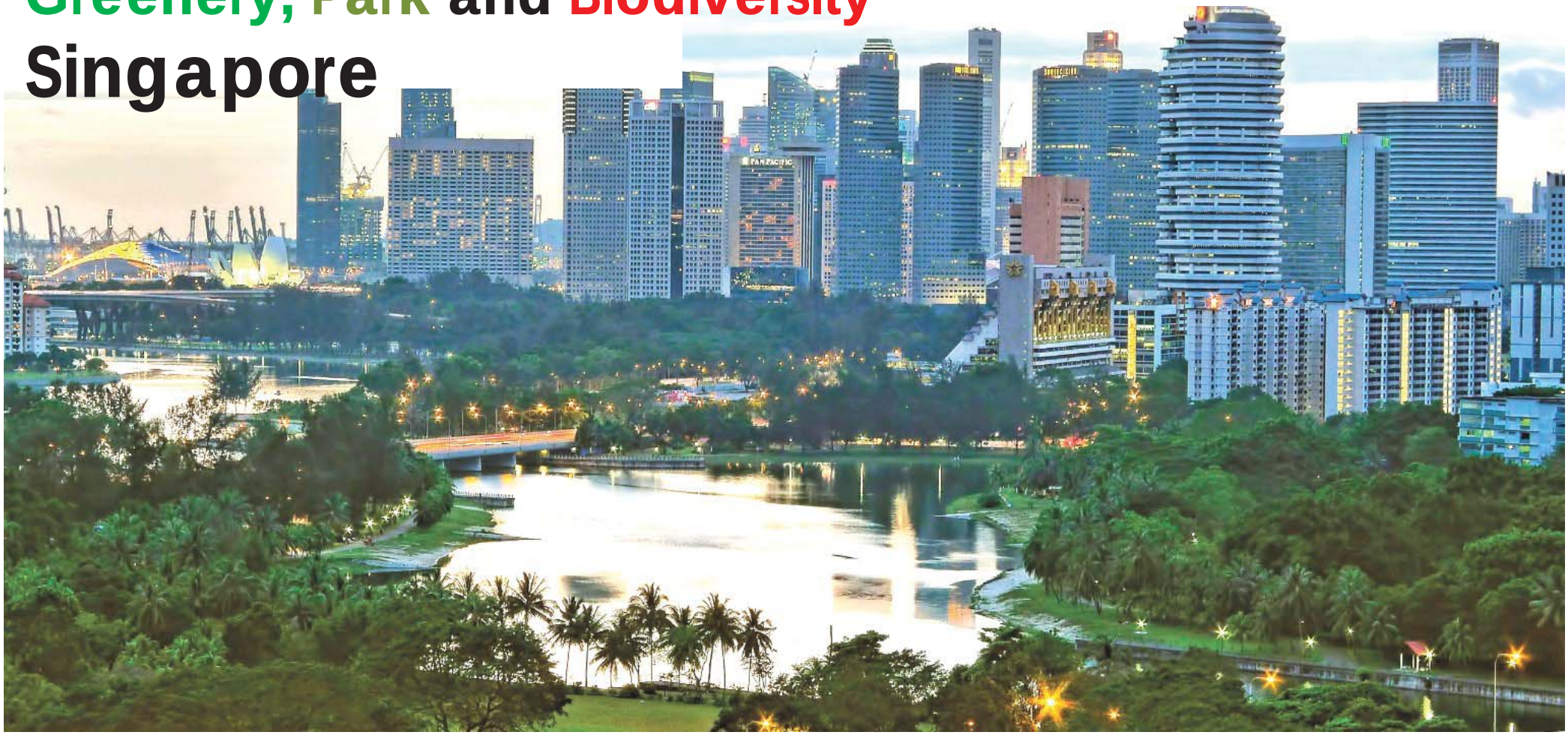
Planning OUR City in Nature

Greenery, Park and Biodiversity

Singapore



for **MND Urban Sustainability R&D e-Symposia**

6 August 2021 4:00pm to 5:30pm

CHEONG Kok Hwee, Director (Park Planning), Policy and Planning Division

NATIONAL PARKS

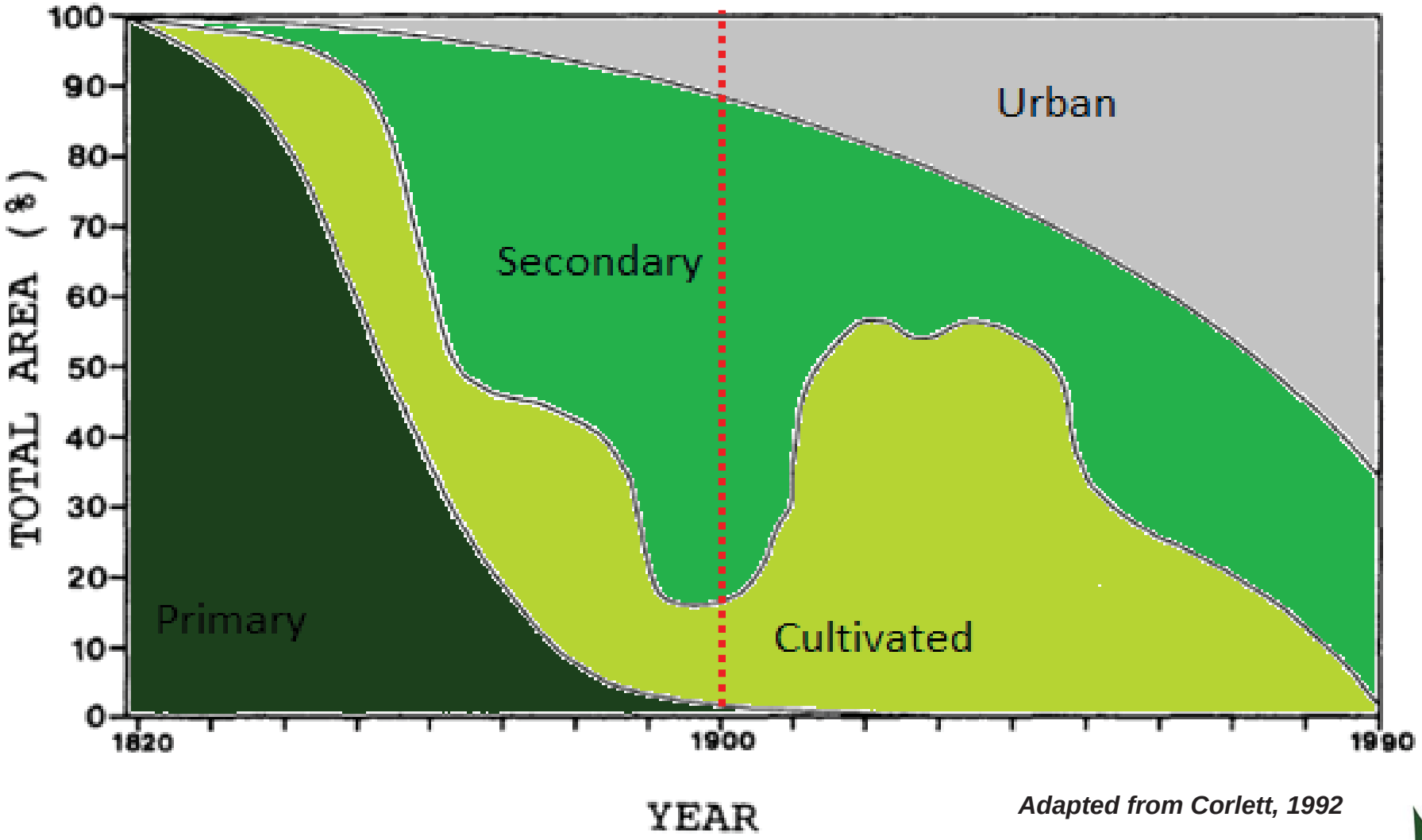
Outline

- Setting the baseline
- From Garden City to City in Nature
- Greenery and Park Planning
- Conservation Planning
- Future Challenges

Not so long ago…

◇ Eugen von Ransonnet (del., lith.), Chromolithograph, H31.7 x W22 cm, 2008-00187-002
Published in Eugen von Ransonnet, *Skizzen aus Singapur und Djohor* (Sketches: Singapore and Johore), Braunschweig: George Westermann, 1876

Almost all gone…

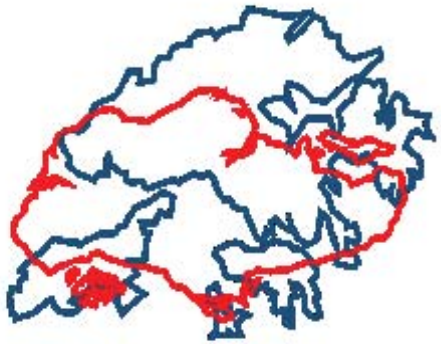


Adapted from Corlett, 1992

Singapore as a City-State…

London (2X)

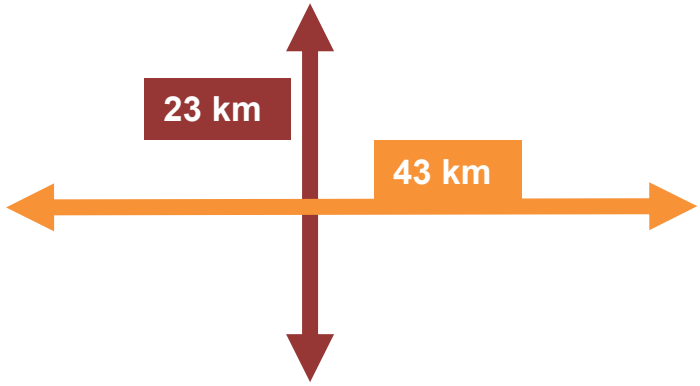
New York City (1.7X)



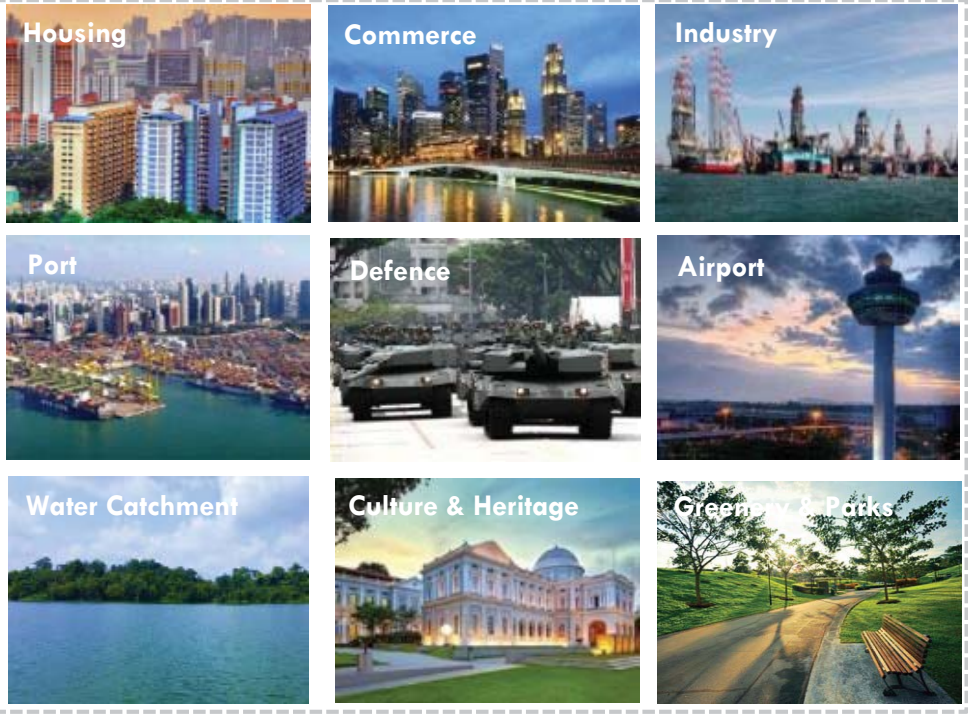
Hong Kong (1.5X)

