

Singapore's Award-Winning Approach to Water Management

The article traces how Singapore—with no natural aquifers or ground water—goes from having inadequate supplies to winning awards for exemplary water management.

By PUB

Singapore, which last year won its second award for efficient water management, is increasingly being held up as a model city for sustainable water management.

Its national water agency, PUB, won the 2007 Stockholm Industry Water Award – one of the highest accolades in the industry – and the 2006 Water Agency of the Year prize, the first to be presented by Global Water Intelligence in its annual awards.

The Stockholm Water Award Committee said PUB had managed to put together a complex yet well-functioning water management system that was widely accepted by the public and industry.

The committee chairman Lars Gunnarsson says, “The PUB story would fit well as a study example in the education of water managers. This is an exemplary model of integrated water management in a framework of good policy and innovative engineering solutions.” PUB’s chief executive, Khoo Teng Chye, attributed Singapore’s success to several factors.

“We have always placed emphasis on R&D and water technologies” he said. “Water is an important resource and it is through strong political will, good governance, effective implementation and a motivated workforce that we have been able to put in place a robust and sustainable supply of water in Singapore.”

Singapore's water story

The fact that this young South-East Asian nation has managed to overcome chronic water shortages in the space of just four decades is no small feat.

Its natural constraints make water resource management a huge challenge: 4.5 million people living in an area of just 700 square kilometres, surrounded by the ocean but with few fresh water resources.

The country faced shortages, flooding, and pollution in its rivers in the 1960s and 1970s, and bought most of its water from Malaysia, its northern neighbour.

Knowing that this put it at the mercy of both nature and politics, the country made the strategic decision to invest heavily in new technologies in order to secure alternative sources of water.

This led to the formulation of a robust and diversified water supply strategy known as the Four National Taps, whereby Singapore would rely on four different sources: water from local catchment areas, imported water, reclaimed water and desalinated water.

Integrating the system and maximising the efficiency of each of the four taps have ensured a stable, sustainable water supply for Singapore.

It is one of the first countries in the world to fully exploit the idea of urban catchment, with half of Singapore’s land area now used to harness storm water.

This figure will increase to two-thirds by 2009 with the completion of several new reservoir schemes, including a unique “reservoir in the city”, the Marina Reservoir.

Making waves in water reclamation

As the island is 100% seweraged, PUB is able to separate the storm water and the used water it collects.

The used water is treated using state-of-the-art membrane technologies to produce high-grade reclaimed water known as NEWater, which has been a success story in itself. Introduced in 2003, NEWater is supplied mainly to non-domestic consumers such as wafer fabrication parks, industrial estates and commercial buildings for industrial and air-cooling purposes.

A small percentage is mixed with raw reservoir water before being treated conventionally at the waterworks for drinking – something a majority of Singaporeans now accept, thanks to a well-executed public education campaign.

Singapore's four NEWater plants can now meet 15 per cent of its water needs, with plans to further boost production to 30 per cent by building a fifth plant.

The country also turned on its first desalination plant in 2005, using reverse osmosis to produce drinking water from the sea.

Mega water projects

Several other mega projects are also underway. A dam that is being built across Singapore's Marina channel will soon be completed. Besides enhancing the country's water supply, it will also alleviate flooding in the low-lying city areas and be transformed into a lifestyle attraction offering a host of recreational possibilities for all to enjoy.

A new and more sophisticated system for managing the country's used water needs will also soon replace the current one. The Deep Tunnel Sewerage System will act as a "super highway" for managing used water more efficiently, designed so that gravity alone drives used water through a deep tunnel running from the north to the east of the island.

The used water is then treated to international standards at a centralised water reclamation plant before it is discharged into the sea or channeled to the NEWater Factory to be further purified into NEWater.

Managing demand

PUB realised that it was not enough to secure Singapore's water supplies, however – it had to manage demand, too.

The 2006 Stockholm Water Prize laureate, Professor Asit Biswas, highlighted this as a key ingredient in Singapore's effective water management, in a study he carried out for the United Nations Human Development Report 2006.

"Singapore is one of the very few countries that look at its water supply in totality," he said. "One of the main reasons why they are successful in managing its water supply is the concurrent emphasis on supply and demand management."

Besides diversifying its water sources, therefore, PUB has put in place a water demand management programme that incorporates the proper handling of the transmission and distribution network to minimise losses, as well as the implementation of water conservation measures.

The result was a considerable reduction in unaccounted-for water, from 11% in the 1980s to 5% today, one of the lowest levels in the world.

Engaging the community

In tandem with this, the water agency is engaging the Singaporean public with the goal of getting ordinary citizens to take ownership of the island's precious water assets.

Since 2004, a series of public education programmes has been launched to encourage water conservation through daily habits, due to the success of which, the per capita consumption of water in households has inched downwards, from 165 litres a day in 2003 to 157 litres a day now.

Individuals and organisations are encouraged to adopt the island's waterways and take care of it so that they learn the value of keeping it clean. The national water agency also actively promotes recreational activities at its reservoirs such that they are now a haven for water sports such as kayaking and wakeboarding.

In addition, PUB recently unveiled a long-term blueprint called the active, beautiful, clean waters programme, which will transform the country's drains, canals and reservoirs into vibrant streams, rivers and lakes, creating beautiful new spaces for the community's enjoyment.

The idea is to bond Singaporeans even more closely to the water, so they will cherish and better appreciate it.

PUB's Khoo said: "In a way, we are going to bake our cake and eat it too. Singapore already has an affordable and sustainable water supply system. Instead of keeping our water assets just for water supply, we are going to transform them so that the community can enjoy them as new lifestyle attractions."

A multi-million dollar industry

These achievements in securing the national water supply have been accompanied by the realisation that these new water technologies are a potential goldmine.

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Knowing that the water industry is projected to be worth about US\$400 billion by 2015, the Singapore government has identified it as a new growth sector for the country's economy.

It has invested S\$330 million in water R&D over the next five years, with the aim of tripling the value-added contribution from the water sector to \$1.7 billion (0.6% of GDP) by 2015.

The goal is to groom Singapore as a global "hydrohub" and, in that vein, major industry players such as GE Water, Siemens Water Technologies and Delft Hydraulics have been wooed to set up R&D centres in Singapore.

Home-grown water companies such as Keppel Corporation and Hyflux, as well as Singapore's universities, are setting up water R&D centres too.

Singapore has also spearheaded and played host to several international water conferences in the last few years, among them are the 2005 International Desalination Association World Congress on Desalination and Water Reuse, 2005 International Water Association

- Asia-Pacific Regional Group Conference and Exhibition and the first Singapore Desalination and Water Reuse Leadership Summit last year.

And this June, PUB is organising the inaugural Singapore International Water Week, a global platform for water solutions that will bring together water experts and companies from across the world to showcase new water technologies and share best practices.

The highlight of the event will be the first Lee Kuan Yew Water Prize, an international award to recognise outstanding contributions in solving the world's water woes.

The event is part of PUB's overall strategy for raising the profile of Singapore's water sector even further.

"It is a major step for us in our efforts to develop Singapore into a vibrant and thriving global hydrohub," said Mr Khoo. "It signals our strong commitment to developing the water industry in Singapore and building overseas linkages and partnerships."