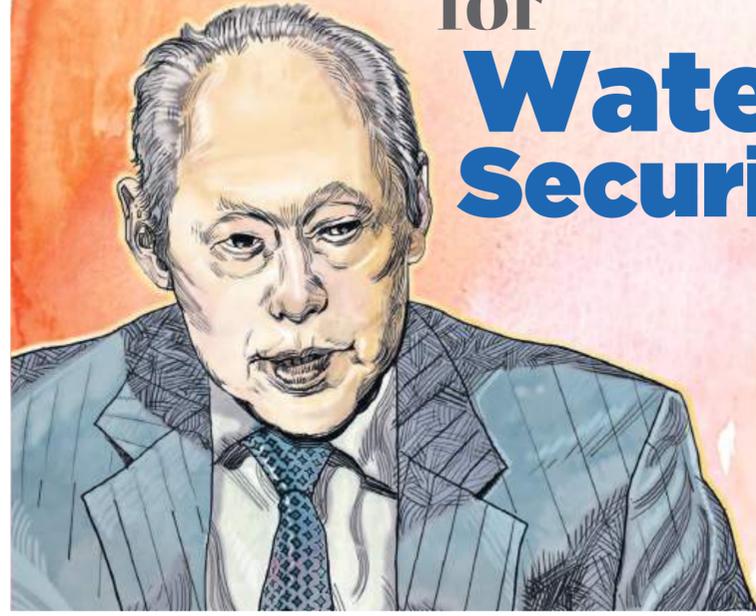


CHAPTER 2 Across the Causeway: Imported Water

The Quest for Water Security

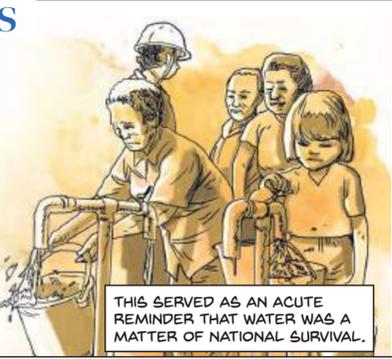
Water is a basic necessity. And for Singapore, it concerns our survival as a nation. This is a snapshot of Singapore's quest for water security.



"A few days after Independence, the Prime Minister of Malaysia told the British High Commissioner, 'If Singapore doesn't do what I want, I'll switch off the water supply.' So I knew that unless I could become less dependent on Malaysia's supplies, I would always be a satellite. So the quest began for water independence..."
- Mr Lee Kuan Yew, 25 June, 2008

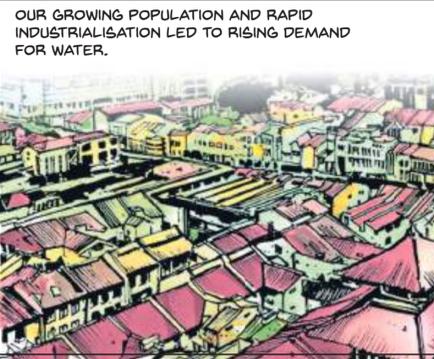
CHAPTER 1 Early Struggles & Resolve: Local Catchments

AS A NATION WITH ALMOST NO NATURAL WATER RESOURCES, SECURING A RELIABLE WATER SUPPLY WAS A CRITICAL PRIORITY FOR US. OUR FIRST NATIONAL TAP WAS OUR LOCAL CATCHMENTS.



1960s
IN THE 1960s, WE WERE HIT BY DROUGHTS. THERE WAS WATER RATIONING FOR 10 MONTHS.

THIS SERVED AS AN ACUTE REMINDER THAT WATER WAS A MATTER OF NATIONAL SURVIVAL.



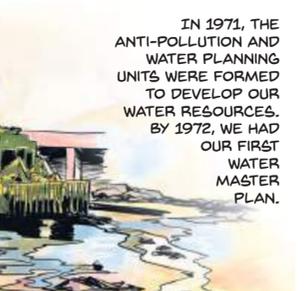
OUR GROWING POPULATION AND RAPID INDUSTRIALISATION LED TO RISING DEMAND FOR WATER.