Singapore's land area compared to other global cities

Singapore's land use challenges…



LAND NEEDS

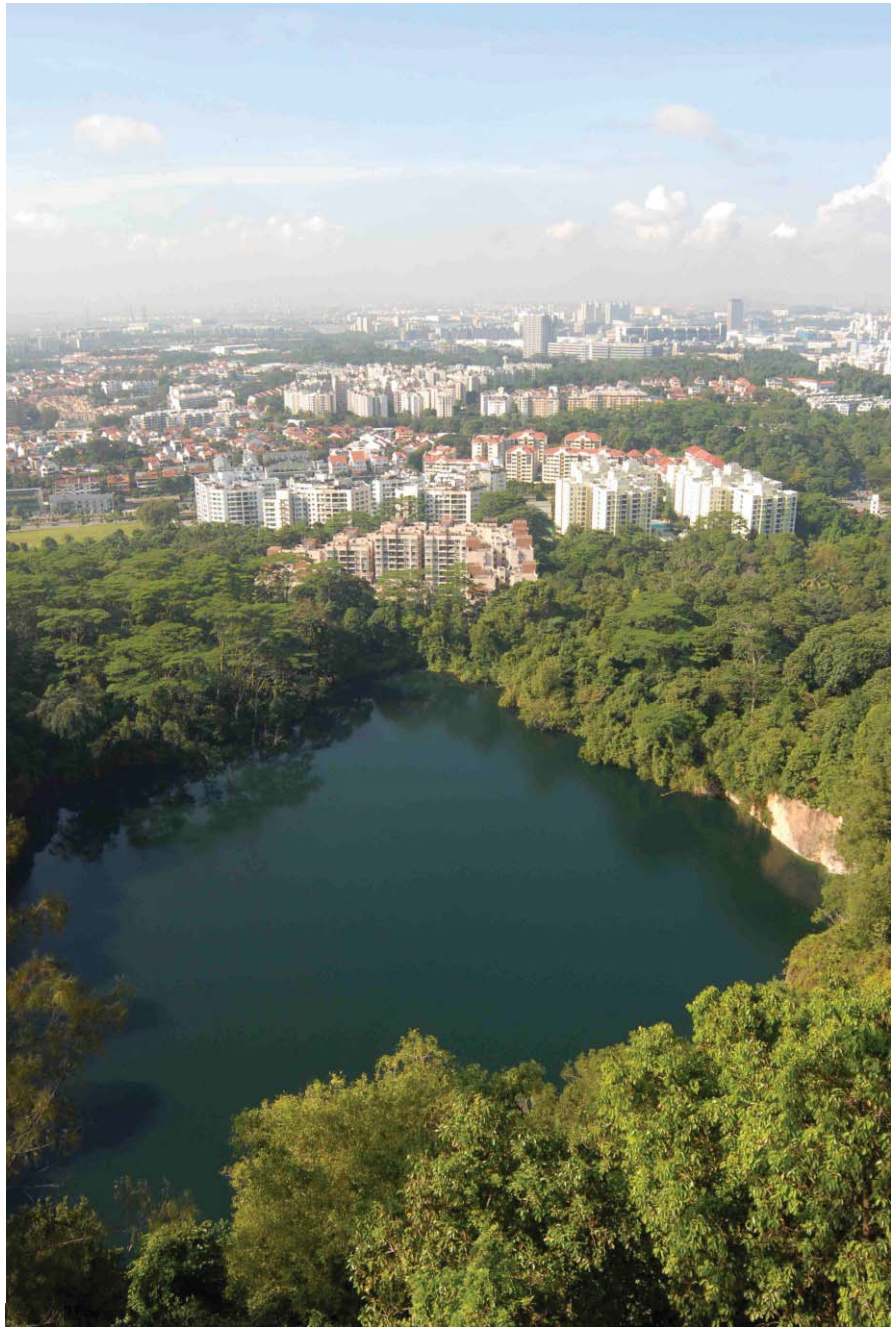


SEA NEEDS

Singapore today…

No	City	Green View Index (%)	Population Density (/km²)
1	Tampa	36.1	1,283
2	**Singapore**	**29.3**	**7,797**
3	Breda	29.3	1,459
4	Oslo	28.8	4,421
5	Vancouver	25.9	5,249
6	Sydney	25.9	400
7	Montreal	25.5	3,889
8	Cambridge	25.3	6,586
9	Durban	23.7	2,600
10	Johannesburg	23.6	2,900
11	Sacramento	23.6	1,800
12	Frankfurt	21.5	3,000
13	Geneva	21.4	12,000
14	Amsterdam	20.6	4,908
15	Seattle	20	3,151
16	Toronto	19.5	4,150
17	Miami	19.4	4,770
18	Boston	18.2	5,344
19	Tel Aviv	17.5	8,353
20	Turin	16.2	6,900
21	Los Angeles	15.2	3,198
22	Buenos Aires	14.5	13,680
23	Franca	13.7	122
24	New York	13.5	10,831
25	Cape Town	13.4	1,100
26	London	12.7	5,518
27	Sao Paulo	11.7	7,913
28	Quito	10.8	7,200
29	Kobe	9.4	2,783
30	Paris	8.8	21,000

MIT's Treepedia Study, 2021



With highest quality of living in Asia...

Singapore continues to top Mercer's 21st Quality of Living ranking for Asia (2019*)

Worldwide ranked 25th amongst 231 cities in the survey

* Due to COVID-19 pandemic, Mercer did not conduct any QOL Ranking in 2020.

Rich in biodiversity

2,145 native vascular plant species

403 bird species

65 mammal species

110 reptile species

85 freshwater fish species

334 butterfly species

124 dragonfly species

35 true mangrove tree species

12 seagrass species

255 hard coral species

50 sea anemone species

Singapore awarded UNESCO Sultan Qaboos Prize for Environmental Preservation in 2017

Where we are at today…

Total Green Spaces - 7,800ha

Nature Reserves
3,347ha

Gardens & Parks
4,451ha

Park Connectors
360km

Nature Areas
20 sites

Park Provision Ratio
0.78

Park Accessibility
93%

NATIONAL PARKS

Outline

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- Greenery and Park Planning
- Conservation Planning
- Future Challenges

How did the Greening Journey start?

Mr Lee Kuan Yew started the greening movement on **16 June 1963**.
This was before Singapore achieved independence on **9 Aug 1965**.

Photo credit: SPH; NAS

Best possible living environment

Distinctiveness of city

Social leveller

From Garden City to City in a Garden to City in Nature

Rasau Walk, Lakeside Garden, Jurong Lake Gardens

City in Nature

Restoring **Nature** back into the City for Liveability, Sustainability and Well-being

Applying nature-based solutions towards achieving:

- **Climate Resilience**
- **Ecological Resilience**
- **Social Resilience**

Becoming City in Nature…

Key Strategies

1. Extend our Natural Capital
2. Intensify Nature in our Gardens and Parks
3. Restore Nature into the Urban Landscape
4. Strengthen Connectivity between our Green Spaces

Everyone has a Role to Play

Advancing Digitalisation, Science & Technology, Industry

Outline

- Setting the baseline
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GREENERY

components

- **Roadside greenery**
  - **SGMP, Nature Ways, Heritage Roads**
- **Internal greenery within developments**
  - **Ground greenery**
  - **Skyrise greenery e.g. SGIS, LUSH**
  - **Community spaces e.g. CIB, CIN, Edible gardens**
- **Green up public infrastructure**
  - **Covered linkways, Rail stations, Utility buildings, Schools, etc**



