

# Strategic Analysis Paper

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## Kuwait: Food and Water Security

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### Key Points

- Kuwait is currently food secure, having the ability to import its food requirements using wealth from oil revenues.
- Spending is expected to exceed oil revenue by 2017; economic diversification will be essential to maintain a system of trade-based food security.
- Vast potential exists in investing in solar-powered desalination processes to provide an environmentally sustainable approach to addressing the risk of depleting hydrocarbon stores.
- Supply-side management is required to address extremely high domestic food and water consumption rates.

### Summary

Kuwait has the highest level of food security among Gulf Co-operation Council (GCC) member states. Like its GCC counterparts, export revenues from oil and gas allow for a system of trade-based food security. An arid climate and water scarcity mean that agricultural production is limited and domestic food production cannot meet demand. Climate change and increased soil salinity further impedes the growth and development of the agricultural sector. A rapidly growing population, rising affluence and changing consumption patterns add to challenges faced in achieving sustainable development. Kuwait aims to achieve food self-sufficiency by 2040, however, a lack of natural resources, coupled with a stagnant economy, lack of political consensus and poor economic outlook lead to questions about the feasibility of these plans.

## Analysis

### Water Resources

With no permanent rivers or lakes, groundwater is Kuwait's only natural water resource. In a [report](#) published by the World Resources Institute in August 2015, Kuwait is placed among nine of the highest-ranked countries that face an 'extremely high water risk' by 2040. The long-term average rainfall is around 121mm per annum; high evaporation rates and deficient soil moisture mean only a small percentage of this infiltrates aquifers. The country has almost no internally renewable sources of groundwater. It relies on an inflow of about 20 million m<sup>3</sup> annually in lateral underflow from Saudi Arabia. What little groundwater supplies Kuwait has are deteriorating in quantity and quality due to continuous pumping, with extraction rates approximately 12 times the recharge rates. For its freshwater resources Kuwait is dependent on desalinated seawater, its scarce natural groundwater and treated municipal wastewater; an optimum utilisation of all water resources is required for sustainable development.

#### *Water Demand and Supply*

Kuwait's water consumption is among the highest in the world with per capita consumption averaging 447 litres every day. The groundwater withdrawal rate is 255 million m<sup>3</sup> per year, 12 times its annual groundwater inflow. Of total water withdrawn annually, 54 per cent is used for agriculture, 44 per cent for municipal purposes and 2 per cent for industrial purposes. High rates of withdrawal are leading to increased salinity in the existing water supply. Desalination plants are the primary source of freshwater for drinking and domestic purposes in Kuwait, providing 92 per cent of water for domestic and industrial needs and 60 per cent of total water supply. There is no charge for the use of groundwater supplies; this leads to wasteful practices in agriculture and misuse of high-quality water.

### Strategies for Water Security

#### *Desalinated Water*

Kuwait operates seven desalination plants with a total maximum daily production capacity of 2.432 million m<sup>3</sup>. Desalination alone will not meet the demands of Kuwait's growing population. Kuwait faces the real threat of being unable to afford the expense of desalinated water without a strong diversified economy. Although it is currently feasible to produce desalinated water in the short- to medium-term, a more cost-effective and less energy-intensive solution will be necessary for the long-term.

Kuwait has immense solar power potential, estimated at 389 MW per day. Fossil fuel powered desalination processes can be replaced by renewable solar technology. The construction of a major solar powered desalination plant in Kuwait is estimated to cost approximately US\$2.5 billion, with an expected payback period of eight to ten years. Investment in solar powered desalination could reduce emissions in Kuwait by 0.36 million tonnes and save 0.963 million barrels of oil annually, making it both cost-effective and an environmentally sustainable solution that is able to bypass the risks of volatile fuel prices and depleting hydrocarbon stores.

### *Wastewater Treatment*

At US\$3.4 billion, the majority of investment in water in Kuwait between 2005 and 2014 was spent in the construction of water treatment plants. The estimated annual volume of recycled wastewater produced is between 206 and 254 million m<sup>3</sup>. About 30 per cent of wastewater is currently discharged into the sea. Kuwait plans to increase its water resources by utilising 100 per cent of its wastewater for use in agricultural irrigation, greenery landscaping and the development of forested areas. This will assist in reserving freshwater and reducing the water resource deficit. Treated wastewater also costs less to produce than freshwater, and costs less for consumers to purchase.

