Urban parks: refuges for tropical butterflies?

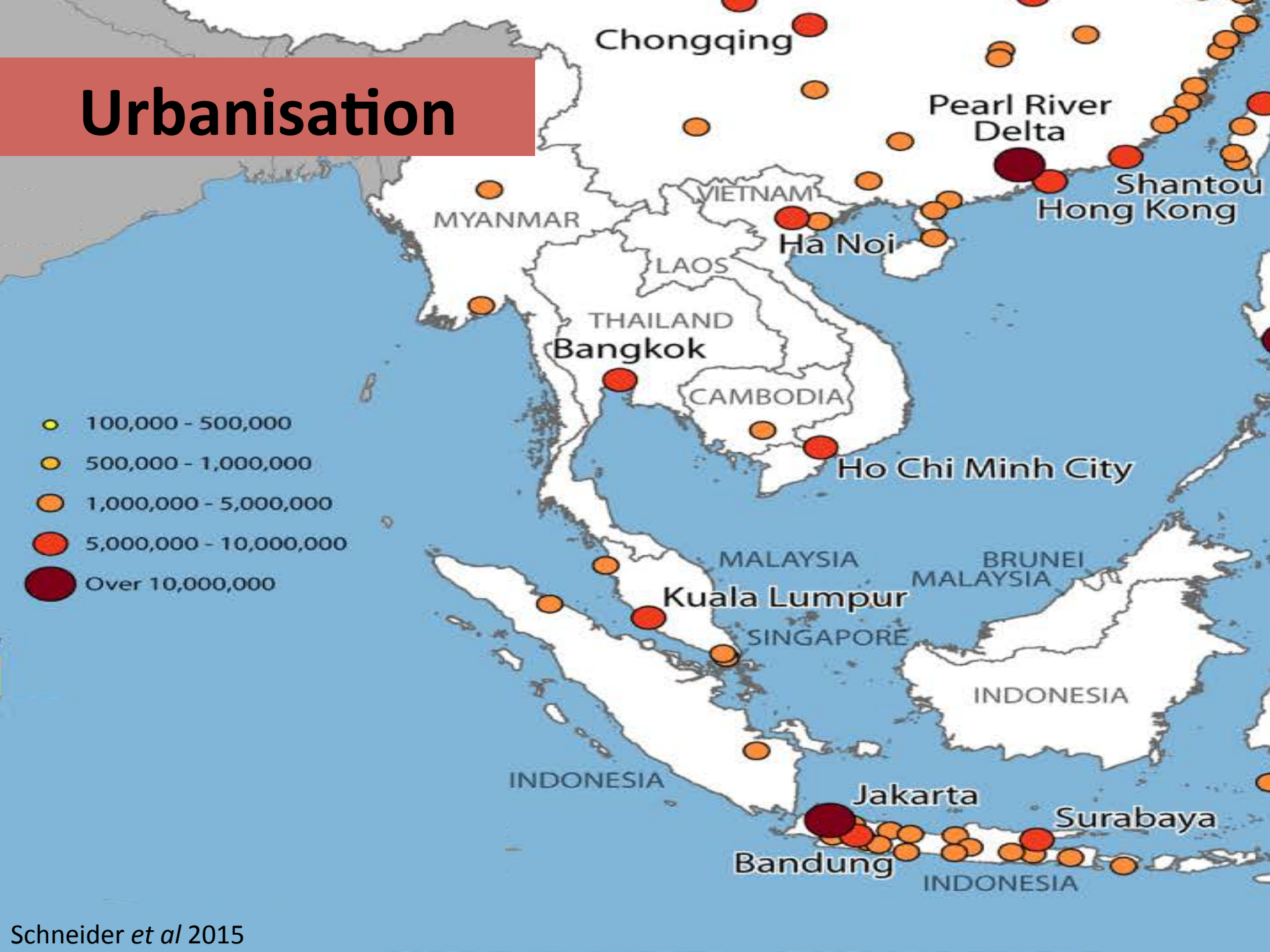
Kong-Wah Sing,

Wan Jusoh, Nor Rasidah, John-James Wilson

by jazmi awangrok

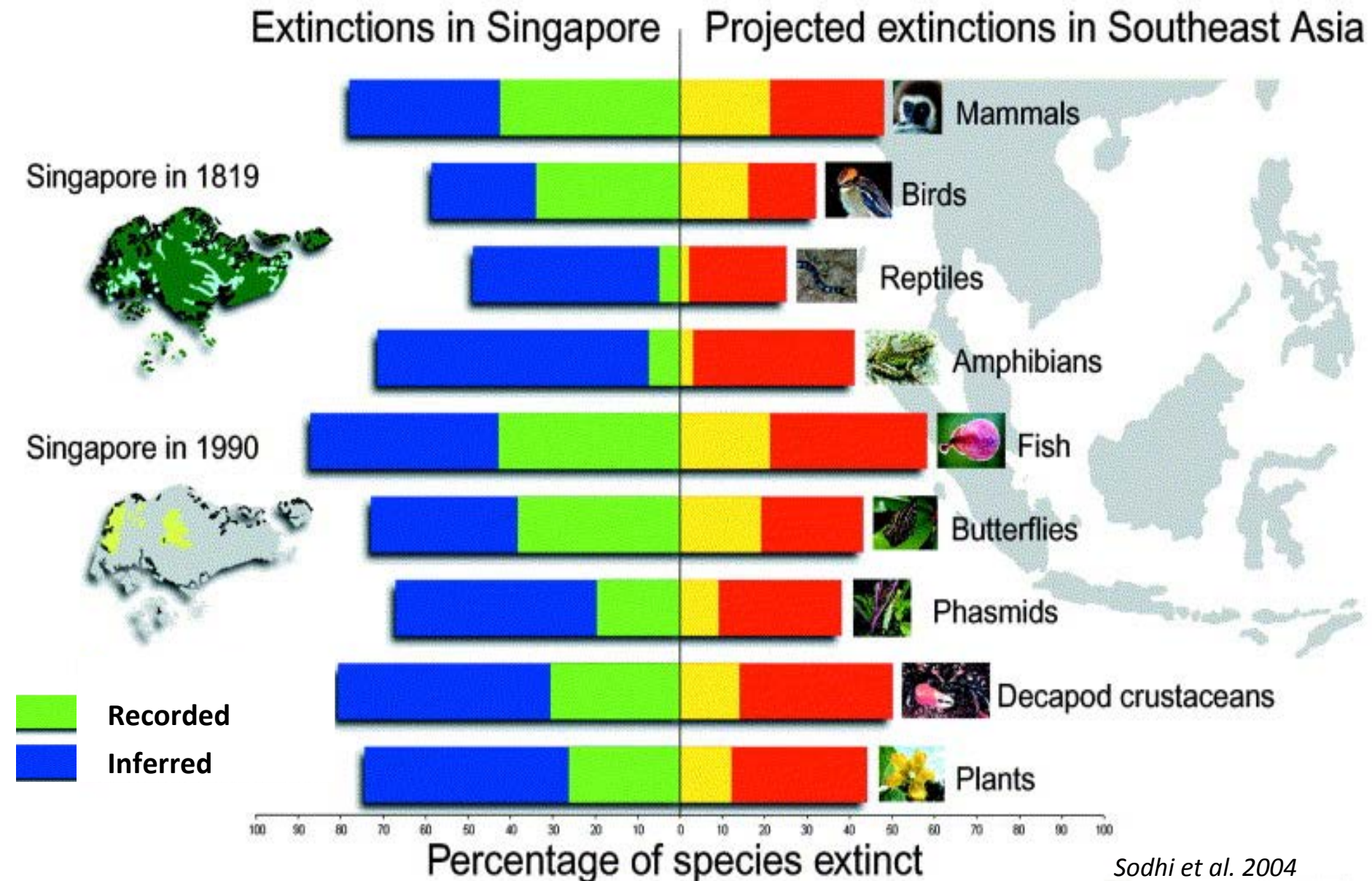