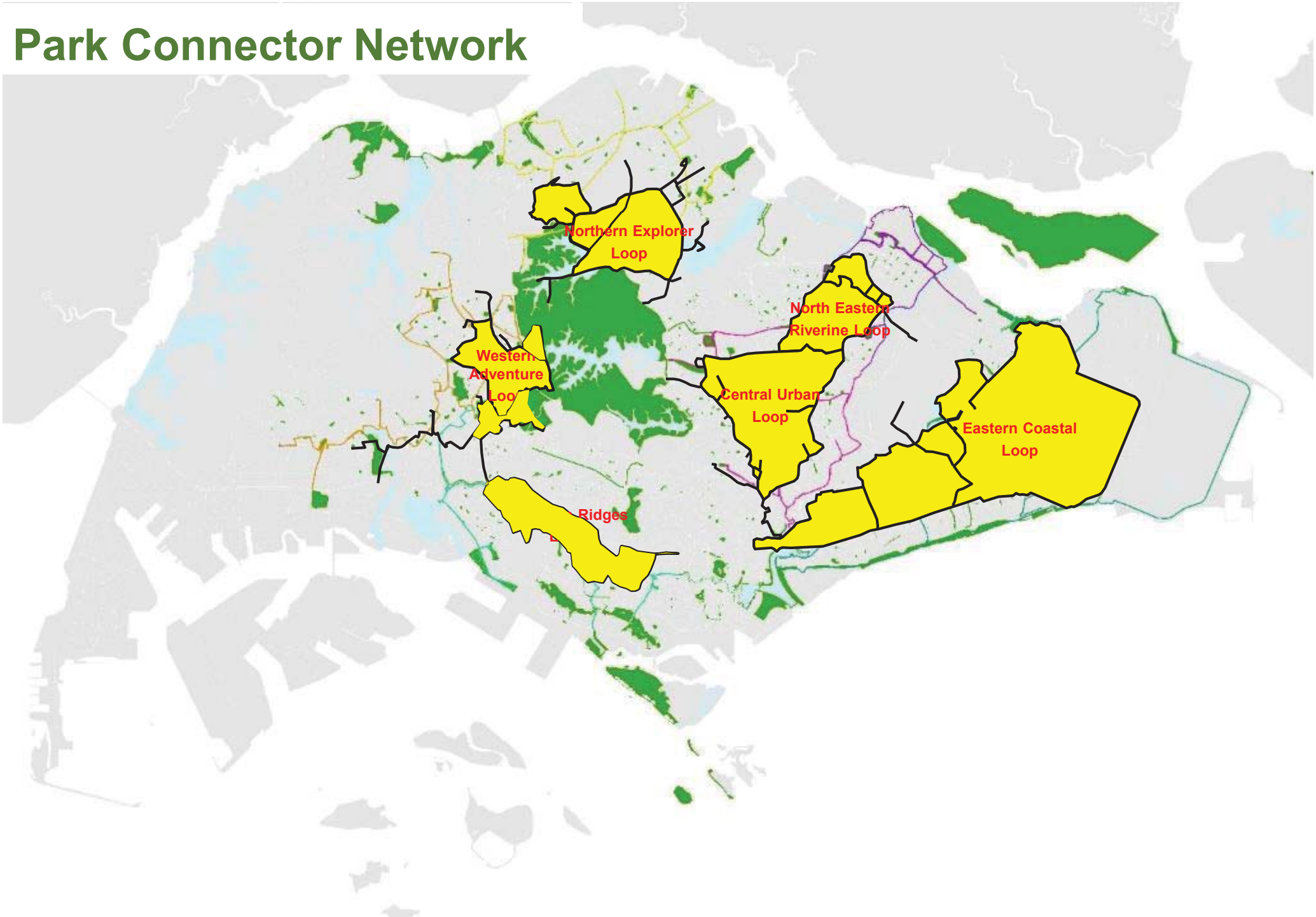




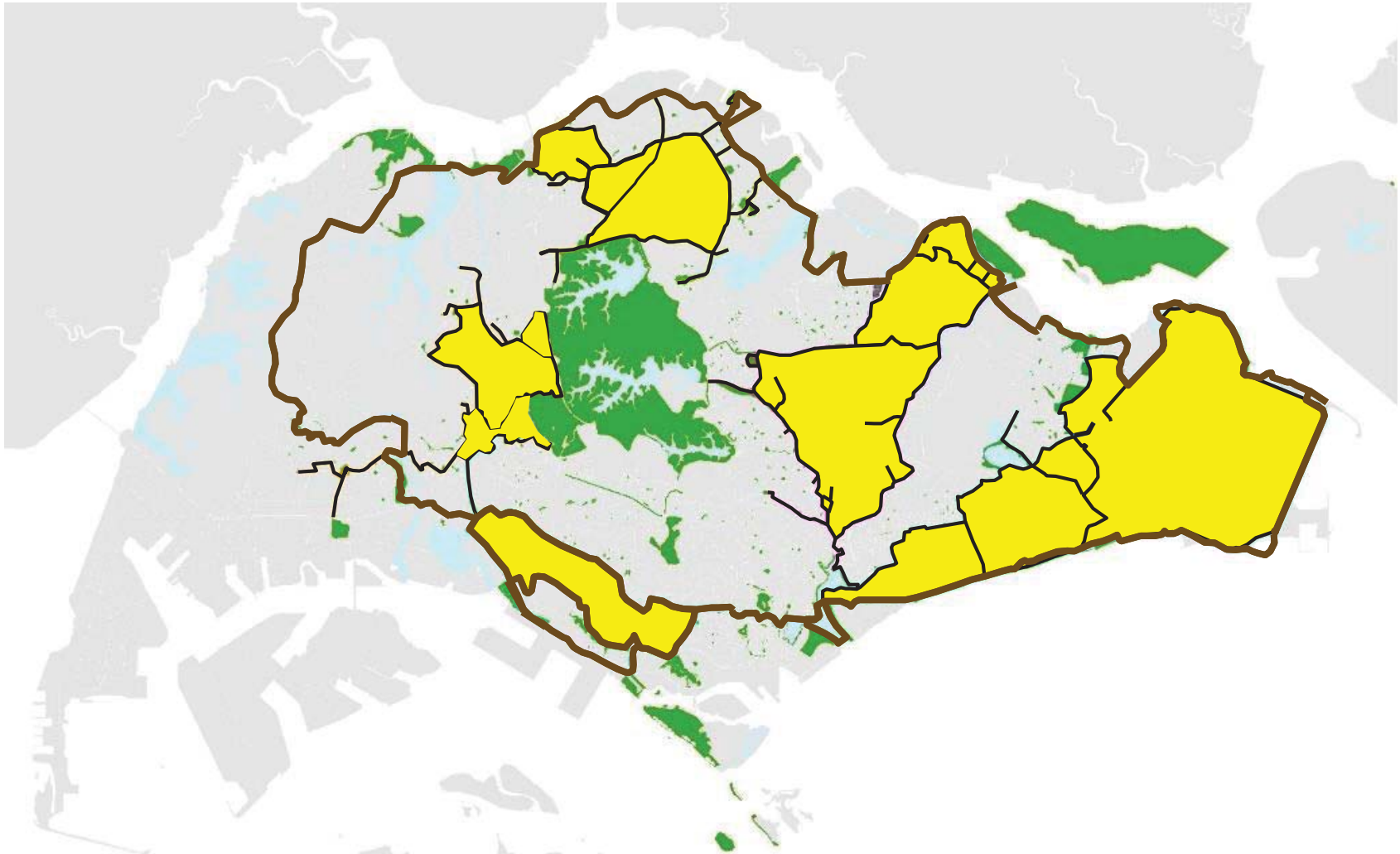


Tree conservation
Tree planting at open-air parking at street level
Roadside greenery
Green buffer & peripheral planting

