Tropical Singapore an oasis for water research

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A view of one of the water catchment areas of the Upper Seletar reservoir in Singapore on June 20, 2009. Thanks to technology, Singapore now has the capability to generate much of its own water and is gearing up to play a major role in recycling used water -- an emerging industry worth around 100 billion US dollars globally.

Khoo Teng Chye, the amiable chief of Singapore's water agency, says he has been sleeping soundly since taking office five years ago.

Unlike his predecessors at the Public Utilities Board (PUB), Khoo does not have to fret about whether the wealthy but resource-starved island-state will have enough water for its long-term survival and development.

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used water -- an emerging industry worth around 100 billion US dollars globally.

"I'm lucky," Khoo told AFP in an interview ahead of an international conference and expo on water later this week.

"I came after the breakthrough so my thoughts now are more focused on how to make the industry grow," he said, referring to the process of purifying water on a large scale and relatively cheaply using membrane technology, a chemical-free way of purifying water.

Despite its rapid rise in affluence and having a well-equipped military to deter potential aggressors, Singapore's lack of natural resources has always made it vulnerable.

It buys a large part of its water requirement from neighbouring Malaysia, but this has become a contentious issue in often testy ties dating back to the their bitter separation more than 40 years ago.

"Ever since we became independent in 1965, the issue of trying to manage our water in such a way that we can sustain our growth and development way into the future has been a top priority," Khoo said.

With a land area of just 700 square kilometres (280 square miles), Singapore does not have the watersheds and natural rivers from which to draw the life-giving resource.

"We have only water from the sky -- the rain," said Khoo.

The government has turned two-thirds of the island into a massive catchment for the abundant rain that falls all year round to supplement the water piped in from Malaysia.

A 7,000-kilometre (4,340-mile) drainage network directs rainwater into 15 reservoirs, a number that will increase to 17 next year.

"We are probably the only city or country in the world that does urban stormwater harvesting on such a large scale," said Khoo.

As part of its overall goal to become an environmentally friendly city, Singapore is transforming the reservoirs into scenic lakes that can host water sports and other recreational activities.

Ugly concrete water drains and canals will be transformed to resemble natural rivers and streams, according to Khoo.

The turning point for Singapore came in early 2000 after improvements in membrane technology made it possible and affordable to treat sewage water on a massive scale, Khoo said.

The technology refers to a variety of processes using semi-permeable filters rather than chemicals or energy to separate untreated water from its contaminants and impurities.

The resulting product is safe to drink and use in the high-end semiconductor factories that are the engines for Singapore's economy.

Singapore quickly embraced the technology and turned a strategic weakness into an advantage.

The government has invested more than 5.0 billion Singapore dollars (3.45 billion US) to build water-related infrastructure over the past seven years, including four plants that recycle sewage water for homes and industries.

The government has dubbed the recycled product "NEWater".

A fifth water reclamation plant, one of the biggest in the world, will open on June 23 during International Water Week, an annual conference hosted by the city-state, now seen as a model for other water-deprived nations.

A 48-kilometre (29.76-mile) underground tunnel system will feed sewage water into the facility, capable of treating 800,000 cubic metres (176 million gallons) daily.

Initially the butt of many jokes, NEWater will account for 30 percent of Singapore's needs by next year, but this can easily be increased if the need arises.

Desalinated water -- costlier to produce than reclaimed waste water -- provides 10 percent of Singapore's needs, while local catchments and imported water account for the rest.

"I think we now have the capacity, if we need to, to be able to sustain our growth and development," said Khoo when asked if Singapore can become fully self-sufficient.

"As technology improves, cost will keep coming down."

Singapore's investments have created a spinoff industry which the government hopes will turn the country into a centre for research.

In 2006, the government earmarked 330 million dollars over five years to fund research in water technologies.

This has encouraged US conglomerate General Electric, Germany's Siemens and Dutch firm Deltares to set up research centres here to develop new solutions to meet the world's water needs, Khoo said.

In addition, some of the foreign and local firms that participated in building Singapore's water projects have made the country a base to serve clients in Asia and the Middle East.

Local firm Keppel Corp is building a 1.5-billion-dollar waste water treatment plant in Qatar, while another local firm, Hyflux, won a bid for world's largest seawater desalination plant in Algeria.

With an increasing number of people worldwide living in urban centres, meeting their water needs without harming the environment has become more compelling, Khoo said.

"Singapore in a way has become a hub for water knowledge and water expertise in the region," he said.

"The government wants to build on and enhance this hub as it sees that water, instead of being a strategic weakness, could possibly be a strategic strength for the country."

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