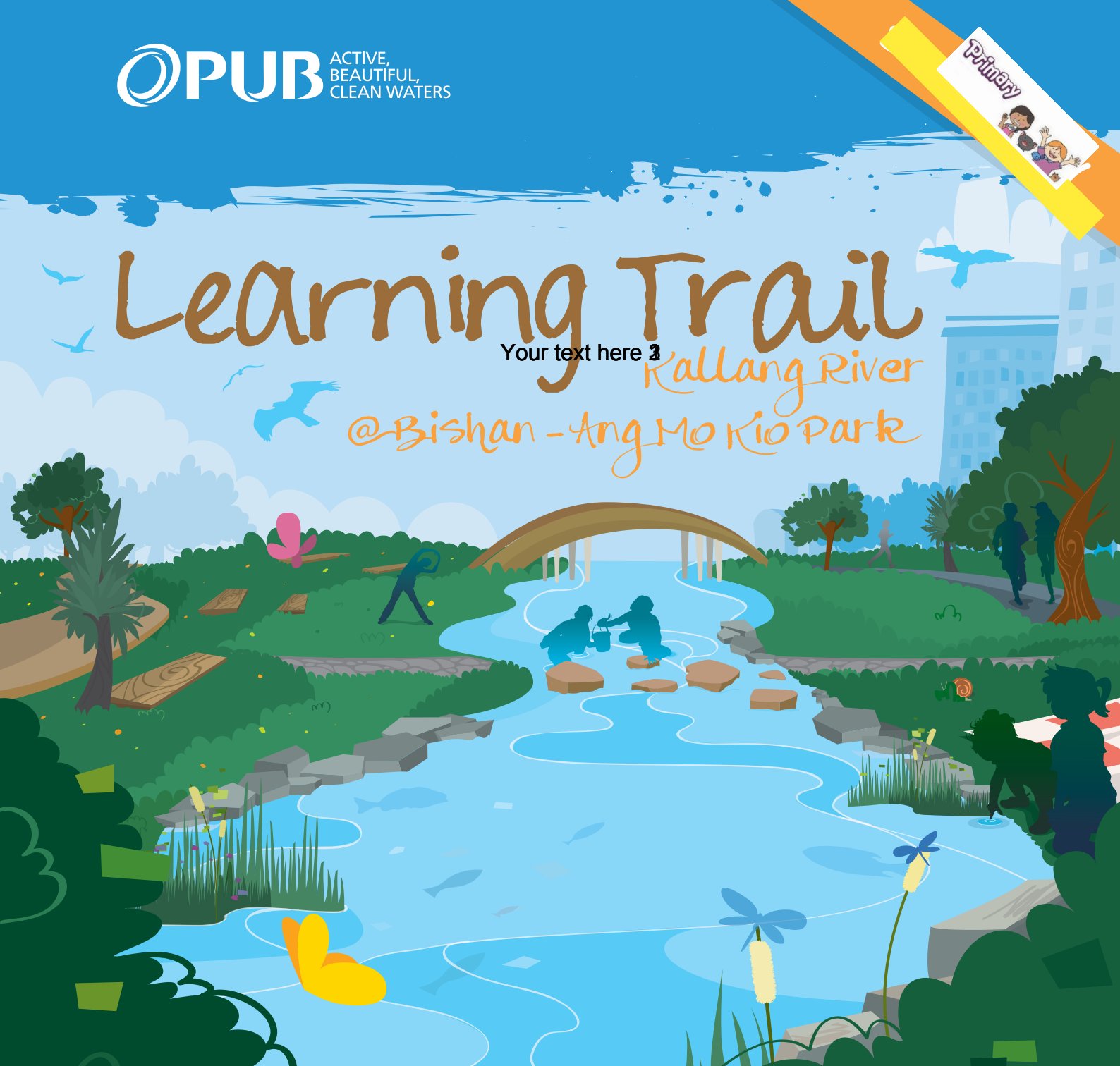
PUB ACTIVE, BEAUTIFUL, CLEAN WATERS

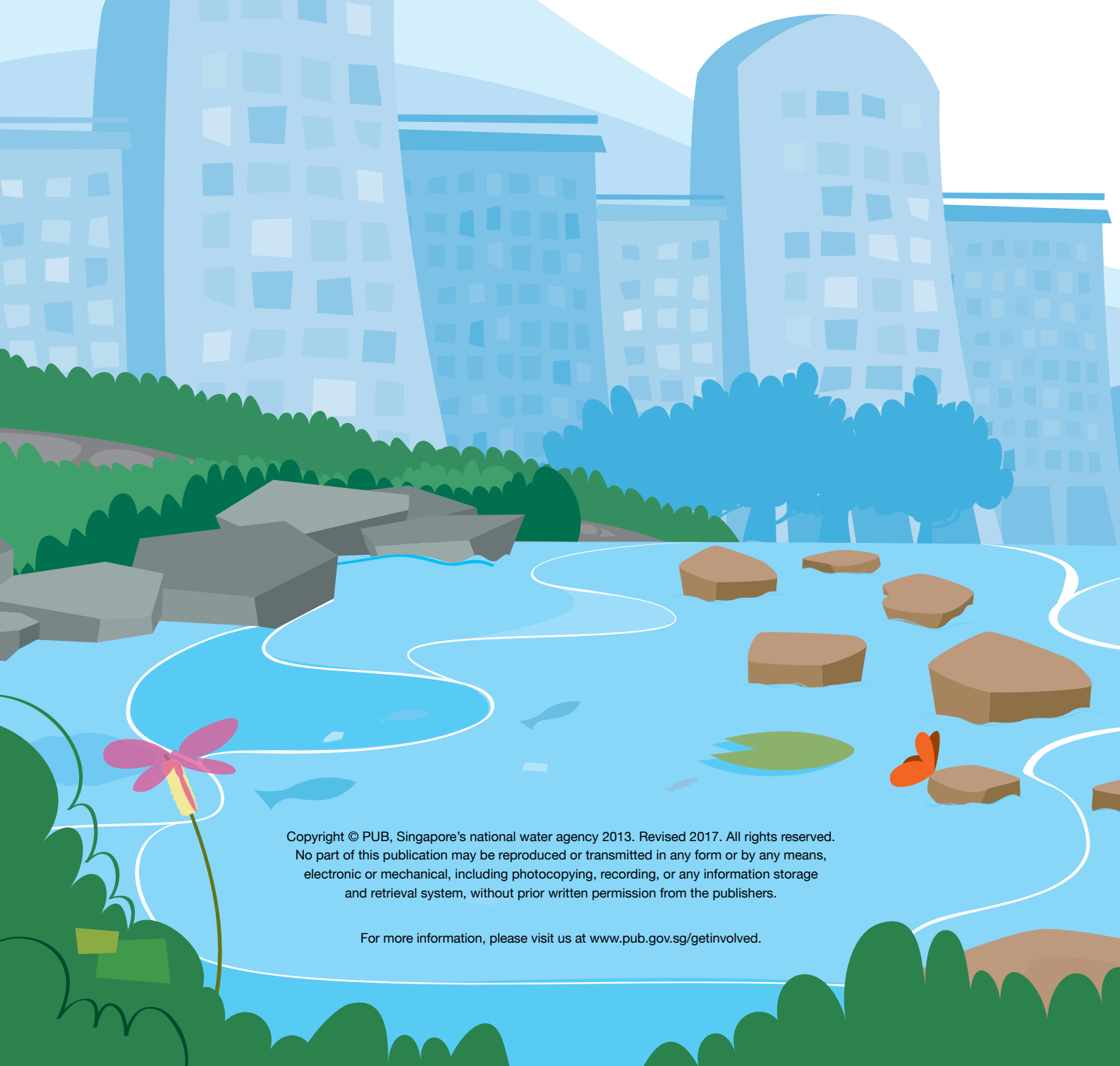
Primary

Learning Trail

Your text here 3

Kallang River @Bishan - Ang Mo Kio Park





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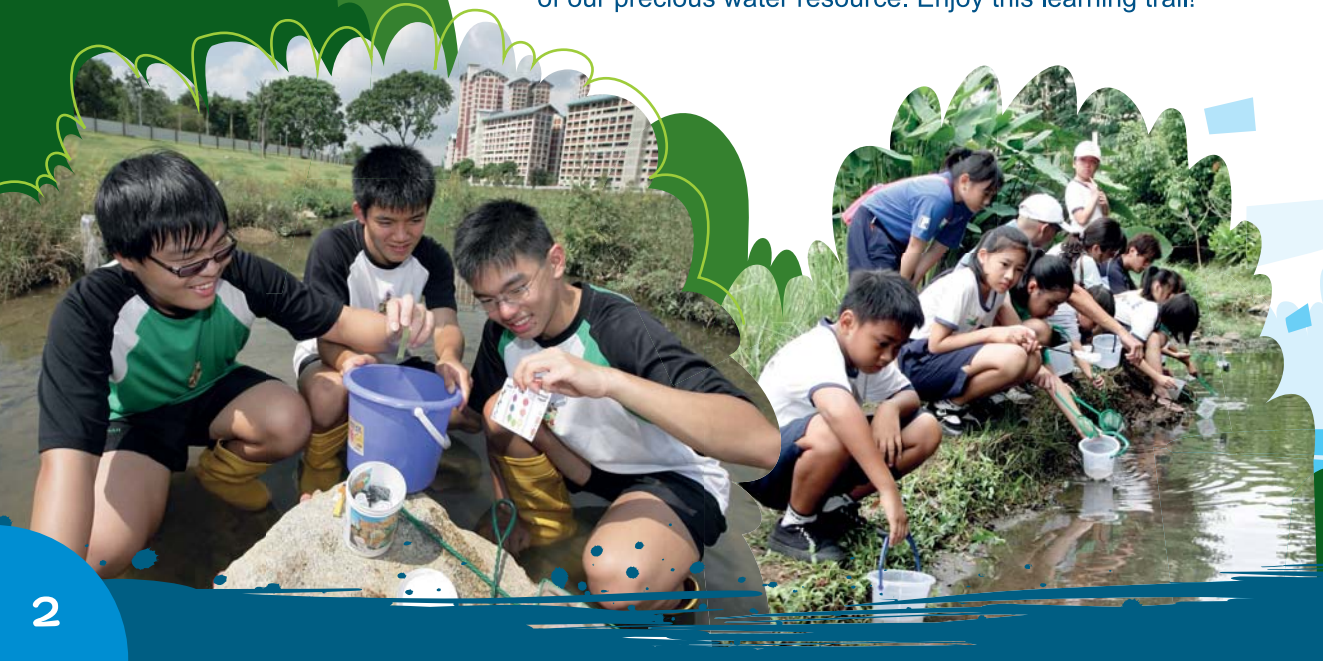
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Discover Kallang River @ Bishan-Ang Mo Kio Park

Hello! Welcome to Kallang River @ Bishan-Ang Mo Kio Park, one of the largest and most popular parks located in the heartlands of Singapore. Discover how our small city-state, which used to face challenges such as droughts and pollution has transformed into a global hydrohub and vibrant City of Gardens and Water.

Here, the section of Kallang River that previously ran in a concrete canal along the length of the park, has been transformed into a natural, meandering river, well integrated with the park. This project is jointly developed by PUB, the national water agency and the National Parks Board under the Active, Beautiful, Clean Waters (ABC Waters) Programme, a long-term initiative to transform Singapore's drains, canals and reservoirs into beautiful and clean streams, rivers and lakes for recreation and community bonding.

We hope to make Kallang River @ Bishan-Ang Mo Kio Park a meaningful place for outdoor learning. As you learn more about the unique features at Kallang River @ Bishan-Ang Mo Kio Park and the diversity of life it supports, we hope you will appreciate our waterways and reservoirs and take greater ownership of our precious water resource. Enjoy this learning trail!



Along the River

Water is essential to life. In Singapore, drinking water is available to us with a simple turn of the tap. Have you ever thought about how Kallang River plays a part in our water story? What is its history and its role? How did it transform into today's natural, meandering river?