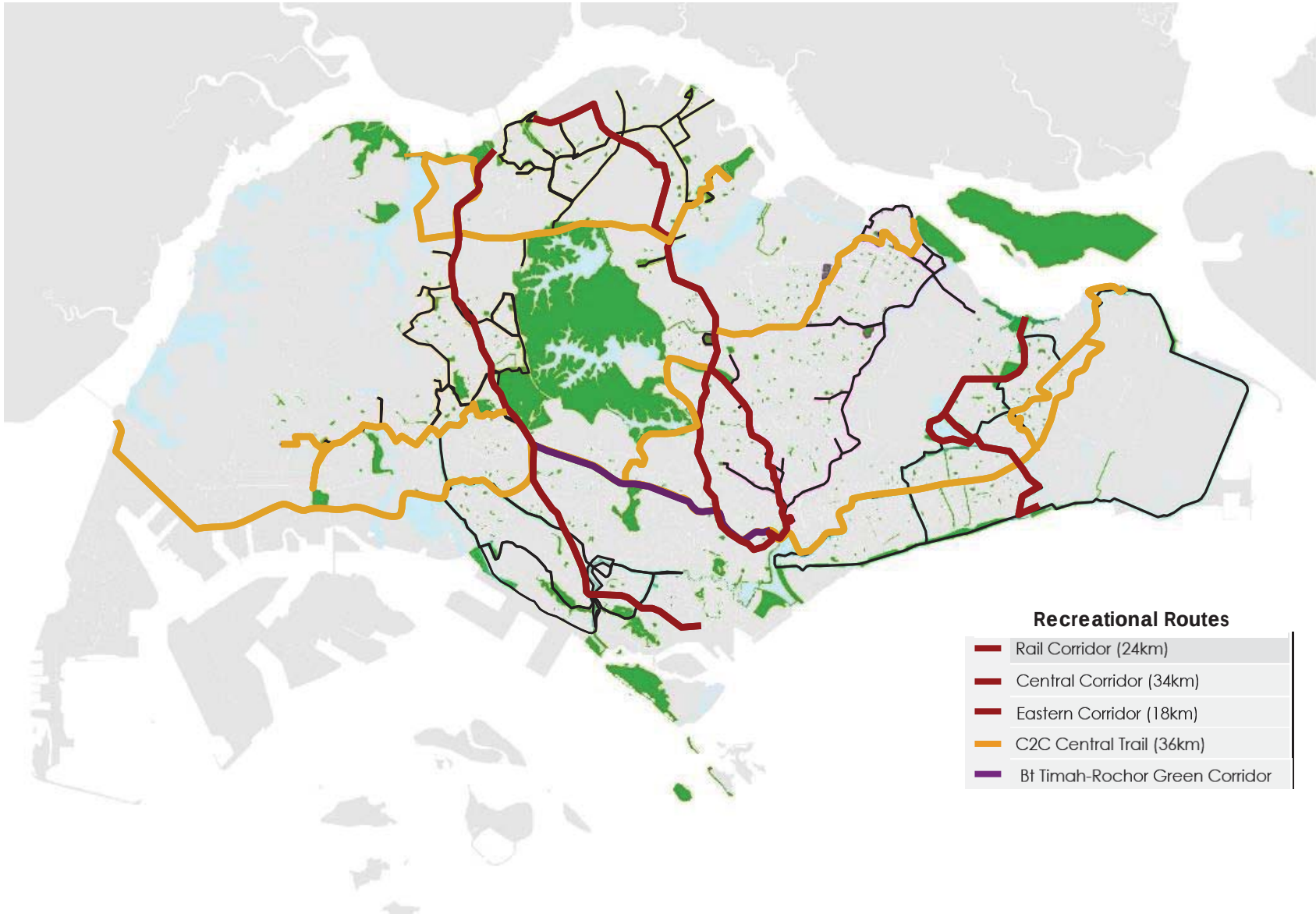
Park Connector Network



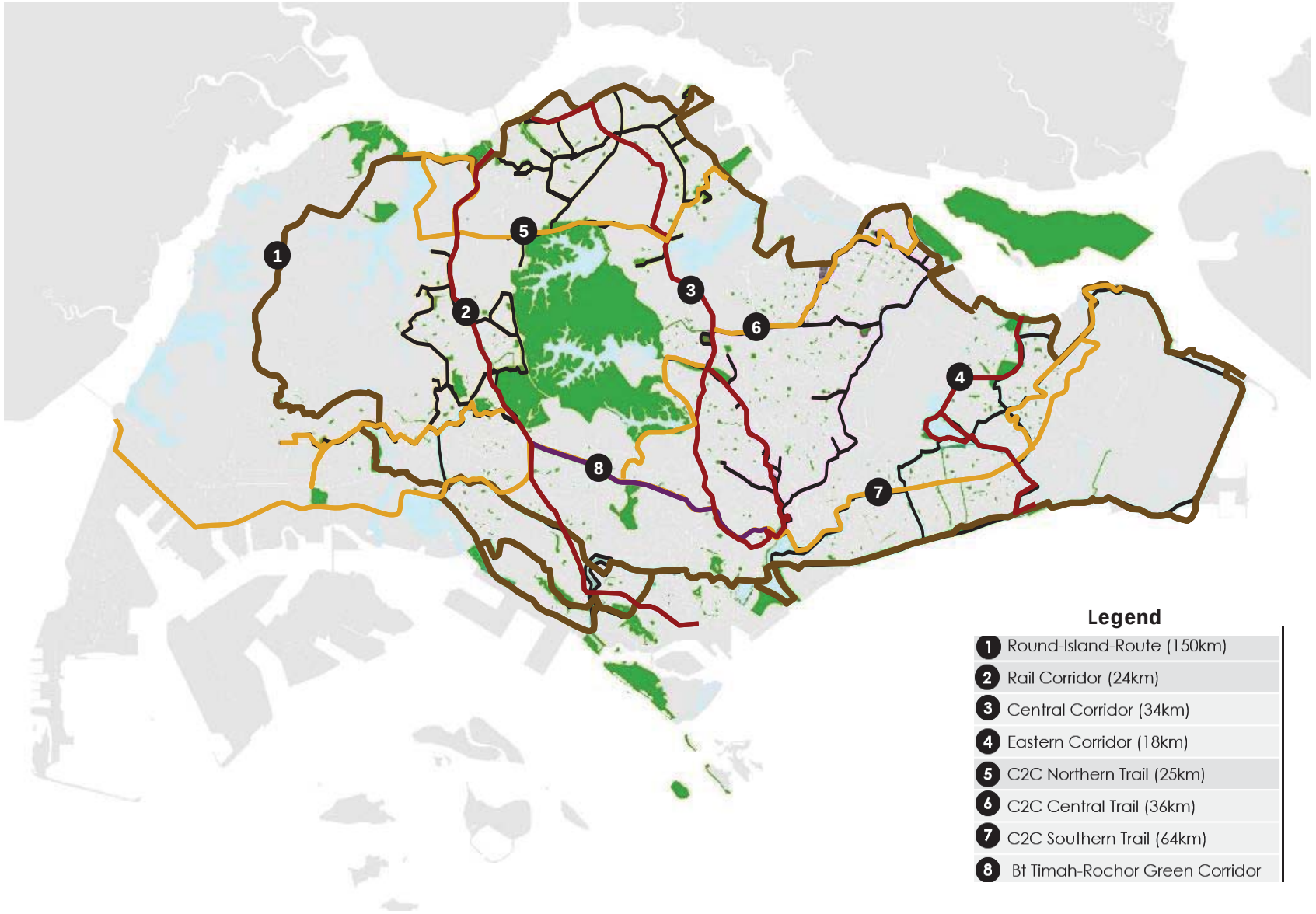
Round Island Route



Recreational Routes



City In Nature: 500km of PCN by 2030



Outline

- Setting the baseline
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- Future Challenges

Nature Conservation Master Plan…

1. Conservation of Key Habitats

2. Habitat Enhancement, Restoration and Species Recovery

3. Applied Research in Conservation Biology and Planning

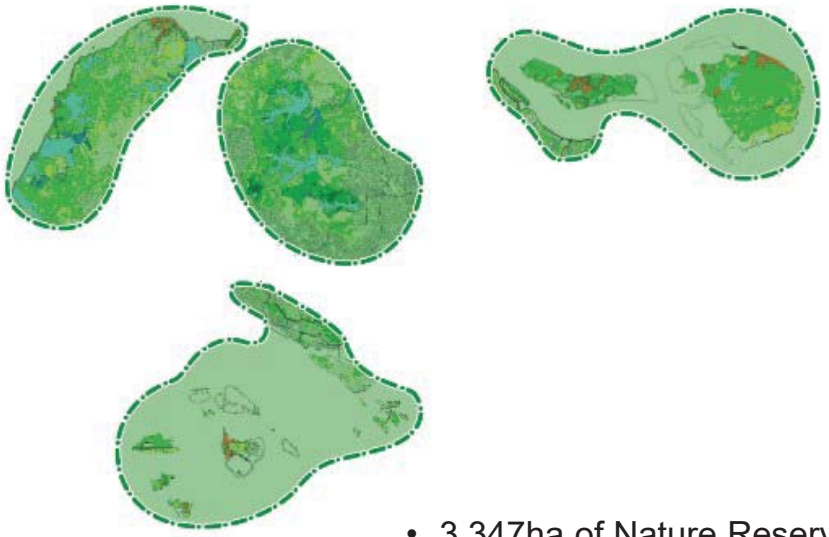
4. Community Stewardship and Outreach in Nature

