanics will be trained to fix them, and households will pay a small, affordable maintenance fee to a community fund so spare parts can be bought without waiting for foreign aid.

5.3. Leadership, Management, and Funding: This project will use a shared management approach, avoiding the past failures of top down government control.

- **Funding and Expertise:** International development organizations, such as UNICEF and the World Bank, will provide the initial capital and engineering training.
- **Local Leadership:** On the ground, daily operations will be managed entirely by community elected councils and traditional *mirabs* (water masters). *Mirabs* already have the deep cultural respect needed to ensure water is distributed fairly among local farmers.
- **Education:** Sanitation and hygiene training will be hosted inside local mosques and madrasas. Because these are the most trusted spaces in rural Afghanistan, using them ensures that the public health education is culturally accepted and widely adopted.

5.4. Enabling Policies and Limitations : For this project to succeed, the national government must step back from trying to micro manage local water distribution. The government's role should be limited to acting as a strict regulator preventing the illegal drilling of deep commercial wells and acting as a diplomat to sign transboundary water treaties with neighboring countries like Uzbekistan. As every coin has two sides there are a few limitations to this approach. Training local councils and mechanics takes time, meaning the system cannot be built overnight. Furthermore, the plan still heavily relies on initial foreign funding, which can be unstable. However, by anchoring the actual management in deep rooted cultural traditions like the *mirab* system and *ashar* labor, this solution is the most realistic and feasible way to build a resilient, water secure future for the Afghan people. To operationalize these four solutions, the international community must urgently establish a depoliticized, multilateral water trust fund.

6. Conclusion:

Afghanistan’s water crisis is not merely an environmental challenge; it is a profound threat to the nation’s food security, public health, and human capital. While climate change, over-abstraction, and decades of infrastructural deficit have pushed the country's water systems to the brink, the path forward does not lie in unfeasible, centralized mega-projects. By empowering traditional *mirab* governance, reviving zero-energy *karez* networks, and implementing a community anchored WASH initiative, Afghanistan can build climate resilience from the ground up. Resolving this crisis fundamentally requires placing water management back into the hands of the people. In doing so, the international community and local leaders can do more than just secure safe drinking water and sustainable agriculture; they can emancipate women and girls from the paralyzing burden of water collection, ultimately cultivating a healthier, more educated, and food-secure future for the entire nation.

"Qatra qatra darya mesha." (Drop by drop, a river is made.)

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