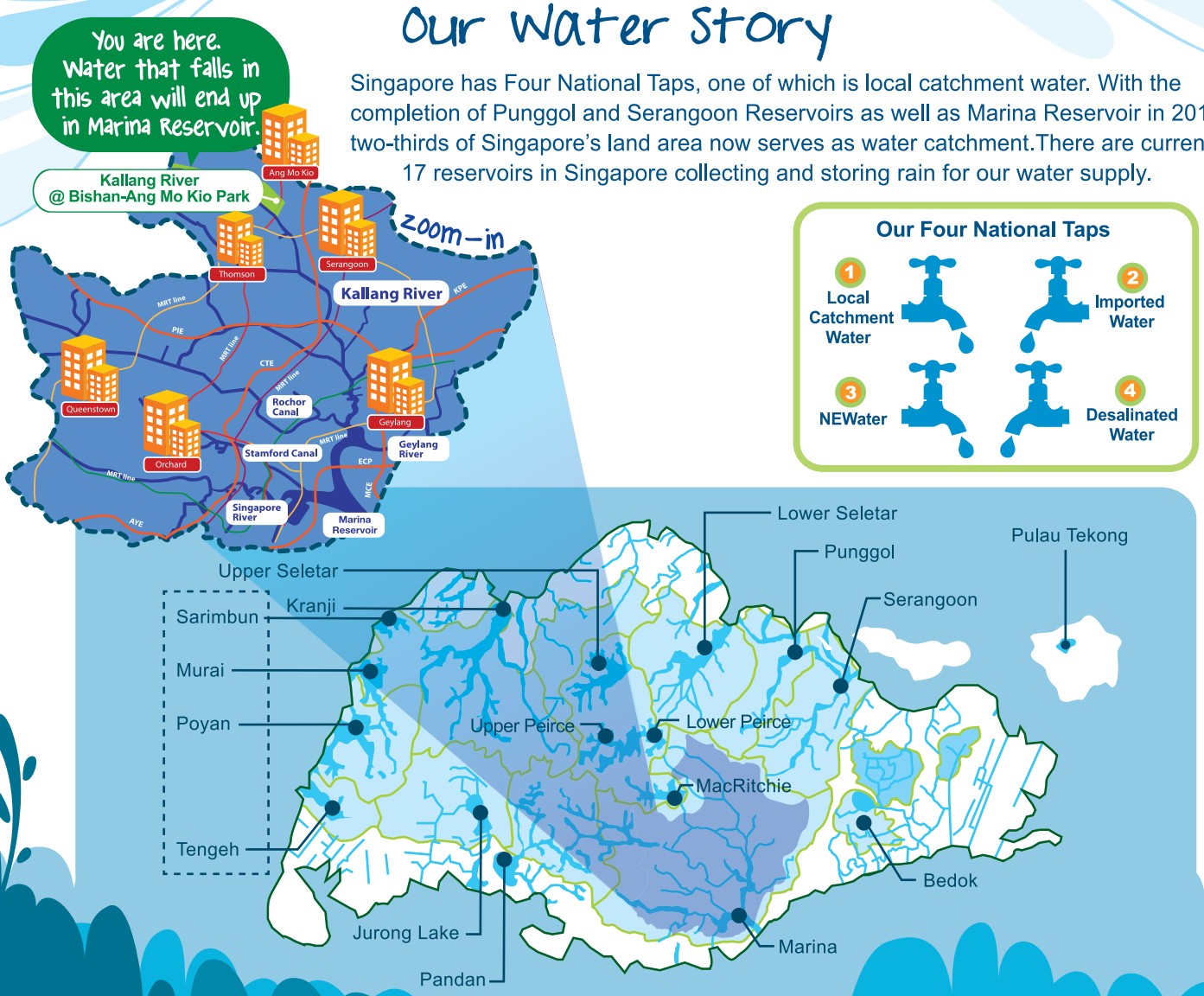
Explore Kallang River @ Bishan-Ang Mo Kio Park with your heart, mind and senses. Each of us has a part to play in protecting our blue spaces. We can either actively protect or destroy this pristine environment. Think about this as you go through the activities in this learning trail. Now let's get our feet wet by exploring one of Singapore's oldest rivers and uncover the following themes:





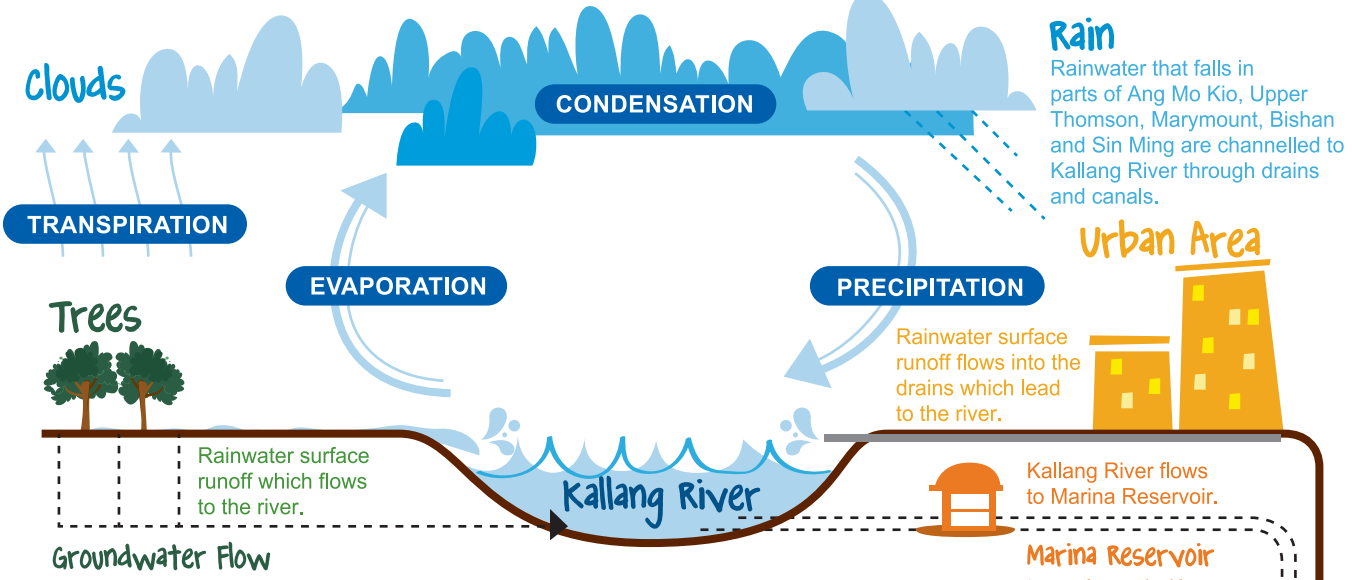
Our Water Story

Singapore has Four National Taps, one of which is local catchment water. With the completion of Punggol and Serangoon Reservoirs as well as Marina Reservoir in 2011, two-thirds of Singapore's land area now serves as water catchment.There are currently 17 reservoirs in Singapore collecting and storing rain for our water supply.



The Water Cycle and Journey of Water

We cannot live without water. The water cycle is critical because it ensures the availability of water for living things and the maintenance of ecosystems. Although over 70% of the Earth is covered with water, only 2.5% of this water is fresh. The continuous flow of fresh water is a result of the water cycle, also known as the hydrological cycle. Global climate change caused by human activities has led to abnormal weather patterns – intense rainfalls, longer dry spells and floods are impacting Singapore and other countries.





What's Around Here?

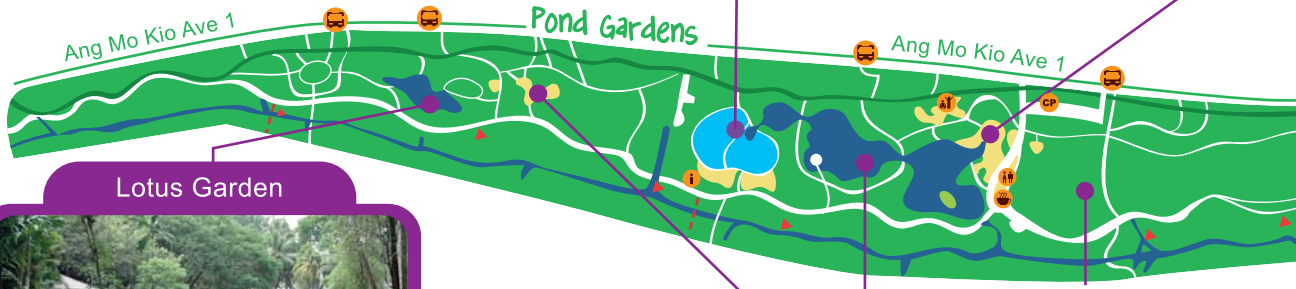
Under the ABC Waters Programme, Bishan-Ang Mo Kio Park has been redeveloped with new amenities, catering to people of all ages.