1. Conservation of Key Habitats

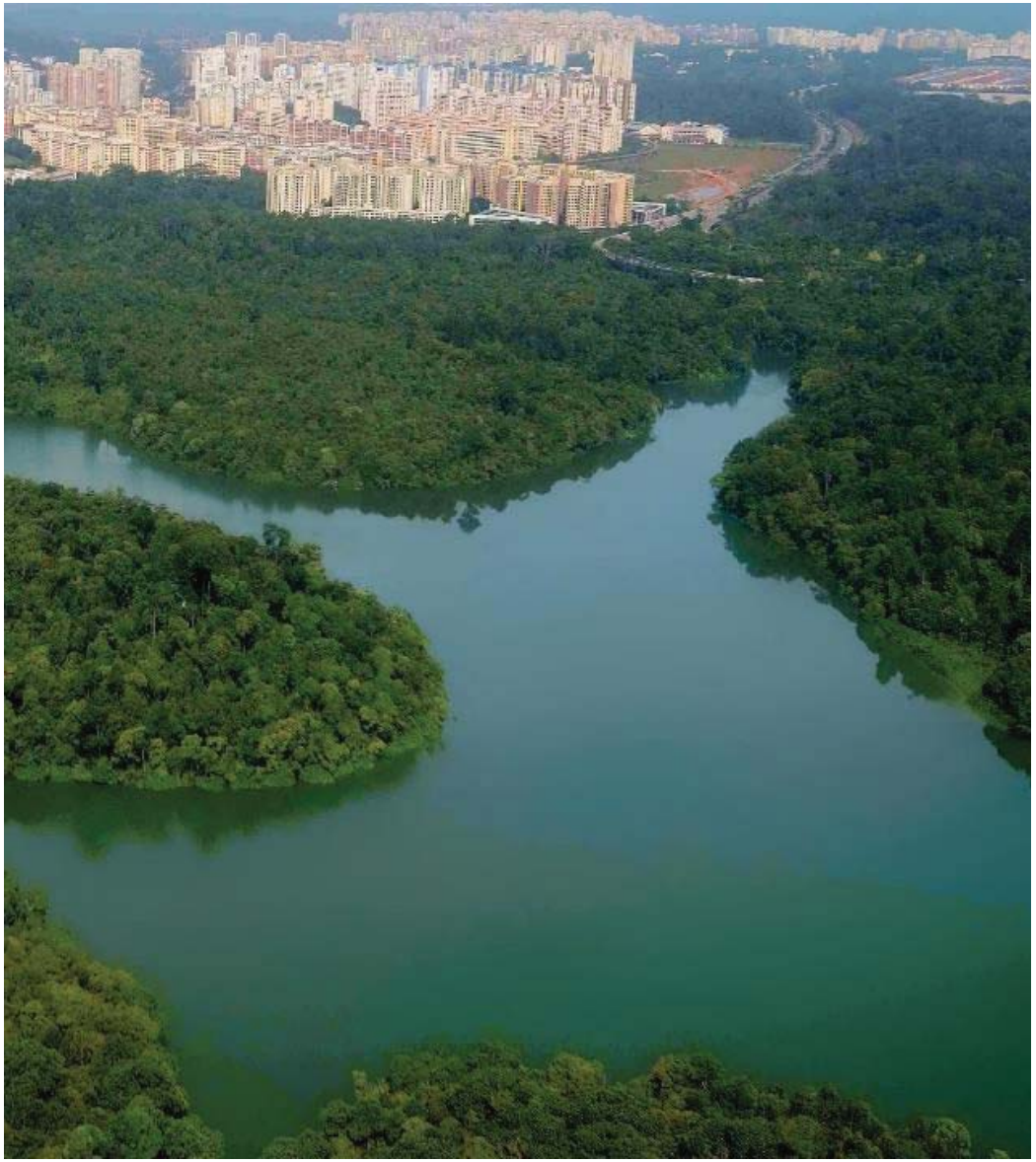
Safeguard and Strengthen Core Areas

Nature Reserves

- Core habitats for biodiversity
- Primary providers of ecosystem services



- 3,347ha of Nature Reserves



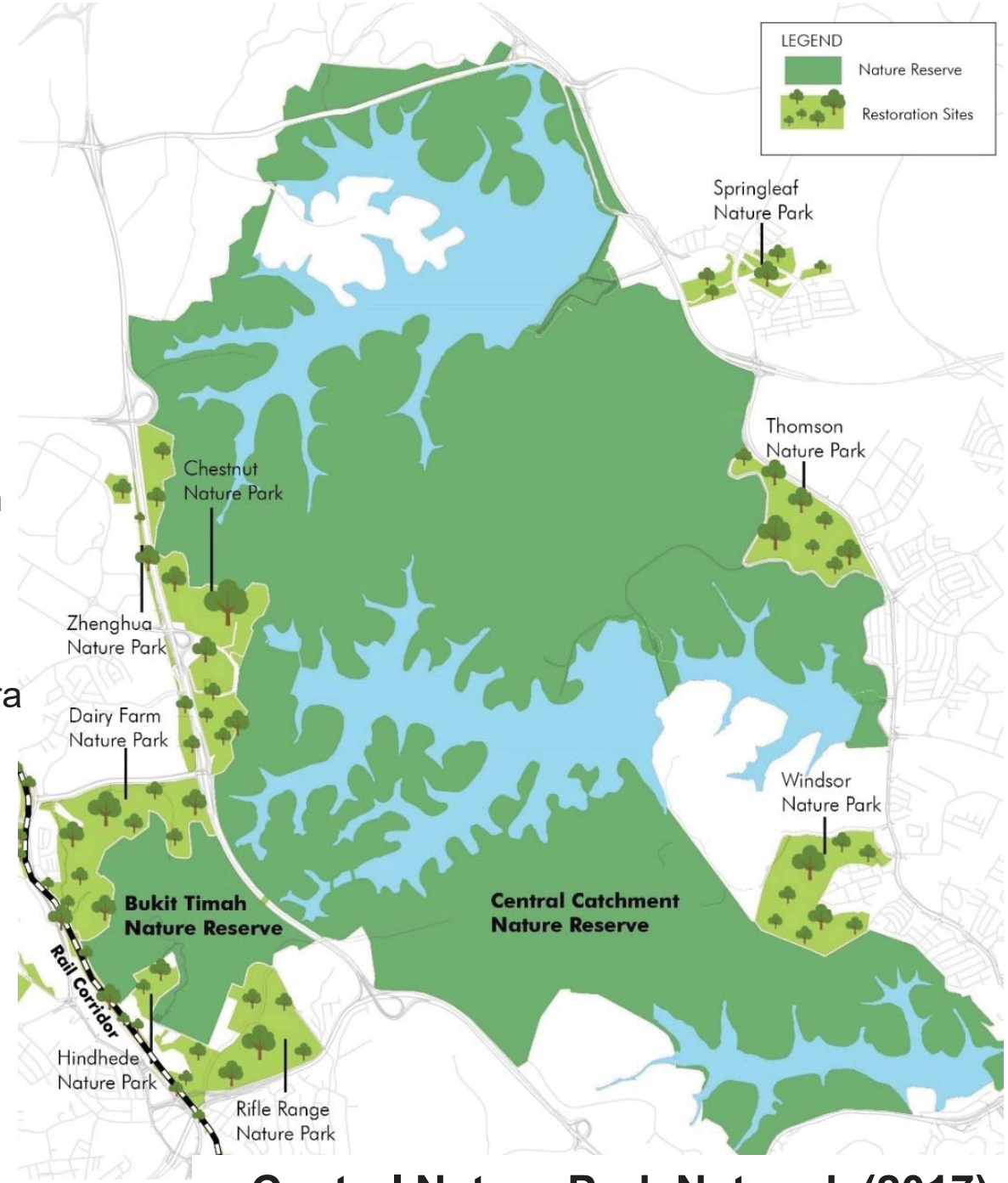
Central Catchment Nature Reserve

1. Conservation of Key Habitats

Secure and Enhance Buffer Areas

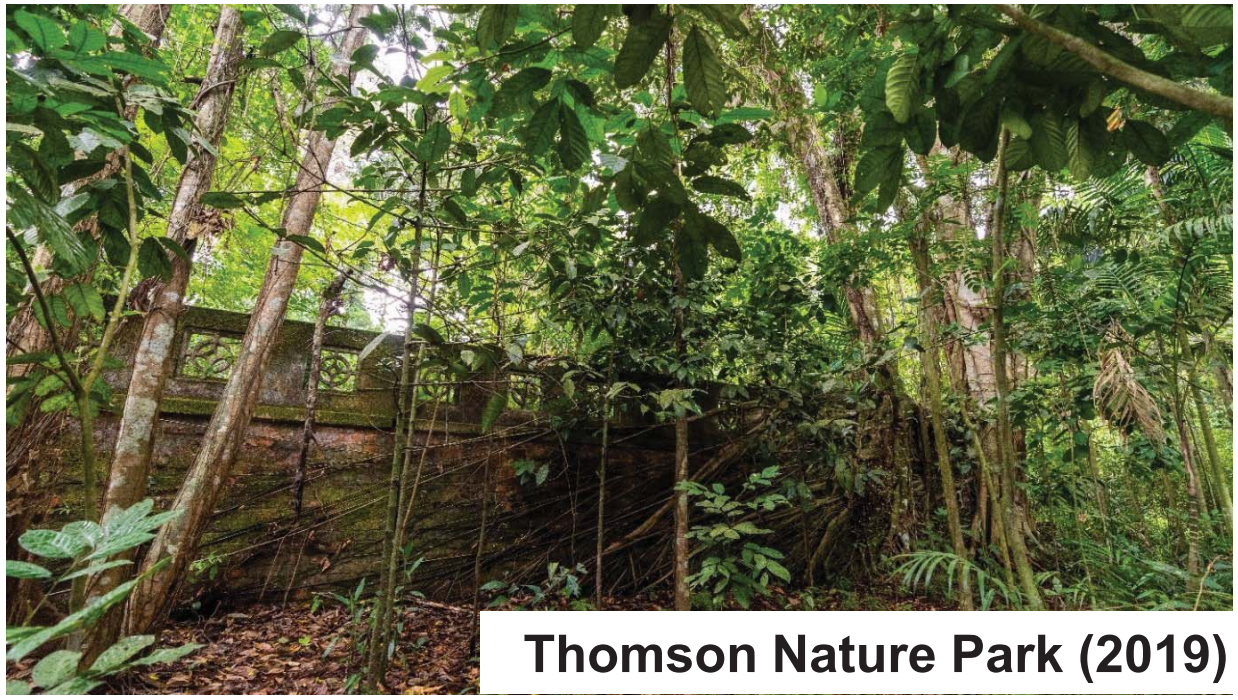
Nature Parks

- **Rustic** and **forested nature parks** which **buffer** Nature Reserves
- Provide **complementary habitats** for flora and fauna from Nature Reserves
- Serve as **compatible nature-based recreation**



Central Nature Park Network (2017)

Windsor Nature Park (2017)

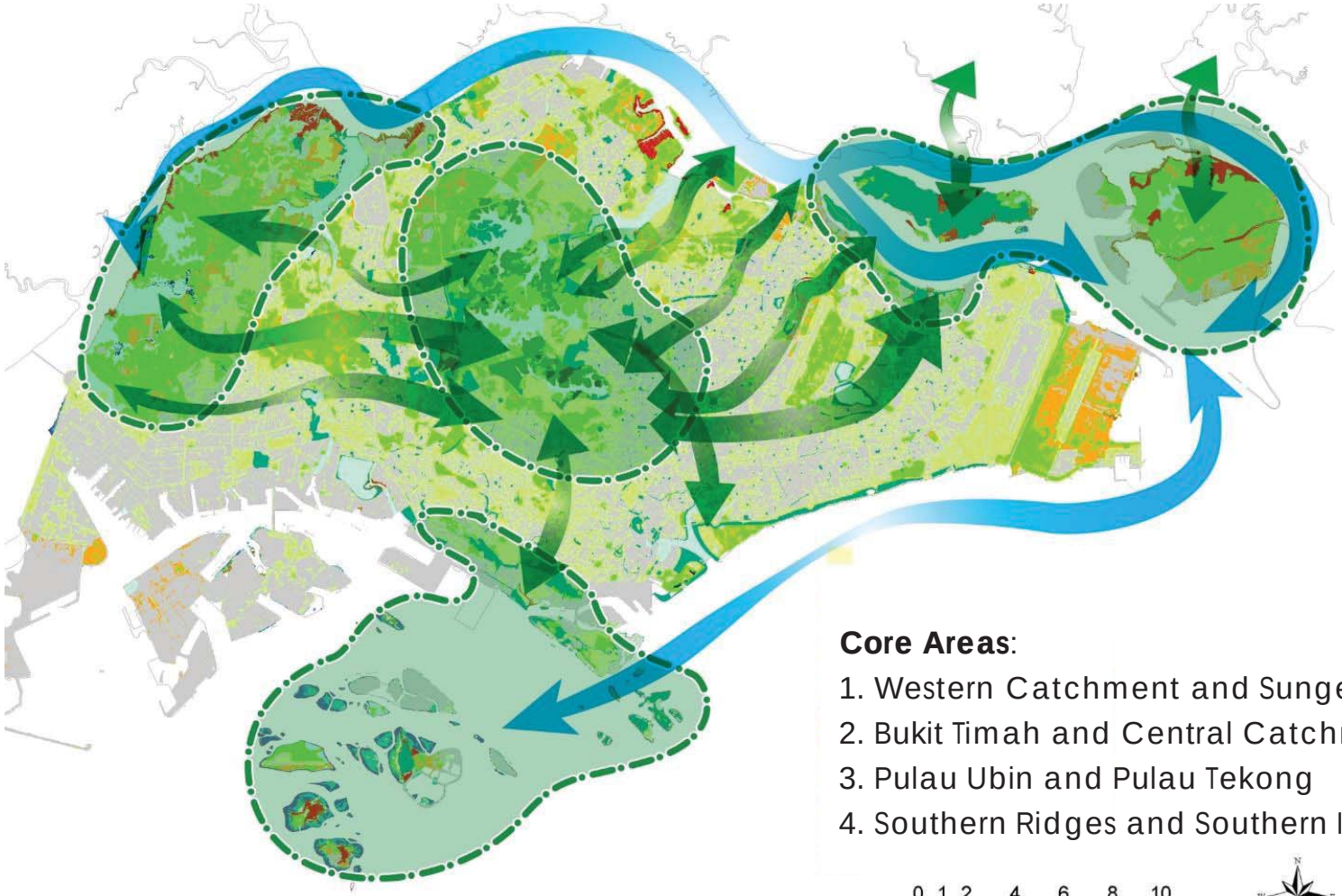


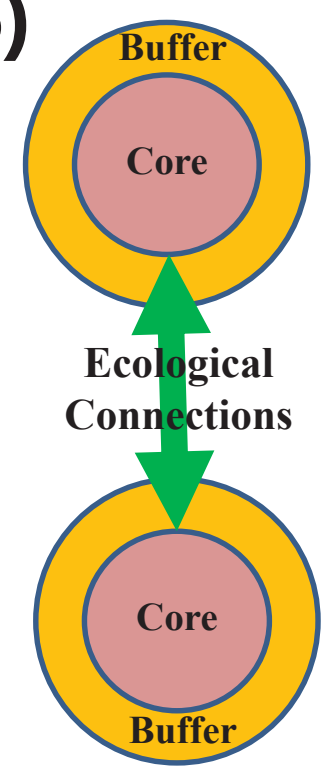
Thomson Nature Park (2019)

1. Conservation of Key Habitats

Develop Ecological Connections

Nature Conservation Master Plan (2009, 2015)



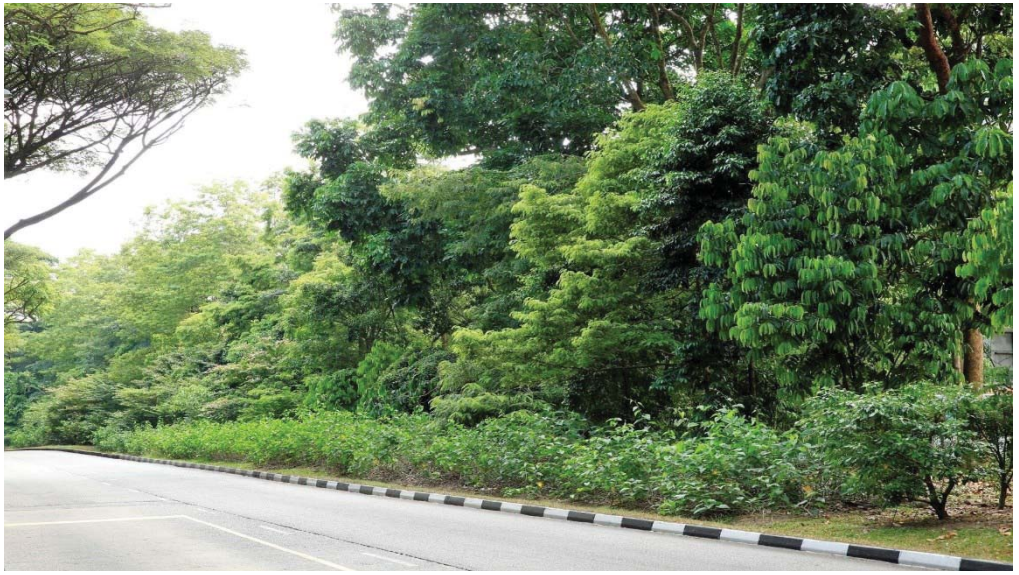


Core Areas:

1. Western Catchment and Sungei Buloh
2. Bukit Timah and Central Catchment
3. Pulau Ubin and Pulau Tekong
4. Southern Ridges and Southern Islands

0 1 2 4 6 8 10 Kilometers

Eco-Link @ BKE (2019)

