

## Fighting Water Scarcity

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### ***How To Defeat Drought***

***Cape Town is running out of water. Israel offers some lessons on how to avoid that fate.***

By Seth M. Siegel

Cape Town, a city of some 4 million people, is on the verge of running out of water. Terrifying as it may sound, water scarcity never happens by surprise. At the national, provincial, and municipal levels, South Africa's leaders ignored Cape Town's shrinking water supply until it became a crisis.

The mistakes were made at every level. Cape Town had no comprehensive, long-term water plan to match water resources with the city's soaring population. No official program encouraged planting water-efficient crops or the use of water-saving technologies. The city reused only 5 percent of its wastewater for industrial and irrigation purposes. Its water has long been free or heavily subsidized, with no market-based incentive to conserve. And most remarkably, although Cape Town sits on a long seacoast hugging the southern Atlantic Ocean, officials delayed building desalination plants for the city.

But solutions to these problems exist. South African officials should have paid attention to a country that long ago figured out how to deal with water shortages before they appear: Israel.

From its founding, Israel not only prioritized water conservation but celebrated it. Theodor Herzl, the father of modern Zionism, wrote in 1902 that water engineers would be the heroes of a future Jewish state. Heeding that call, Israel's pre-state leaders developed an early ideological commitment to preserving and expanding the water supply.

The challenge of keeping a desert country hydrated lured Israel's most talented minds. (In his 1994 Nobel Peace Prize lecture, Israeli Prime Minister Yitzhak Rabin revealed he, too, once dreamed of becoming a water engineer.)

In the early 1960s, Israel began two science fiction-like water initiatives. Recognizing that the amount of water used by showers, dishwashers, and toilets was predictable, Israel turned its national sewage supply into an enormous alternative source of water.

By the early 1980s, Israel had routinized the aggregation and purification of the country's wastewater and built a parallel water infrastructure system to transport treated water to farms. Today, nearly 90 percent of Israel's sewage is treated to an ultrapure level for agricultural use.

By comparison, Spain — second globally in sewage recycling — reuses only some 17 percent of its wastewater. The United States repurposes far less. Israel's second grand water initiative — desalination — also began in the 1960s. Around that time, an experimental desalination facility in Israel produced a cubic meter of water (264 gallons) for \$14. Israel now produces the same volume for about 50 cents. By filtering seawater through holes that are about 0.5 nanometers wide, the desalination process captures all dissolved material, including salt, while the fresh water passes through. (The resulting water is so pure that minerals need to be added back in.)

These two technologies alone could prevent, or at least postpone, another Cape Town-like crisis. Yet both are expensive and sometimes out of reach for countries on the lower end of the economic development scale. But Israel also leads in low-cost efforts to reduce the use of water for agriculture.

On average, countries use 70 percent of their fresh water to grow food. Highly inefficient water users — such as Egypt, Ethiopia, and Iran — use as much as 95 percent. Adopting drip irrigation, as Israel has, could reduce those percentages significantly. Drip irrigation uses about half of the water that traditional irrigation does and can also produce larger yields.

Liquid fertilizer can be added along with the water droplets, minimizing groundwater contamination. In both India and China, adopting drip irrigation has increased farmers' yields and limited groundwater contamination from traditional fertilizer. India subsidizes loans for farmers as an incentive for more rapid adoption.