WE HAD WATER AGREEMENTS WITH MALAYSIA, BUT NEEDED TO DO MORE.



WE LOOKED TO OUR WATER CATCHMENTS TO INCREASE WATER SUPPLY.

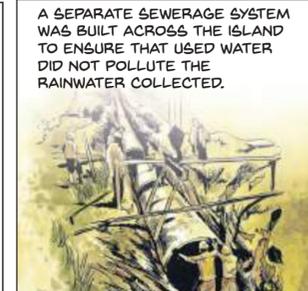
1970s
SO BEGAN A MASSIVE EFFORT TO CLEAN UP OUR WATERWAYS AND INCREASE OUR CATCHMENT AREA.



IN 1971, THE ANTI-POLLUTION AND WATER PLANNING UNITS WERE FORMED TO DEVELOP OUR WATER RESOURCES. BY 1972, WE HAD OUR FIRST WATER MASTER PLAN.



TEAMS LED BY LEE EK TIENG DAMMED UP ESTUARIES TO FORM NEW RESERVOIRS. A NETWORK OF DRAINS, CANALS AND RIVERS ENSURED ONLY CLEAN WATER RUNOFF FED THE NEW RESERVOIRS.



A SEPARATE SEWERAGE SYSTEM WAS BUILT ACROSS THE ISLAND TO ENSURE THAT USED WATER DID NOT POLLUTE THE RAINWATER COLLECTED.

OVER THE YEARS, OUR WATERWAYS HAD DEGENERATED INTO OPEN SEWERS AND RUBBISH DUMPS.

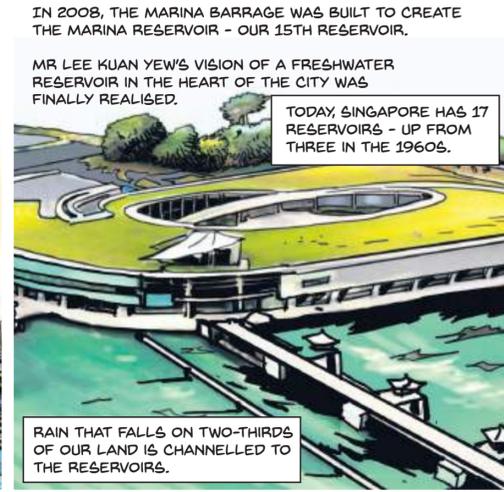
IN 1977, MR LEE KUAN YEW EMBARKED ON AN AMBITIOUS PLAN TO CLEAN UP THE SINGAPORE RIVER AND KALLANG BASIN.

"It should be a way of life to keep the water clean, to keep every stream, every culvert, every rivulet free from unnecessary pollution."
-Mr Lee Kuan Yew, 1977



1980s
THE CLEAN-UP WAS A MASSIVE UNDERTAKING THAT TOOK 10 YEARS (1977 - 1987).

THE RESULT? THE RIVERS BECAME SO CLEAN THAT AQUATIC LIFE RETURNED.

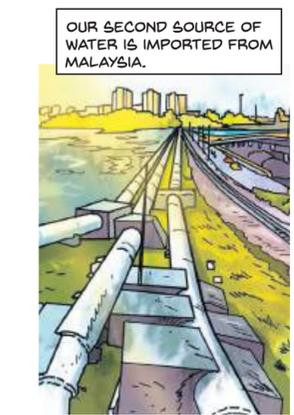


IN 2008, THE MARINA BARRAGE WAS BUILT TO CREATE THE MARINA RESERVOIR - OUR 15TH RESERVOIR.

MR LEE KUAN YEW'S VISION OF A FRESHWATER RESERVOIR IN THE HEART OF THE CITY WAS FINALLY REALISED.

TODAY, SINGAPORE HAS 17 RESERVOIRS - UP FROM THREE IN THE 1960s.