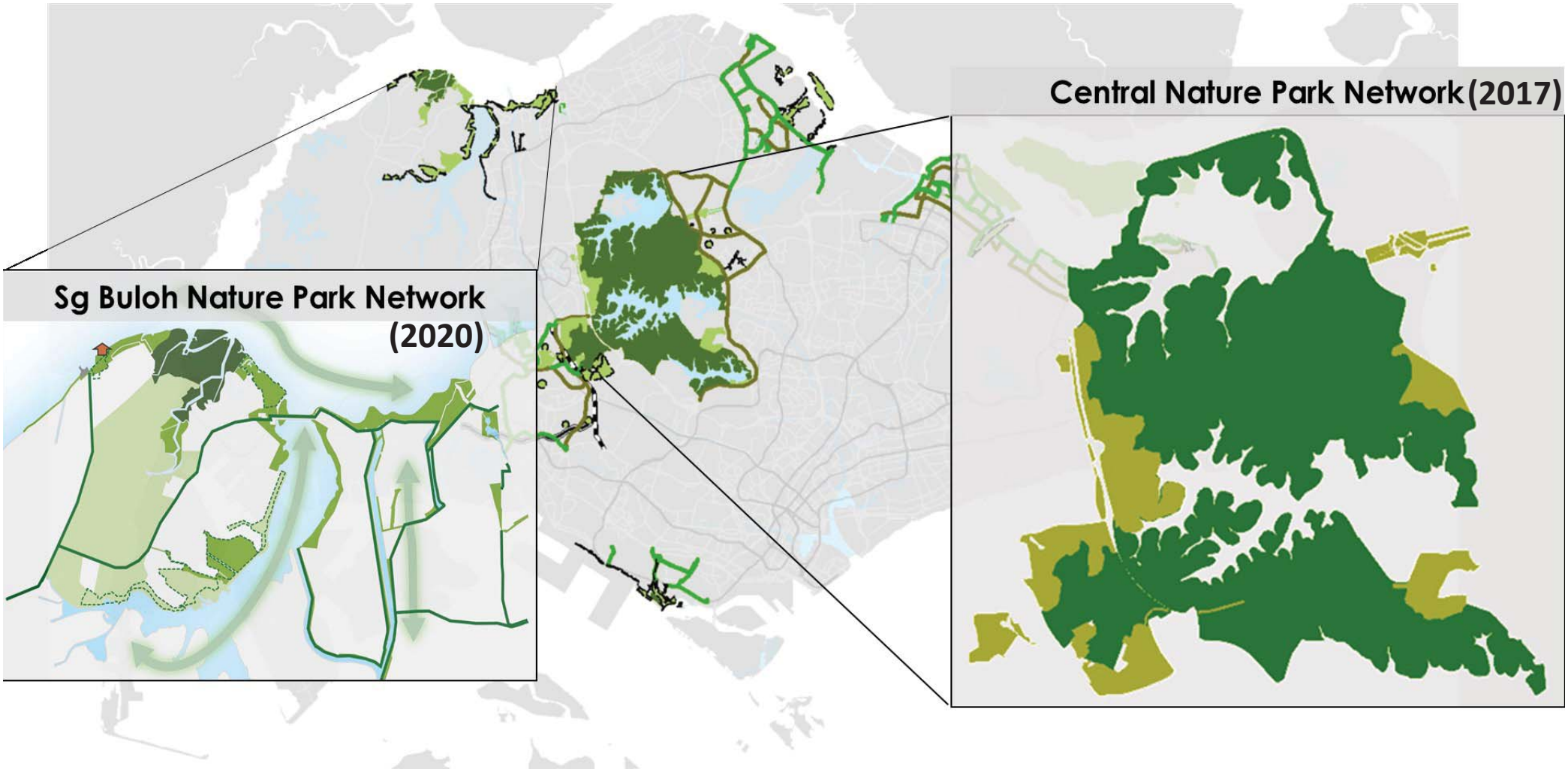


Tanglin Nature Way

Lornie Nature Corridor (2020)

1. Conservation of Key Habitats

Establishing Nature Park Networks



2. Habitat Enhancement and Restoration

Forest Restoration Action Plan (2019)

Forest Restoration at Rifle Range Nature Park

2. Habitat Enhancement and Restoration

Naturalising our parks and gardens

Rasau Walk, Lakeside Garden, Jurong Lake Gardens (2019)

2. Species Recovery Framework

Conserving species through propagation, reintroduction, habitat enhancement or protection

- Targets **endemic**, **rare** or **threatened native species** in Singapore
- Currently we have **67 plant** and **10 animal species** in the list
- NParks aims to implement species recovery plans for **90 plant** and **40 animals species** by **2030**

Cinnamon Bush Frog *(Nyctixalus pictus)*

- Successfully introduced a population into the Rain Forest of Singapore Botanic Gardens

Singapore Freshwater Crab *(Johora singaporensis)*

- First successful brooding of crab eggs to maturity in 2018
- More than 100 individuals released to the wild as of 2021

2. Species Recovery

Conserving germplasm through living collections and seeds

Singapore Botanic Gardens Seed Bank (2019)

3. Applied Research in Conservation Biology and Planning

Comprehensive surveys and long term monitoring

Raffles' Banded Langur
crossing rope bridge
(Thomson Nature Park 2019)

Sunda Slow Loris crossing Eco-Link@BKE

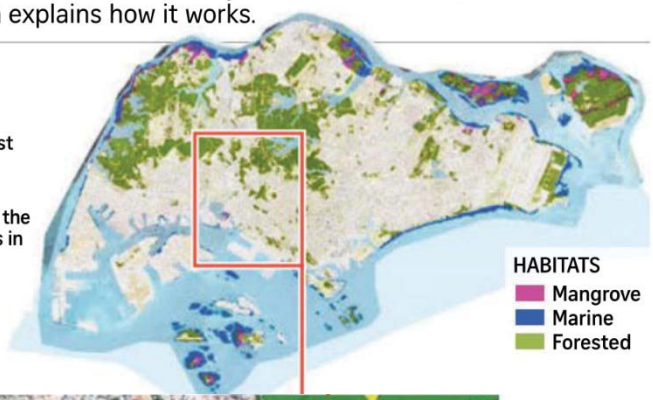
The Straits Times, 2 August 2021

Helping wildlife move around

A map of how wildlife in Singapore can move from one forest plot to another has been developed by the National Parks Board (NParks) in consultation with experts. This will give planners an overview of how wildlife connectivity can be maintained, even amid future development. **Audrey Tan** explains how it works.

TIMELINE OF COMPLETION

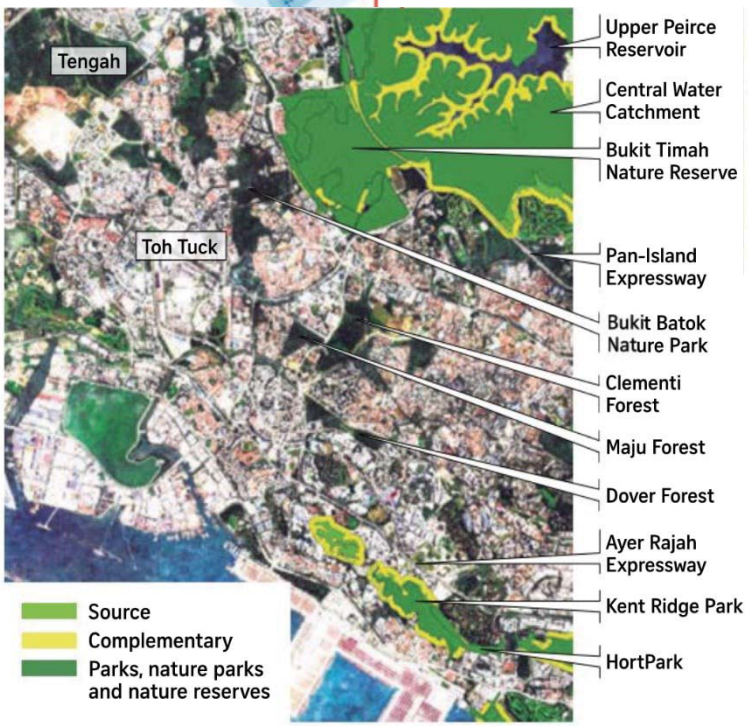
- **Quarter 2** – South-west and north-east Singapore
- **Quarter 3** – North-west Singapore, and the rest of the island, as well as in coastal and marine areas
- **Quarter 4** – Share findings from the exercise with the wider nature community



STEP 1

WHERE THE WILD SPACES ARE

- Source habitats such as nature reserves are marked out on a satellite map of an area, and a **100m green buffer** is added to their boundaries.
- Buffers provide space for recreation, and **reduce pressure on wildlife strongholds.**
- For south-western Singapore, most buffers already fall within NParks' existing nature park network, such as Bukit Batok Nature Park.
- NParks will work with other agencies to see how identified buffer areas outside of the existing network can be planted up.

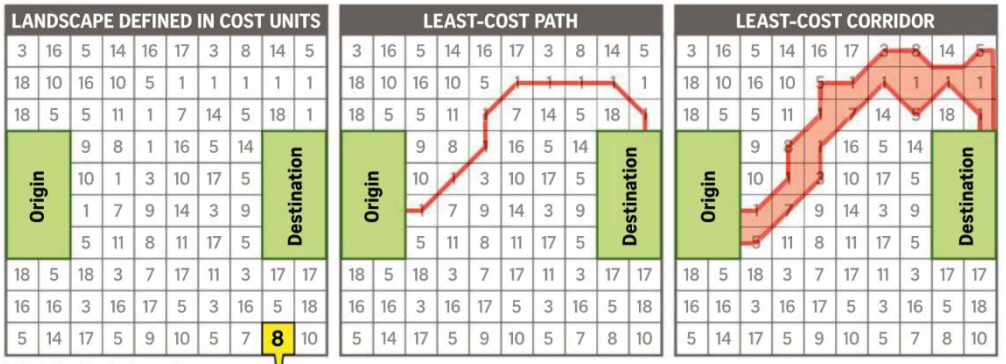


STEP 2 PATHS OF LEAST RESISTANCE

What is it

- Predicted pathways are plotted based on a method known as **"least-cost modelling"**, which measures how easy or difficult it is for the species to move across the landscape.