The Kuwaiti government is currently working on a project to build a wastewater system with an initial capacity of 500,000 m<sup>3</sup> per day as well as the construction of wastewater transmission and sewage effluent networks. This is an essential step in moving to improve and expand the existing collection and distribution network and provide adequate storage facilities for the expected increase of wastewater.

### *Artificial Aquifer Recharge and Strategic Water Storage*

Treated wastewater can also be used to artificially recharge fresh and brackish water lenses in Kuwait's aquifers during winter periods when demand for irrigation water is lower. This strategy has the potential to improve future water security as municipal wastewater increases. The water stored in the aquifer can then be used for irrigation during high demand periods or used as a strategic water reserve.

In 1976, Kuwait's Ministry of Electricity and Water built 33 towers that had a total storage capacity of over 100,000 m<sup>3</sup>. There is considerable potential to enhance water security by increasing its strategic water storage volume. The Kuwaiti Government needs to prioritise investments in infrastructure to increase its strategic water capacity.

### **Land Resources and Agriculture**

Only 0.6 per cent of Kuwait's land is arable, with 0.3 per cent used for permanent crops and 7.6 per cent for permanent pasture. Arable land is declining at a rate of one per cent per annum. Kuwait's arable soils contain 80 to 90 per cent sand and have very low water retention capacity and organic nutritional elements. Almost all of the cultivated area relies on artificial irrigation. Of water withdrawn annually from Kuwait's groundwater supplies, 54 per cent is used for agriculture.

Waterlogging, salinisation and intensive use of rangelands have contributed to land degradation over the years, leading to decreased agricultural yield. Agriculture accounts for only 0.24 per cent of Kuwait's gross domestic product and the reduction in productivity results in a declining agricultural labour force. In order to achieve increased agricultural production levels the government will be required to invest in agricultural technology, education and training to make the sector more viable.

### *Food Production*

In an attempt to enhance food security, Kuwait is aiming to reclaim more land through irrigation. With support from the government for large-scale food production, Kuwait is steadily increasing the domestic production of some food items, including poultry, eggs, fruit and vegetables. A lack of water, however, places considerable limitations on any expansion of Kuwait's agricultural sector. Focusing on reducing the vulnerabilities associated with a dependence on food imports will be a more cost-effective approach to enhancing food security.

### *Imports*

Kuwait's reliance on food imports increases its risk of food insecurity as it faces the threat of supply disruptions. Kuwait's geographical location bordering Iraq and in close proximity to Iran introduces geopolitical considerations to continued food security. For instance, [past Iranian threats](#) to close vital trade routes highlight Kuwait's reliance on international shipping. Disturbances to Arabian Gulf shipping lines could hamper the delivery of food imports to Kuwait. Improving food storage facilities in Kuwait would go some way towards mitigating the threat of supply disruptions by reducing import reliance and enabling Kuwait to better capture and utilise domestic production.

### **Strategies for Food Security**

In May 2015, Kuwait announced plans for food self-sufficiency by 2040; however, details of the plan remain unclear. Complete food self-sufficiency will be both economically and environmentally unfeasible, and could potentially waste scarce water resources. Kuwait has the potential to be self-sufficient in selected food stuffs, such as poultry. Targeted farming that uses water-efficient and drought-resistant crops will ensure the optimum use of limited resources.

### *Demand Management*

Policy is currently focused on supply-side management through increased agricultural output and increased capacity for desalination. There needs to be a greater focus on demand-side management. Kuwait is currently among the highest water and food consumers in the world. The high level of food consumption has led to elevated levels of over-nutrition, with approximately 90 per cent of Kuwaitis reportedly obese or overweight.

Subsidies are given to farmers which lower the price on produce. High affluence and low food prices have led to overconsumption and food wastage. As many as 58 per cent of Kuwaitis say they prepare more food than they require. The situation is rarely referred to in the media and government campaigns have failed to raise sufficient awareness of the need to adjust water consumption. Education campaigns to prompt behavioural change are required to change attitudes towards water conservation, and encourage domestic water saving practices.

