

Strategic Analysis Paper

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Food and Water Security in Qatar: Part 2 – Water Resources

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Key Points

- Scarce natural water resources, variable and low rates of evaporation, and high rates of water consumption have led to the over-extraction of groundwater.
- Desalinated water supplies at least 50 per cent of the country's water demand; groundwater (36%) and recycled wastewater (14%) compliment this supply.
- Qatar has one of the highest domestic water consumption rates in the world; Qatari households consume approximately 430 litres of water per day on average.
- High household water consumption remains a significant problem and Qatar will need to consider developing greater incentives to reduce domestic water usage.
- Significant potential exists for the expansion of treated wastewater reuse to improve Qatar's water security.

Summary

Qatar experiences an extremely high level of water stress owing to its scarcity of natural renewable water resources and high rates of water consumption. The country's arid desert climate is characterised by unpredictable and erratic rainfall, averaging between 50 and 80 mm each year. High temperatures and high relative humidity are also common in the summer months. Variable and low rates of precipitation are not reliable enough to supplement irrigation and maintain agriculture. These factors and a lack of permanent rivers in Qatar have led to overdependence on groundwater resources, mainly groundwater aquifers, for agricultural irrigation.

Analysis

Water Security

Direct and indirect recharge of groundwater from rainfall provides the main natural internal water resource in Qatar. The country also receives lateral recharge from Saudi Arabia through a shared artesian aquifer. Qatar's two main groundwater resources are the Rus and Umm er Rhaduma aquifers; water withdrawal from these sources far exceeds their recharge rates and has led to the rapid lowering of the water table, causing the deterioration of water quality and increasing saline intrusion. The depletion of natural renewable water resources has led Qatar to rely heavily on desalination plants for its water supply.

Qatar's agricultural sector is dependent on groundwater aquifers for its water supply, with only limited amounts of treated water used to grow animal fodder. The Qatari government has realised, however, that the use of groundwater for this purpose is untenable. The annual rate of extraction is almost four times that of recharge. Over-mining of aquifers has resulted in falling water tables and groundwater salinisation has reduced agricultural productivity.

Qatar claims that its seawater desalination capacity positions the country in a state of "structurally-induced water abundance". Desalination accounts for 50 per cent of total water consumption; groundwater (36%) and recycled wastewater (14%) complement this supply. Qatar has one of the highest per capita water consumption rates in the world and this is expected to increase in the coming decade. The Qatari National Development Strategy report estimates that water consumption will increase 5.4 per cent annually for Qataris and 7 per cent annually for non-Qatari residents to 2020.

Strategies for water security

Efficient Agricultural Practices

Agriculture places heavy demands on Qatar's water system and used 36.2 per cent of total water resources in 2011. Targeted farming and improved irrigation techniques could increase the efficiency of domestic agricultural production. More than 43 per cent of water used for agriculture is used to irrigate fodder crops. Of this, more than 70 per cent is used for flood irrigation. To ensure the efficient use of water, this technique needs to be replaced by drip irrigation systems and other water-saving technologies. Changing crop selection to heat tolerant varieties and species which require less water will also assist reduce irrigation demand and water wastage in the Agriculture sector.

Groundwater Management

Qatar shares the Umm er Radhuma aquifer with Bahrain and Saudi Arabia. Although the aquifer is threatened by salinisation due to seawater intrusion and over-extraction, there are currently no agreements in place between the countries for its management. It is estimated that at current rates of withdrawal, Qatar's aquifers will be depleted in 30 years. A joint management system will be required to treat salinisation, ensure the aquifer's sustainable use and prevent potential conflict over the resource.

Desalinated Water

Qatar plans to create cost-effective solar desalination plants to provide water for agriculture and reduce reliance on its depleting aquifers. The current demand of 1.4 billion litres of water per day is expected to increase by more than 50 per cent to 2.2 billion litres per day by 2022. Desalination plants already provide a large portion of the state's water and plans are underway to significantly expand these facilities to meet growing demand and supplant groundwater extraction for agriculture. The new plants will use advanced reverse-osmosis technology that is less energy intensive than the existing multi-stage flash process.