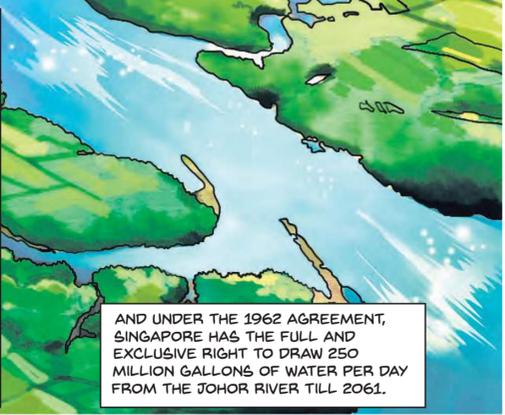
RAIN THAT FALLS ON TWO-THIRDS OF OUR LAND IS CHANNELLED TO THE RESERVOIRS.



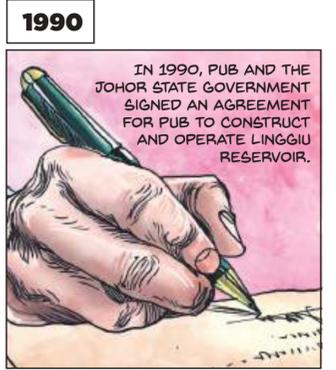
OUR SECOND SOURCE OF WATER IS IMPORTED FROM MALAYSIA.

TWO WATER AGREEMENTS SIGNED BETWEEN SINGAPORE AND MALAYSIA WERE IN FORCE WHEN WE BECAME INDEPENDENT IN 1965. THESE AGREEMENTS WERE GUARANTEED BY BOTH GOVERNMENTS IN THE SEPARATION AGREEMENT, WHICH WAS REGISTERED AT THE UNITED NATIONS.

UNDER THE 1961 AGREEMENT, SINGAPORE COULD DRAW AN UNRESTRICTED QUANTITY OF WATER FROM THE TEBRAU AND SCUDAI RIVERS FOR A PERIOD OF 50 YEARS, TILL 2011.



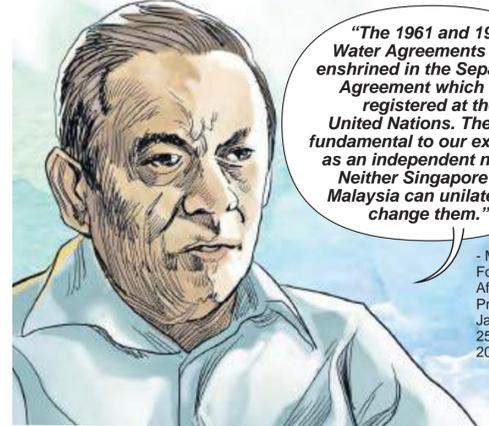
AND UNDER THE 1962 AGREEMENT, SINGAPORE HAS THE FULL AND EXCLUSIVE RIGHT TO DRAW 250 MILLION GALLONS OF WATER PER DAY FROM THE JOHOR RIVER TILL 2061.



1990

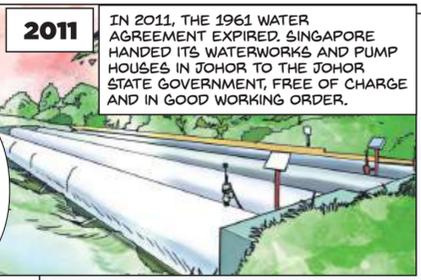
IN 1990, PUB AND THE JOHOR STATE GOVERNMENT SIGNED AN AGREEMENT FOR PUB TO CONSTRUCT AND OPERATE LINGGIU RESERVOIR.

FROM 1998 TO 2003, SINGAPORE AND MALAYSIA WERE ENGAGED IN DIFFICULT NEGOTIATIONS OVER A NUMBER OF ISSUES, INCLUDING WATER.



"The 1961 and 1962 Water Agreements were enshrined in the Separation Agreement which was registered at the United Nations. They are fundamental to our existence as an independent nation. Neither Singapore nor Malaysia can unilaterally change them."