### *Economic Diversification*

As oil-rich GCC states attempt to diversify their economies to reduce reliance on hydrocarbon stores, Kuwait's economy remains stagnant and has fallen behind in attracting investments aimed at diversifying its economy. Kuwait's non-hydrocarbon sectors declined after the Iraqi invasion in 1990, which saw the departure of hundreds of businesses and foreign banking and investment institutions.

Kuwait's economy is currently dominated by petroleum, which has endowed it with a level of wealth that was estimated at US\$2.1 trillion in 2011. In 2012, half of the country's US\$167.9 billion GDP derived from petroleum production, with earnings from oil comprising 93 per cent of government revenues, 90 per cent of export earnings and 45 per cent of its GDP.

In order to maintain a system of trade-based food security, Kuwait depends on export revenues from its extensive oil and gas reserves and the International Monetary Fund forecasts that spending will exceed oil revenue in the next five years. This heavy reliance on oil production means that Kuwait's economy experiences considerable exposure to external risk, particularly from oil price fluctuations.

High reliance on oil also raises questions about the economic feasibility of Kuwait's food self-sufficiency plans. Desalination costs US\$1.2 billion each year with this figure likely to grow with increased population and food production. Kuwait will need to accelerate its efforts to diversify its economy in order for its food self-sufficiency plans to be more sustainable.

In 2010, Kuwait announced a five-year development plan which included plans to turn Kuwait into a regional trade and financial hub for the northern Gulf through economic development, diversification and GDP growth. Disputes between the National Assembly and government, however, have resulted in repeated delays and stalled projects. In 2014, a new five year plan was announced which aims to renew activity in stalled metro and rail projects, but doubts remain as to whether enough political consensus can be built for the plans to be implemented.

### *Land Rehabilitation*

Situated in a hyper-arid location, almost 100 per cent of land in Kuwait is desertified. Urbanisation, extensive grazing, off-road vehicle use, overexploitation of sand and gravel resources and military activities have all contributed to land degradation. Depletion of groundwater has also increased levels of soil salinity.

Land rehabilitation can assist in increasing domestic food production capabilities. Studies have shown that land rehabilitation in Kuwait can benefit from planting native plants that have wide special distribution rather than using plant species that are confined to small specific habitats.

## Food and Water Security Outlook – to 2025

The following actions have been identified to secure Kuwait's food and water security to 2025:

- Investments are required in agricultural technology to assist targeted farming practices. This can increase domestic production of certain foodstuffs while ensuring crops produced are drought-resistant and use water efficiently. Domestic food production should not be aimed at significantly increasing production as this will be environmentally unsustainable and lead to a waste of water resources.
- Increasing food storage capacity to reduce vulnerabilities associated with reliance on food imports. Kuwait is expected to remain heavily reliant on food imports to 2025. This will mean food affordability may be reduced during unexpected price hikes on imports. Kuwait will also continue to be vulnerable to threats of supply disruptions caused by regional and international conflicts.
- Political cohesion is required to ensure the successful completion of water management projects. With its acute lack of natural groundwater resources, increasing demand for water supply and lack of clear plans for water management, Kuwait is at high-risk of experiencing water crisis before 2025 unless appropriate measures are taken to improve water management. The government has declared its commitment to working towards reducing per capita water consumption and investing in wastewater management and desalination projects, however, political instability may halt many projects, leading to potentially adverse impacts on water security.
- An increased effort in demand-side management to curb over-consumption of food and water. Policy is currently skewed towards supply-side management and overlooks the potential for water conservation from reduced wastage. Behavioral change through awareness campaigns can encourage support for water prices in the future.

Kuwait's population is expected to continue growing to 2025 and unless government policies are altered to discourage over-consumption, food and water demand will continue to expand from their already unsustainable levels. As the global population grows, income levels rise and consumption patterns change, world food demand is projected to increase considerably. This, however, is unlikely to seriously affect Kuwait's capacity to support trade-based food security due to its high degree of wealth from oil revenues.

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