The park comprises two sections. Pond Gardens is located between Upper Thomson Road and Marymount Road. River Plains is situated between Marymount Road and Bishan Road.

Look around you. Tick what you can spot.

Cleansing Biotope





Lotus Garden



Playground



Do you notice any other features at the park? Share it with your trail mates.

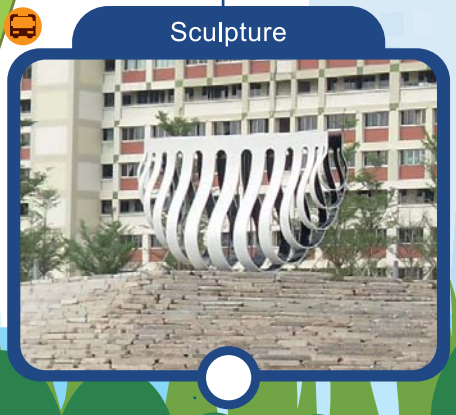






Legend

- : NParks Office
- : Food & Beverage
- : Fitness Station
- : Toilet
- CP : Carpark
- : Lifestyle Hub
- : Info Point
- : Bus Stop
- : Park Connector Network
- : Safety Node
- : Safety Line
- Pond Gardens
- River Plains



Past and Present: The River that Flows

Kallang River plays a significant role in contributing towards Singapore's socio-economic development.
Find out more about the changes that it has undergone over the years.

before 1819
Kallang River was home to almost 500 native fishermen also called Biduanda Orang Kallang.

1824
Residents were relocated to another river in Malaysia after Singapore came under British Rule.

1870
Bishan derived its name from the large Cantonese burial ground, commonly known as *Peck San Theng*, which means "pavilions on the green". The burial ground was established by Chinese immigrants.

1960
In the 1960s, part of Kallang Basin was reclaimed for industrial and housing purposes.

between 1977 -1987
Then Prime Minister, Lee Kuan Yew, put forth a challenge to Singapore – to clean up Singapore River and Kallang Basin. Initiated by the Ministry of Environment, multiple government agencies rallied together to clean the river. Squatters, wholesalers, street hawkers, backyard trades and industries, and farmers were resettled. Pollutive activities like boat-yard activities and charcoal trading were phased out.

1988

Bishan Park was constructed and became one of the more popular parks in Singapore's heartlands. Kallang River flowed within a canal which ran along the edge of the park.

2007
Planning for redevelopment of the Kallang River into Bishan Park began as part of the ABC Waters Programme.

2009

An official ground-breaking ceremony was held to mark the start of works to integrate Kallang River into the park.

2012

The project is completed. The park is renamed Bishan-Ang Mo Kio Park by Prime Minister Lee Hsien Loong.

Find the Missing Words

Recall what you have learnt about the history of Kallang River @ Bishan-Ang Mo Kio Park.
Find the missing words in the puzzle below. (Hint: There are eight missing words.)

I A B C W A T E R S G
B N T A S C A N A L E
R C E U R E S A E P P
C W O M V C C T I A C
A A B L R S A I P V L
A T G D I E I V P I E
H E N N E I H E N S A
I R I O V R E S E R N
G S L V P A T N I N U
S B I D U A N D A F P
S E I R T S U D N I F
V R S S E V A L W A R

Answers:
Reservoir
Natives
Biduanda
Industries
Clean up
Canal
Fishermen
ABC Waters

Human Impact on River and Environment

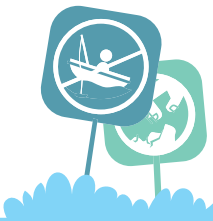
Our actions have an impact on our waters and environment. The integration of Kallang River into Bishan-Ang Mo Kio Park allows our community to get closer to our waters.

