

Strategic Analysis Paper

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Scarcity and Abundance: UAE Food and Water Security

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Key Points

- The United Arab Emirates is extremely water scarce and cannot support a domestic agricultural sector capable of feeding its population.
- The country's energy resources and financial wealth enable it to comfortably meet its food and water needs through desalination and trade.
- Long-term food and water security and agricultural self-sufficiency are key strategic goals for the UAE government; critical dependency on desalination and food imports exposes the country to risks from global food price spikes and shortages, and geopolitical and environmental threats.
- The UAE has one of the world's most comprehensive plans to support food and water security, but much can be done to improve its sustainability.
- The UAE's strategy to develop its position as a regional hub for agri-food trade will support efforts to bolster regional food security.
- Opportunities exist for Australia and the UAE to collaborate to improve the UAE's food security and boost Australia's agricultural sector.

Summary

The UAE is one of the world's most water-scarce nations and faces a crippling shortage of renewable fresh water. Dubai, its most populous city with more than two million people, relies on desalination plants for 98.8 per cent of its water supply. Without an adequate renewable water supply, the UAE is unable to grow the food needed to feed its population.

Despite the extreme scarcity of water and agricultural resources, the UAE is by [many measures](#) comfortably food secure. The country was ranked 30th in the world on the Economist's recent Global Food Security Index. The UAE's oil and gas wealth enable it to comfortably maintain an affordable and accessible food supply through international trade.

The country's reliance on artificial water sources and imported foods, however, makes it vulnerable to crises and undermines its long-term food security. For this reason, the UAE has developed one of the world's most comprehensive food and water security strategies. It recognises that "water is a strategic commodity on par with oil – maybe even more important" and that "without water security, there can be no food security".

Analysis

Demand

The UAE's current population of 9.34 million people is projected to reach close to [11.5 million people by 2025](#). This will place increased pressure on the country's already strained food and water resources. Food consumption is currently growing at 12 per cent each year and it is predicted that the value of food imports will increase from US\$3 billion in 2011 to US\$8.4 billion by 2020 to meet this demand. Significant issues with food waste and over-consumption further increase the UAE's food demand. The UAE has one of the world's highest rates of obesity, in part due to the shift towards a globalised diet that began following the discovery of the country's oil wealth. The demand for processed, western foods increases the UAE's reliance on food imports.

Over-consumption is also a problem in the water sector. The UAE is the world's third largest consumer of water, despite its arid climate and lack of renewable water sources. Consumers in the UAE use around 400 litres of water each day, compared to a global average of 250 litres. The UAE relies on its expensive desalination plants to meet this water demand.

Supply

Water Supply

The United Nations defines a country as 'water scarce' if it has 1000 cubic meters of water or less available per capita, per year. The UAE's natural water supply is less than half this level, making it one of the world's most water-scarce nations.

Most of the groundwater in the UAE is found in fossil aquifers that receive little to no water recharge. For every litre of water that flows back into the country's groundwater reserves from infrequent rainfall, twenty-five litres is withdrawn. This rate of extraction is leading to severe degradation of the remaining water supplies. Renewable water resources have decreased by 42 per cent since 2000 and further declines are expected in the near future. Acute water shortages are expected in the region by 2025.

To meet the skyrocketing water demands of its population, more than 25 desalination plants supply as much as 80 per cent of the UAE's total water supply. While critical to the viability of the state, however, desalination is a costly and energy-intensive process. It is estimated

that by 2030, even with improvements in technology, desalination will consume at least 20 per cent of the UAE's overall energy production.

Food Supply

More than 70 per cent of all water used in the UAE goes into irrigation for agriculture. Even with ambitious plans to cut agricultural water use in half by the end of 2014, expanding domestic production is difficult due to the lack of available water supplies.

Only 6.5 per cent of the UAE's land is suitable for farming and it is difficult to produce economically viable crops in conditions of extreme heat, low rainfall and barren desert soil. Despite being the country's major consumer of water, the agricultural sector, contributes only 3 per cent of the country's GDP and employs only 3 per cent of the labour force. The UAE's major crop is dates, along with tomatoes, cucumber and eggplant. The country is close to self-sufficient in fruit and vegetable production. It also produces enough eggs, poultry, fish and dairy products to meet its needs. This production does not meet the dietary needs of the population, however. The UAE relies on imports for its grain, meat, sugar and edible oil needs. Food imports amount to between 85 and 90 per cent of food consumption each year. Its main food sources are India, the United States and Brazil.

There are three aspects to food security: the availability, affordability and accessibility of food. Limitations on agricultural production mean that the UAE's biggest challenge is availability. The country simply cannot produce the quantity of food it needs to feed its population. Food security, however, does not rely solely on the ability to produce food domestically. A strong oil and natural gas industry and high levels of national and per capita income mean that the UAE can comfortably afford to maintain trade-based food security.