The Qatari government aims to end groundwater extraction entirely and use desalinated water to recharge its depleted aquifers. An over-reliance on desalinated water, however, comes with its own risks; as 25 per cent of the world's oil supply passes through the Persian Gulf each day the area is susceptible to oil spills that could disrupt the desalination process. The Persian Gulf is also at risk of increased salinity and algal blooms caused by the highly saline by-product released from desalination plants. Measures need to be put in place to reduce the risks associated with oil transport in the gulf and to manage the brine left as a result of desalination.

Strategic Water Storage

Qatar General Electricity and Water Corporation (KAHRAMAA) began work on the Water Security Mega Reservoirs Project in 2012. The mega reservoirs will allow Doha to store 7 days' worth of potable water based on the expected consumption rates in 2036. It involves the construction of five mega-reservoir sites which will link the Ras Laffan desalination facility in Qatar's north and the Ras Abu Fontas plant in the south. Construction will be carried out in two stages, with a total storage capacity of 14.384 billion litres of water expected upon completion. These large reservoirs will serve an indispensable role in water storage and will play a crucial part in enhancing Qatar's future water security.

Household Use and Wastewater Management

Waste water is the only water in surplus and therefore significant potential exists for its use to improve water security. According to Qatar's Minister of Development, Planning and Statistics, 50 per cent of wastewater is collected, with 60 per cent of this treated at a basic level. Under-developed infrastructure to treat and deliver recycled water to potential users is limiting the expansion of waste water re-use. Qatar will need to expand both the collection and the distribution networks for recycled water, and attract private sector investment in water treatment facilities.

Qatar has one of the highest domestic water consumption rates in the world; Qatari households consume approximately 430 litres of water per day on average. Water usage is also higher amongst Qatari residents when compared with expatriate consumption, indicating a need to initiate changes in behaviour and attitudes to water conservation. Water usage is currently unmetered and it is unlikely that the Qatari government will produce unpopular policies to restrict its usage. Instead the government plans on increasing

awareness of water scarcity amongst young people by launching a national campaign in partnership with the Water Interest Group of the Qatar Green Building Council.

In 2008 laws were introduced to reduce outdoor hose water usage, while current strategies to reduce usage include the formation of a Department for Conservation & Water efficiency within KAHRAMAA. KAHRAMAA are charged with implementing the Qatar National Water and Electricity Conservation Campaign which aims to reduce water consumption by 35 per cent between 2009 and 2016. Despite these efforts, water consumption rates remain a significant problem and Qatar will need to consider developing greater incentives for its residents to reduce water usage.

Conclusion – Qatar’s Food and Water Security to 2025

Qatar is expected to experience high rates of population growth and with it a rise in food, water and energy consumption in the coming years. This will place an increased strain on its resources. Rising temperatures and reduced rainfall associated with climate change is also expected to exacerbate these conditions.

In order to increase the output of the agricultural sector a significant increase in Qatar’s water supply is required and Doha has already acknowledged that this cannot come from groundwater. Qatar’s goal to produce 40 per cent of its food needs by 2025 hinge upon the ability of the country to find new and sustainable water sources. Without these sources, food self-sufficiency plans are economically and environmentally unsustainable. Qatar is capable of expanding desalinated water resources to meet the water requirements for domestic agricultural expansion. The cost of doing so, however, is significantly higher than importing food needs.

Qatar is likely to remain dependant on food imports to meet a significant portion of its demand beyond 2025, leaving it vulnerable to supply risk due to geopolitical conflicts and global food price rises. Strategies that reduce supply risk and secure food imports by diversifying supply sources and reducing transaction costs for trade will be required to enhance future food security. Economic diversification will also ensure it can maintain its trade-based food security without relying on its hydrocarbon stores. Future self-sufficiency plans need to be balanced and should consider the economic and environmental ramifications of expanding domestic production and the associated requirements on natural resources.

Any opinions or views expressed in this paper are those of the individual author, unless stated to be those of Future Directions International.

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