Observe and list activities that can have an impact on the terrestrial and aquatic habitats.

Water Quality

Biodiversity

Safety

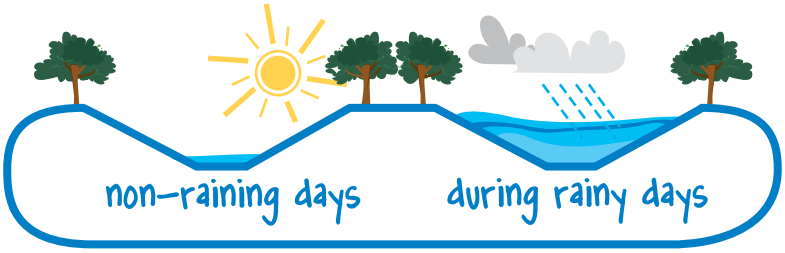






Enjoy the River Responsibly

Everyone can enjoy and have fun at the river. You must, however, take note of the safety measures. At Kallang River @ Bishan-Ang Mo Kio Park, the river acts as a flood plain where the water level rises during heavy rain.



Safety Features at the Park



When the water level in the river rises, you will hear announcements advising you to move out of the river. Lights on the safety nodes will also flash. Take note of the announcements and warning lights, and move beyond the red markers as indicated. For emergencies, life buoys are provided at each of the safety nodes.



Have you seen one of these? This is one of the red markers placed along the river. Take note of the markers when you enter the river, and move beyond these red markers when the warning lights flash.



Water Quality Testing

Good water quality is essential for living things to thrive. The most common standards used to assess water quality relate to the health of ecosystems. **Collect some water at two different locations of Kallang River @ Bishan-Ang Mo Kio Park and test for the following parameters. Record your readings and observations in the space below.**

DEBRIS AND SMELL

SIGNIFICANCE

Observe and smell the water. This can give you basic information about water quality. On its own, water does not have any smell. The smell of the collected water can give you a rough indication of pollution sources.

OBSERVATION

What can you see:

In the water:

On the water surface:

What can you smell:

ANALYSIS

COLOUR

SIGNIFICANCE

The colour of the water can give some clues as to what may be in the water. There may be dissolved pollutants or bacteria. Coloured water, however, does not necessarily mean the water is polluted.

OBSERVATION

LOCATION 1	LOCATION 2	
○	○	Turbid or murky brown – soil particles in water, resuspension from the bottom or banks of the reservoir.
○	○	Brown or dark brown – brown pigments from leaves called tannins are dissolved in the water.
○	○	Green – algae suspended in water – indicates an algal bloom, usually caused by high nutrients in the water, fertilisers or organic matter.
○	○	Turbid or murky grey or black.
○	○	Others

ANALYSIS

TURBIDITY

SIGNIFICANCE

Turbidity is the level of "murkiness" of the water. It refers to the amount of particles such as soil, sediments, algae or organic matter that are suspended in the water.

Turbidity affects the amount of light that can penetrate through the water, which determines the amount of light reaching the different depths of the reservoir. This in turn has an effect on aquatic plant life.

OBSERVATION

Which is the faintest number you can see on the turbidity disc?

Location 1	1	2	3	4	5
Location 2	1	2	3	4	5

ANALYSIS

TEMPERATURE

SIGNIFICANCE

The temperature of the water will vary with the weather and time of sampling. The temperature of water in the reservoir could range between 20 - 30°C which affects the amount of dissolved oxygen. The temperature is higher nearer the surface of the water and lowest near the bottom of a water body.