Food and Water Security Risks

Although the UAE has extensive desalination infrastructure and the finances to ensure access to affordable food supplies, its heavy reliance on artificial water and external food sources exposes it to risks arising from volatility in the global food market, geopolitical instability, and environmental threats.

Market volatility

The global food price crisis was the catalyst that caused Middle Eastern countries to start thinking seriously about their long-term food and water security strategies.

In 2008, rising food demand from emerging economies and crop decimation caused by natural disasters in grain-exporting regions led to diminished grain availability globally. As supply contracted, prices rose. The world food price index increased by 45 per cent during 2008. The price of wheat – one of the UAE's major food imports – increased 130 per cent. Major food producing countries imposed export bans to protect their domestic prices.

The UAE is highly exposed to volatility in world food markets due to its heavy import reliance. As global prices rose and sellers left the market, the UAE's strategic food reserves fell to only 10 days supply and domestic food prices rose. In neighbouring countries, rising

food prices triggered riots in the streets. These incidents demonstrate the potential vulnerability within the UAE to food and water shortages in times of crisis.

Geopolitical risk

Geopolitical threats in the Middle East exacerbate the risk created by critical dependency on imported food and artificial water supplies. A secure supply of food and water is essential to the smooth functioning and stability of the UAE. Should simmering regional conflicts escalate, some of the UAE's critical trade links could be jeopardised, complicating food accessibility.

Environmental threats

The UAE's desalination capacity is vulnerable to external threats. Four oil spills seriously impacted production between 1994 and 2001, as did red tide algal blooms in 2007 and 2008. [If leaks were to occur from Iran's Bushehr nuclear plant](#) this could also contaminate the water fed into the desalination plants.

The UAE's domestic agricultural production faces threats from land degradation, sand invasion and recurrent drought. The environmental threats will be exacerbated by climate change. Rising temperatures in the region, which already experiences extreme heat, will damage the UAE's vegetable and fruit crops. Less rainfall could lead to lower organic matter content in soils and ultimately, lower productivity. These issues will also arise in many of the countries the UAE imports its food from.

The UAE's food and water security strategy

The UAE's energy wealth has allowed it to take impressive steps to address the huge challenges it faces in pursuing a food and water secure future. In 2010 the government established the Food Security Centre in Abu Dhabi to support the implementation of the emirates' food security strategy. The government also supports a number of food security forums, including the inaugural World Food Security Summit, held in Dubai this year. It has pushed for food security to be a key item on the agenda at international meetings, including the G20.

Self-sufficiency strategy

Central to the UAE's national food security strategy is an aspiration towards agricultural self-sufficiency. The government has invested heavily in the agricultural sector by providing the technology required to improve land and water management.

Investment in modernising irrigation systems is part of a strategy to halve agricultural water use by the end of 2014. Water conservation technology has been provided to over 6,200 farms since 2009 and irrigation systems have been upgraded on another 1,200. The use of greenhouses is encouraged to reduce water-use as crops grown in closed-system greenhouses use only 10 per cent of the water required by those grown in open fields. There has also been a shift to the production of high-value, water-efficient crops that can increase the profitability of the sector.

Dramatically reducing water use in the agricultural sector is a critical goal and improving the viability of the sector reduces the UAE's vulnerability to crises. The measures being implemented, however, are expensive and capital intensive. The environmental impact of continued over-extraction of groundwater for agriculture – even with more efficient technology – could also be disastrous in the long-run.

Bolstering water supply

To support water security, the UAE has created a Water Council to coordinate and supervise integrated water management plans. The Council's Water Conservation Strategy provides the framework to manage the UAE's water resources to 2021. Most plans to this point, however, have focussed on supply-side management. Large-scale infrastructure development has occurred in the water sector with the construction of new recharge dams, desalination plants, and waste-water treatment facilities. Desalinated water is being pumped into a fossil aquifer in the [Empty Quarter](#) to re-fill it with enough water to last the country 90 days. While notable, without a simultaneous focus on demand-management, however, these projects will not be enough.

International agricultural investment

In the aftermath of the global food price crisis one of the UAE's key policies to improve food security was to secure import sources by engaging in offshore farming contracts. Investment in overseas agriculture aimed to increase global food supply and ensure that in times of crisis, the UAE had a guaranteed import source. Buying thousands of hectares of cheap farmland gave the UAE direct access to massive food production bases. This policy was implemented through direct government contracts and support for private sector agribusiness partners, including the Emirates Investment Group and Abraaj Capital of Dubai.