Introduction

Urbanisation



Schneider *et al* 2015

Urbanisation: Biodiversity loss

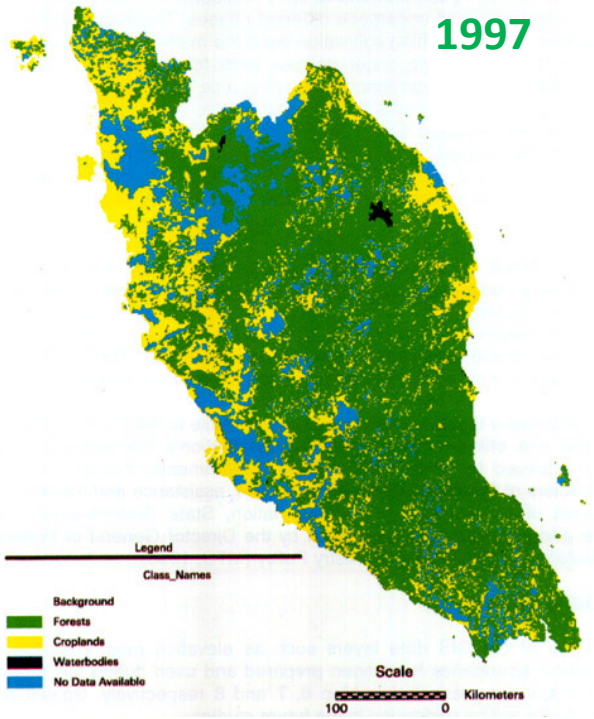


Sodhi et al. 2004

Urbanisation: Peninsular Malaysia