READING

The temperature of the water is:

°C °C

ANALYSIS

DISSOLVED OXYGEN

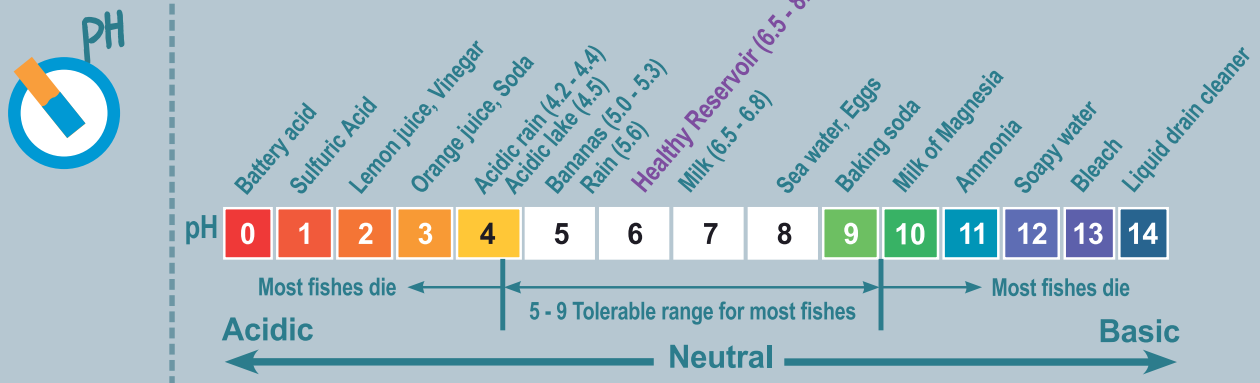
SIGNIFICANCE

This refers to the amount of oxygen dissolved in a given volume of water, at a given temperature and atmospheric pressure. It can be measured in milligrams per litre (mg/l) or parts per million (ppm). The minimum amount of dissolved oxygen needed to sustain fish life is about 4mg/l.

READING

ANALYSIS

SIGNIFICANCE



READING

The pH of the water is:

ANALYSIS

CONCLUSION:

Overall quality of water

Can you drink from the river? Why?

Where does the water in Kallang River come from? How does this affect the water quality in the river?

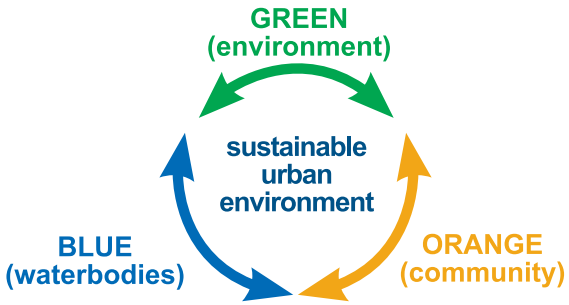
What are the limitations of this water quality testing activity?

Other properties of water:

There are other properties of water that you can test, such as electrical conductivity, hardness of water, amount of nitrates, phosphates and ammonia. Discuss the importance of these properties and how they can be measured.

Naturalisation of Kallang River

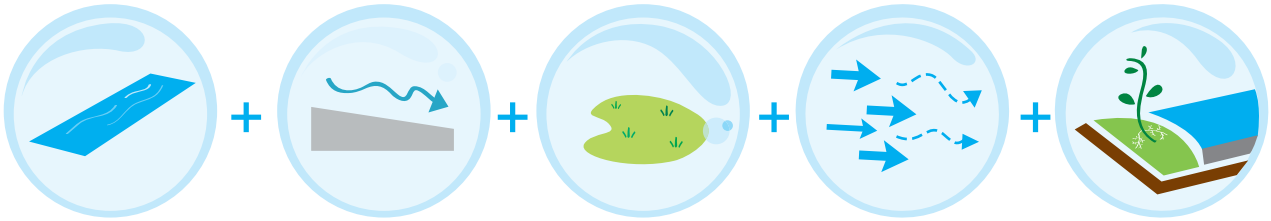
The ABC Waters Programme aims to integrate Singapore's environment **(Green)**, waterbodies **(Blue)**, as well as the community **(Orange)**.





How a canal was transformed

This river park was created by transforming a canal along the existing park into a natural, picturesque waterway, integrating both the river and park. Through the use of soil bioengineering techniques, the river now meanders through the park and is the focus of social, recreational and educational activities.



Existing canal naturalised, widened and integrated through the park.

The river flows across the park.

Open fields next to the river form part of the flood plain that fills up during heavy rain.

The meandering course and plants along the banks slow the flow of water.

Soil bioengineering techniques stabilise the river banks, prevent erosion and enable people to get closer to the river.