In the years immediately following 2008, investment was targeted in developing countries with abundant land and water resources but underdeveloped agricultural sectors. Large tracts of land were purchased or leased in North Africa and South Asia. In Sudan, the UAE leased 400,000 hectares of farmland. However, the strategy has not proven as successful as hoped. In poor countries in Africa where hunger is rife, export-oriented farming projects aroused local hostility. Furthermore, weak infrastructure, poor security situations and high political and sovereign risk has plagued the development of many ventures.

In response to these early failures, the UAE has now shifted the focus of its international investment strategy and has begun investing in landholdings in established agro-producing regions such as Eastern Europe, Australia, and North and South America.

Regional agri-food hub

The UAE has also developed a strategy to bolster its position as the hub for food trade for the entire Gulf Cooperation Community (GCC), supporting regional food security. The UAE has an advanced network of ports, roads and air links, leading the UN to identify it as a key potential regional food hub. The country already re-exports over half of the food that it imports to its neighbours; the government is now partnering with the private sector to develop food storage and distribution facilities. To facilitate these developments the UAE also introduced a new federal food safety law in March 2014 aimed at harmonising policy and strategies across the emirates. In addition to the commercial benefits, developing the

UAE's re-export industry will reduce risks to food security by ensuring that the country has a predictable supply of safe food for its residents.

Policies for a sustainable water and food-secure future

The UAE has made major investments in its food and water future, but opportunities remain to develop an even more sustainable strategy. To ensure its future water and food security, the UAE needs to address issues regarding water demand and further diversify its food supply. This will require bolstering the sustainability of the domestic food sector; reducing exposure to volatility in global food prices by building up storage infrastructure and reserves; and pursuing low-risk international contract-farming arrangements.

Demand-management

While the UAE has made impressive advances to improve its water security through supply-side initiatives, it urgently needs to focus on demand management if it is to ensure a sustainable water future. Providing free or heavily subsidised water creates no incentive to use water wisely. Water subsidies currently cost the country 10 per cent of its GDP. Cutting back on water subsidies for the agricultural sector is crucial, as is ensuring that the cost of water is passed onto users and priced in a manner that reflects its scarcity.

Agricultural sustainability

Maintaining a domestic food production industry is critical to reducing the UAE's sense of vulnerability to food shortages and supply shocks. Research, innovation and investment in sustainable technologies will enable this goal.

However, while self-sufficiency is a politically palatable goal, it is not a realistic value proposition given resource constraints. Not only is the policy costly – importing food is far cheaper than the heavily subsidised and capital-intensive domestic industry can produce – current water use by the sector is unsustainable and will cause shortages. The goal should be to reduce the agricultural sector's total water use, rather than to increase the quantity of food produced with currently available water.

Strategic reserves

The UAE would benefit from further developing its food and water storage infrastructure to complement its highly-developed transport infrastructure. Building food and water reserves would reduce the UAE's risk of disruptions to its water production facilities and its exposure to volatility in the global food market. Larger reserves provide a buffer against high prices and supply shortages.

Low-risk contract farming

Securing food supplies through investment in international agriculture is a critical strategy. The UAE should ensure its investments are geographically diverse, to reduce the risk of increasing food import prices. Price rises may occur if weather events in producing countries reduce supply or if currency movements increase the price of food supply contracts denominated in foreign currencies. To limit the difficulties associated with international contract farming, the UAE should target investment at countries with established

agricultural sectors that produce a significant surplus, such as Australia. Australian Trade Minister Andrew Robb said in a recent visit to the UAE that, '[T]here is a strong fit between demand in the Gulf and Australia's strengths.'

Australia produces enough food each year to feed 40 million people – well above the needs of its 23 million citizens. The sector produces a globally recognised high-quality product and has separate growing regions, minimising climatic risk. Australia is geographically proximate and well located on trade routes to the UAE. The country's stable political environment and its commercial and legal spheres also safeguard contracts. Australia has an agricultural sector that is highly productive, nonetheless it is eager for investment and guaranteed access to markets. Significant opportunities exist for Australia and the UAE to benefit from forging closer links in agricultural trade and investment.

The UAE's water and food security situations are defined by domestic scarcity and abundance achieved through desalination and trade. Despite inadequate water supplies and a weak agricultural sector, the UAE is comfortably food secure. The country, however, faces ongoing challenges meeting its future food and water needs; in particular, its current reliance on artificial and external food and water sources creates significant vulnerability. The country will never be food self-sufficient and renewable water source shortages are almost guaranteed. However, with its comprehensive strategy to mitigate these threats, backed by ample finances and strong political will, the UAE should be able to maintain its current level of comfortable food security. Furthermore, its proactive stance and efforts to develop the infrastructure for an agri-food hub for the GCC will go a long way towards ensuring the region's food security.

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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