UNEP ENVIRONMENT ASSESSMENT PROGRAM FOR ASIA AND THE PACIFIC

1997

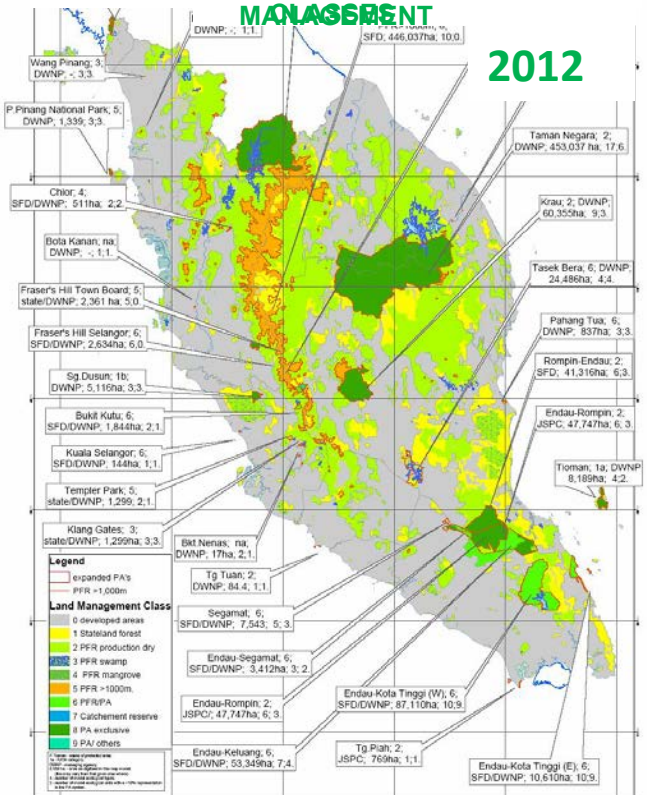


SELECTIVE CONCENTRATION DEVELOPMENT STRATEGY

2006

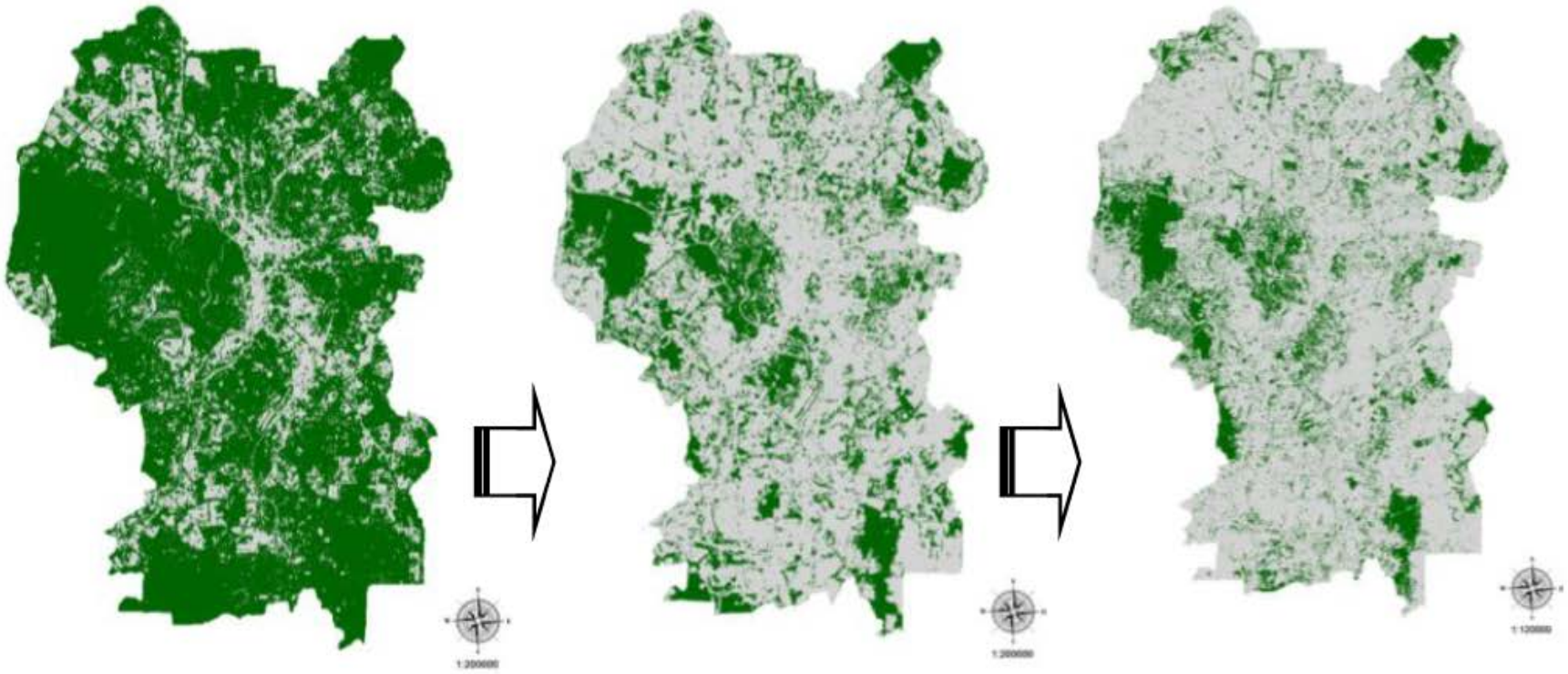
PROTECTED AREAS AND LAND MANAGEMENT

2012



Urbanisation: Kuala Lumpur

87% green area lost and 77% population growth



Norzalawati et al 2013

Urban green spaces

Urban green spaces: biodiversity?

Urban green spaces: butterflies?