How it works



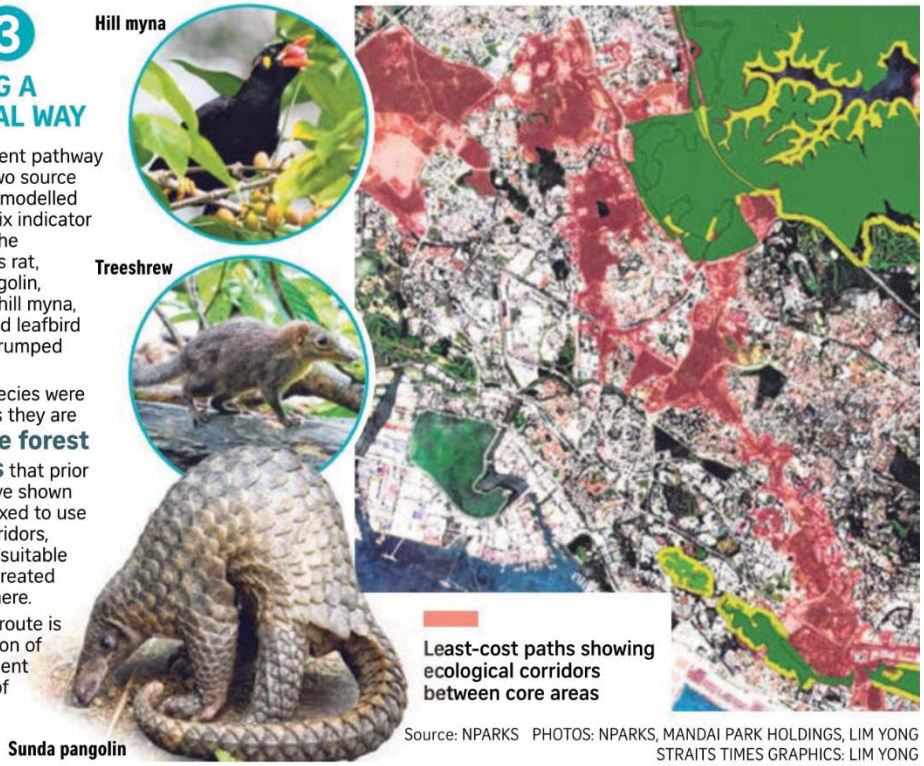
NOTE: For illustration only.

- In this method, various surface structures, such as roads, forests and fields, are assigned a value. A lower value indicates a habitat **more conducive for a species.**
- For example, ground-dwelling

STEP 3

FINDING A GENERAL WAY

- A movement pathway between two source habitats is modelled based on six indicator species – the Annandale's rat, Sunda pangolin, treeshrew, hill myna, blue-winged leafbird and white-rumped shama.
- These species were selected as they are **sensitive forest dwellers** that prior studies have shown can be coaxed to use wildlife corridors, provided a suitable habitat is created for them there.
- The final route is a compilation of the movement pathways of the six species.



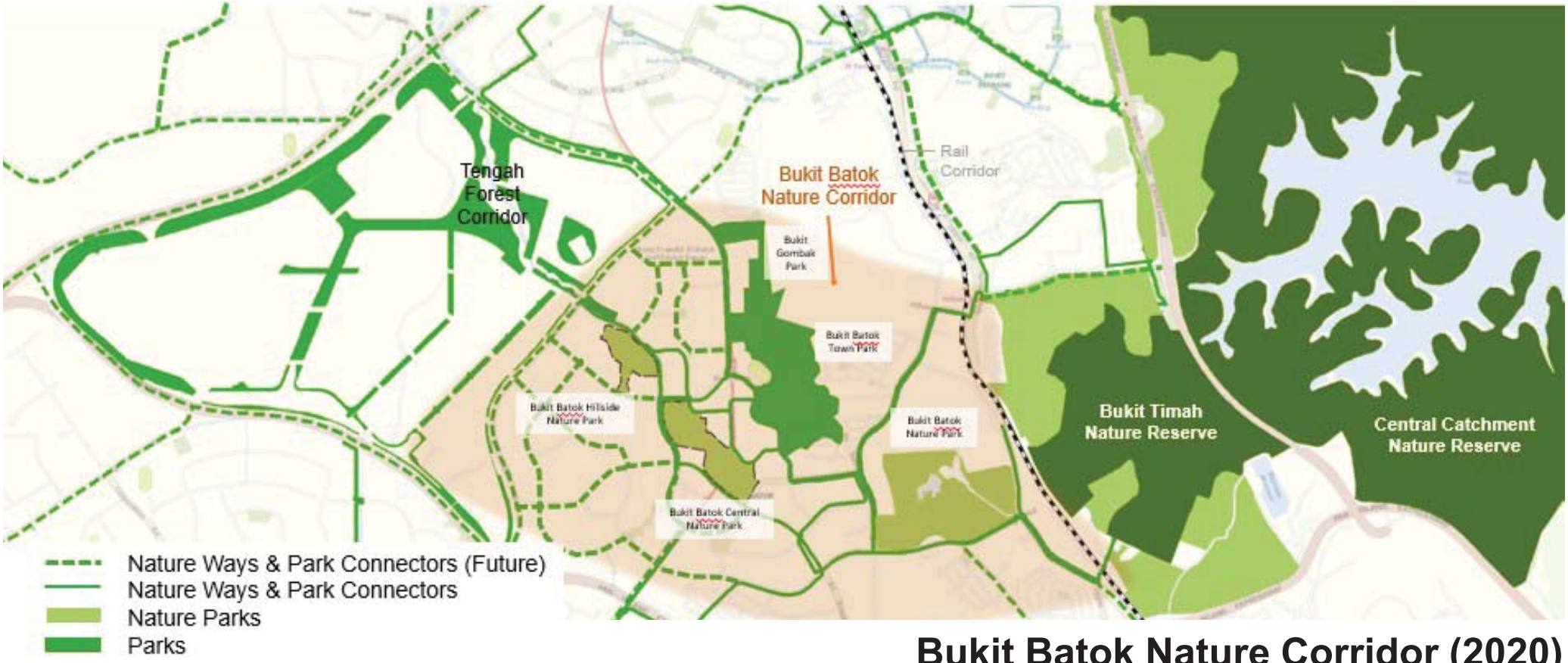
Source: NPARKS PHOTOS: NPARKS, MANDAI PARK HOLDINGS, LIM YONG
STRAITS TIMES GRAPHICS: LIM YONG

3. Applied Research in Conservation Biology and Planning

Ecological modelling for science-based decision making

Considerations taken in the EPE

- Identify **source populations** of native biodiversity
- Identify **ecological corridors** between **source habitats** using **least-resistance pathway GIS modeling**



Bukit Batok Nature Corridor (2020)

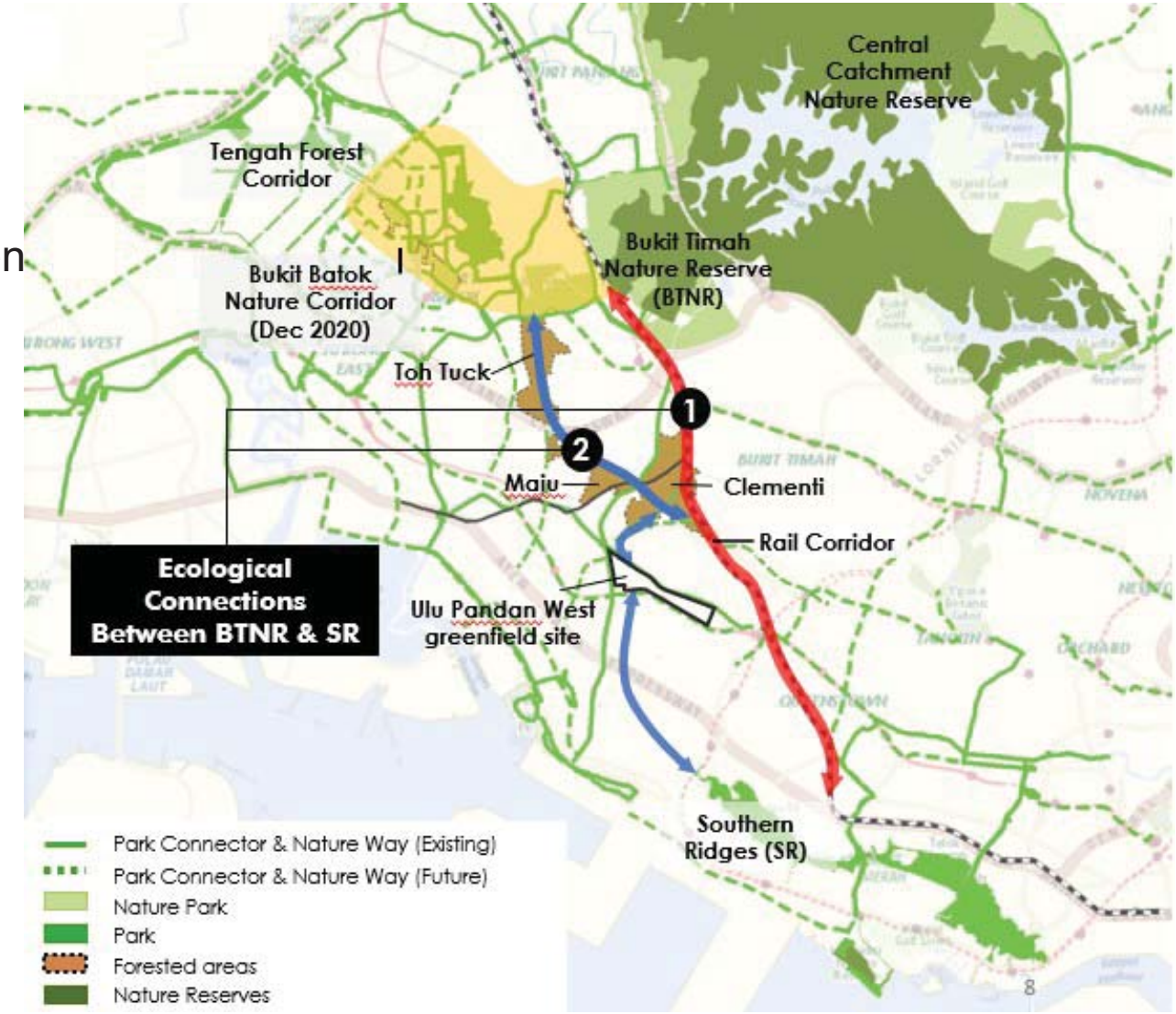
3. Applied Research in Conservation Biology and Planning