- Minister for Foreign Affairs Prof S Jayakumar, 25 January, 2003



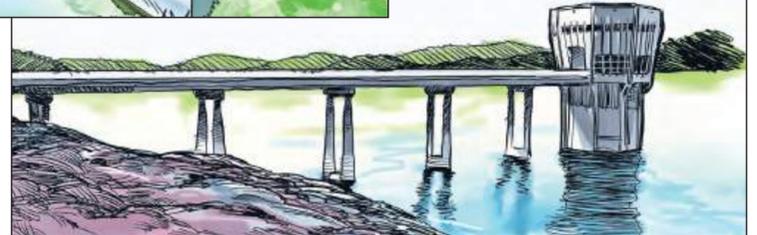
2011

IN 2011, THE 1961 WATER AGREEMENT EXPIRED. SINGAPORE HANDED ITS WATERWORKS AND PUMP HOUSES IN JOHOR TO THE JOHOR STATE GOVERNMENT, FREE OF CHARGE AND IN GOOD WORKING ORDER.

2016

IN OCTOBER 2016, THE LINGGIU RESERVOIR STOCK LEVEL FELL TO A HISTORIC LOW OF 20%.

WATER FROM LINGGIU RESERVOIR IS RELEASED TO SUPPLEMENT THE NATURAL FLOW OF THE JOHOR RIVER, FROM WHICH SINGAPORE DRAWS ITS ENTITLEMENT.



CHAPTER 3 The Way Forward: NEWater & Desalinated water

OUR WATER DEMAND IS EXPECTED TO MORE THAN DOUBLE BY 2060. WE HAVE USED TECHNOLOGY TO INCREASE AND DIVERSIFY OUR WATER SUPPLY.



NEWATER IS AN EXAMPLE.

2003

NEWATER IS PRODUCED BY PURIFYING TREATED WATER, USING ADVANCED MEMBRANE TECHNOLOGIES AND ULTRAVIOLET DISINFECTION.

IT IS ULTRA-CLEAN AND SAFE TO DRINK, HAVING PASSED MORE THAN 150,000 SCIENTIFIC TESTS.



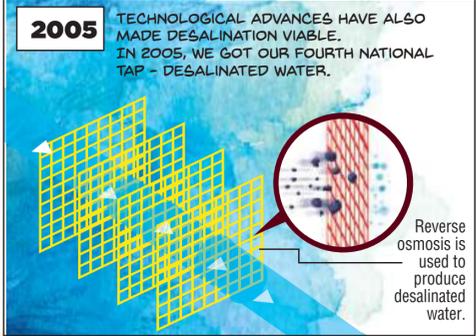
Bedok NEWater Factory and NEWater Visitor Centre

NEWATER IS PRIMARILY USED FOR INDUSTRIAL PURPOSES, SUCH AS IN WAFER FABRICATION PLANTS.



DURING DRY MONTHS, NEWATER IS ALSO USED TO TOP UP THE RESERVOIRS.

TODAY, WE HAVE FIVE NEWATER PLANTS THAT CAN MEET UP TO 40% OF OUR CURRENT WATER DEMAND. BY 2060, NEWATER WILL MEET UP TO 55% OF OUR WATER NEEDS.



2005

TECHNOLOGICAL ADVANCES HAVE ALSO MADE DESALINATION VIABLE. IN 2005, WE GOT OUR FOURTH NATIONAL TAP - DESALINATED WATER.

Reverse osmosis is used to produce desalinated water.

TODAY, WE HAVE TWO DESALINATION PLANTS WHICH CAN MEET UP TO 25% OF OUR CURRENT WATER DEMAND. BY 2020, WE WILL HAVE THREE MORE.



DESALINATED WATER IS EXPECTED TO MEET UP TO 30% OF OUR WATER NEEDS IN 2060.

TODAY, SINGAPORE HAS A ROBUST AND DIVERSIFIED WATER SUPPLY. HOWEVER, OUR WATER SUPPLY REMAINS VULNERABLE - FOR EXAMPLE, AS A RESULT OF CLIMATE CHANGE.



R&D IS KEY TO MAINTAINING A SUSTAINABLE WATER SUPPLY.



WE MUST CONTINUE TO FIND NEW WAYS TO TREAT AND SUPPLY WATER FOR GENERATIONS TO COME.