Ecological modelling for science-based decision making

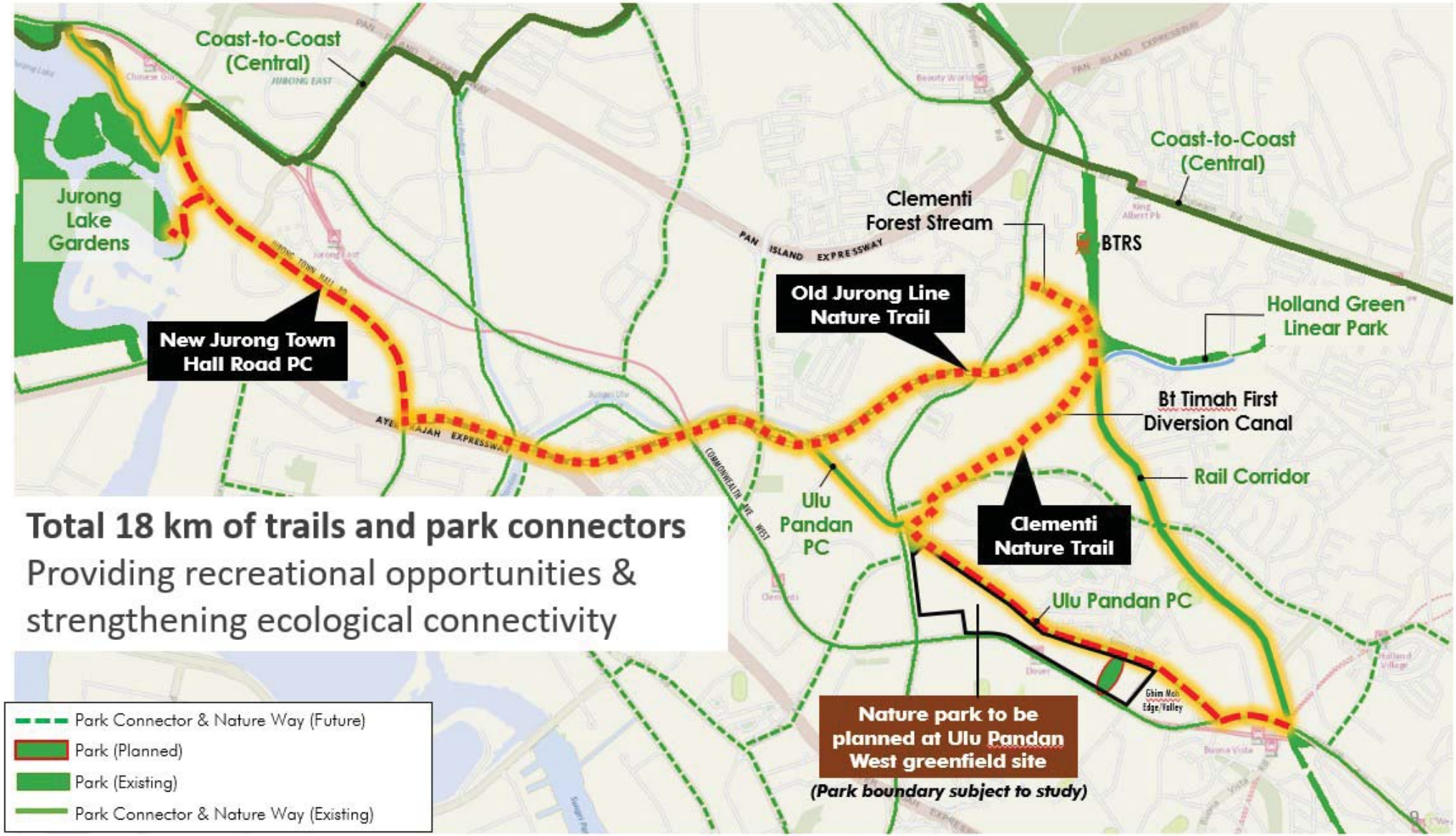
Clementi Nature Corridor

- Study showed the **need for ecological connectivity** between Clementi and the Southern Ridges (Kent Ridge)

- Opportunity to safeguard a sizeable portion of west Ulu Pandan site as a nature park as ecological **stepping stone** from **Clementi** to the **Southern Ridges** to strengthen ecological resilience



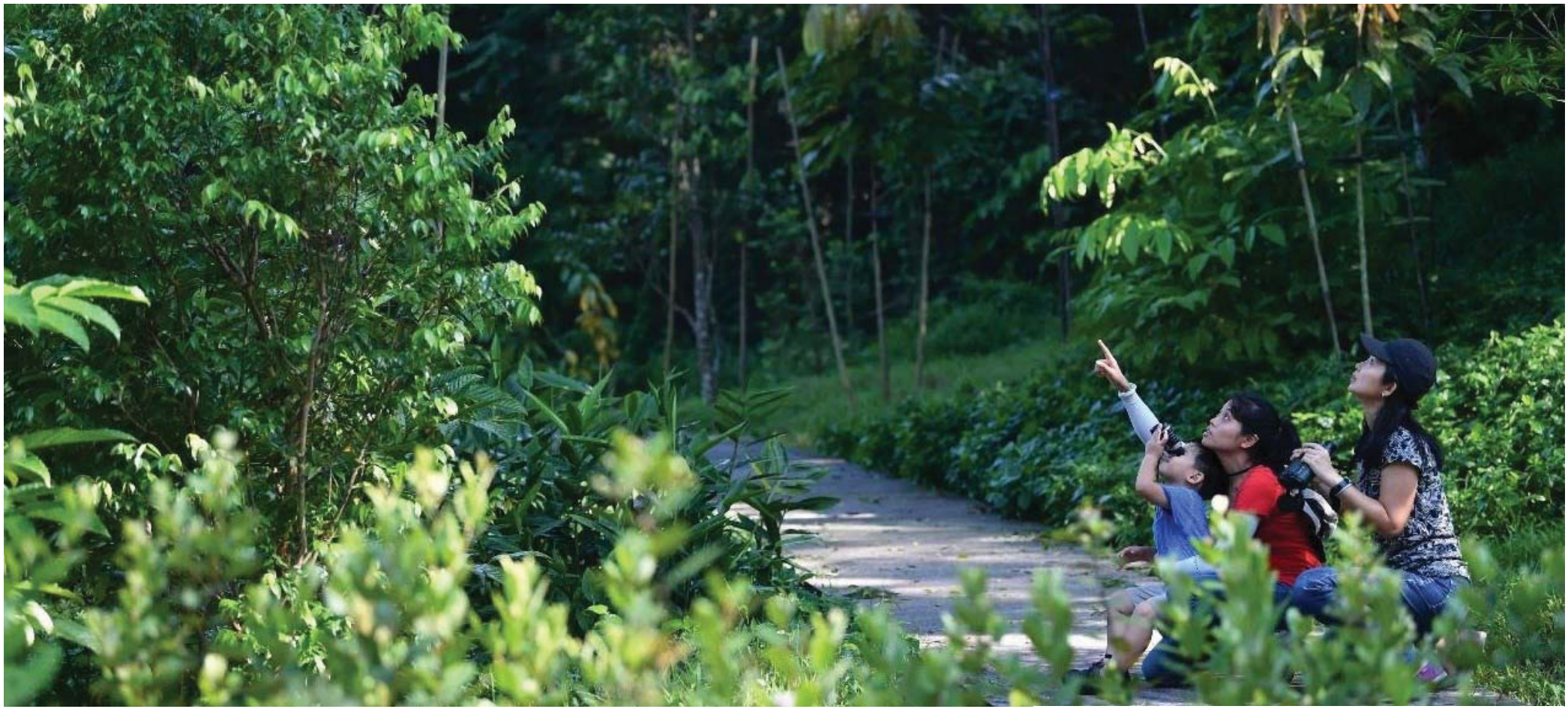
Clementi Nature Corridor (2021)



- **Total 18 km of trails and park connectors**
- Providing recreational opportunities & strengthening ecological connectivity

4. Community Stewardship and Outreach in Nature

Citizen Science under Community in Nature



NParks Biodiversity Watch

4. Community Stewardship and Outreach in Nature

OneMillionTrees movement

Tree Planting

Plant Propagation

Invasive Species Management

Outline

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Future Challenges…

*How can we **mitigate** the **impacts** of **climate change** and **build resilience**?*

TODAY *World* MENU

S'pore among world's major cities to face 'unprecedented' climate conditions by 2050

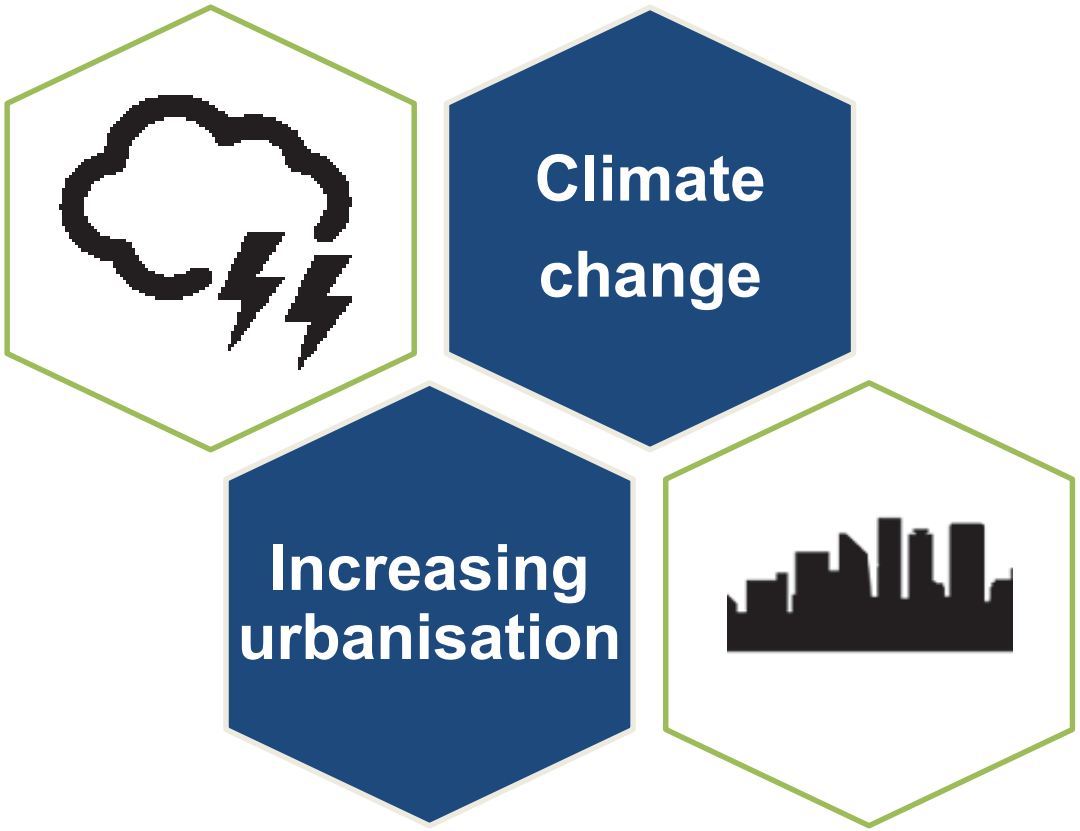
TODAY *Singapore* MENU

Temperatures in Singapore could hit 40°C as early as 2045: Scientists

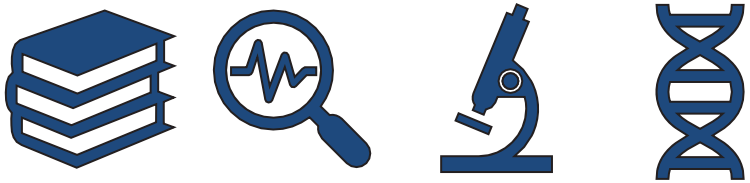
THE STRAITS TIMES

SINGAPORE › Courts & Crime Education Housing

More people, urbanisation 'behind rise in dengue cases'



*How can we **ensure a quality living environment** amidst increasing urbanisation?*



Research to help provide some solutions to these challenges.

In Place of Conclusion…

A **Balance……**

between **Humans** & **Wildlife** and **Nature** & **Development**

We will continue the Greening Journey to enhance OUR City in Nature… together with You……

NATIONAL PARKS
LET'S MAKE SINGAPORE OUR CITY IN NATURE

Thank You

Share your love for nature and animals at
#NParksBuzz #AnimalBuzzSG

nparksbuzz
Share your love for nature with us at
#nparksbuzz