Primary consumer

Picture taken from Google image

Research Article

Tropical Conservation Science Vol.8 (1): 138-149, 2015

Comparison of butterflies, bats and beetles as bioindicators based on four key criteria and DNA barcodes

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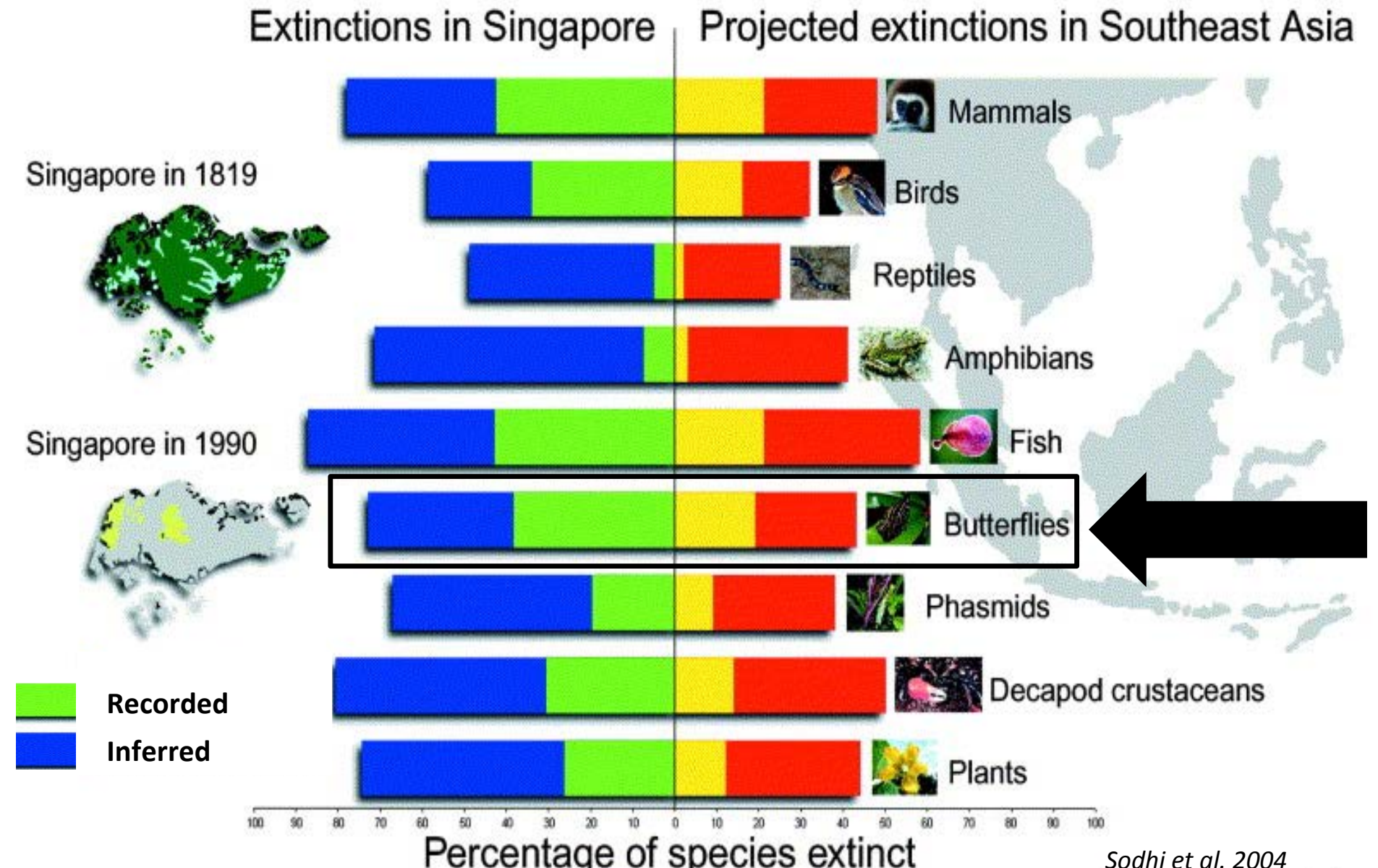
Criterion	Butterflies	Bats	Beetles
Tractable taxonomy	2	1	3
Easily surveyed	2	3	1
Taxonomic distribution	1	2	3
Diversity patterns reflected in other groups	1	2	3
Overall Rank	**1**	**2**	**3**

Urbanisation: butterfly loss



Sodhi et al. 2004

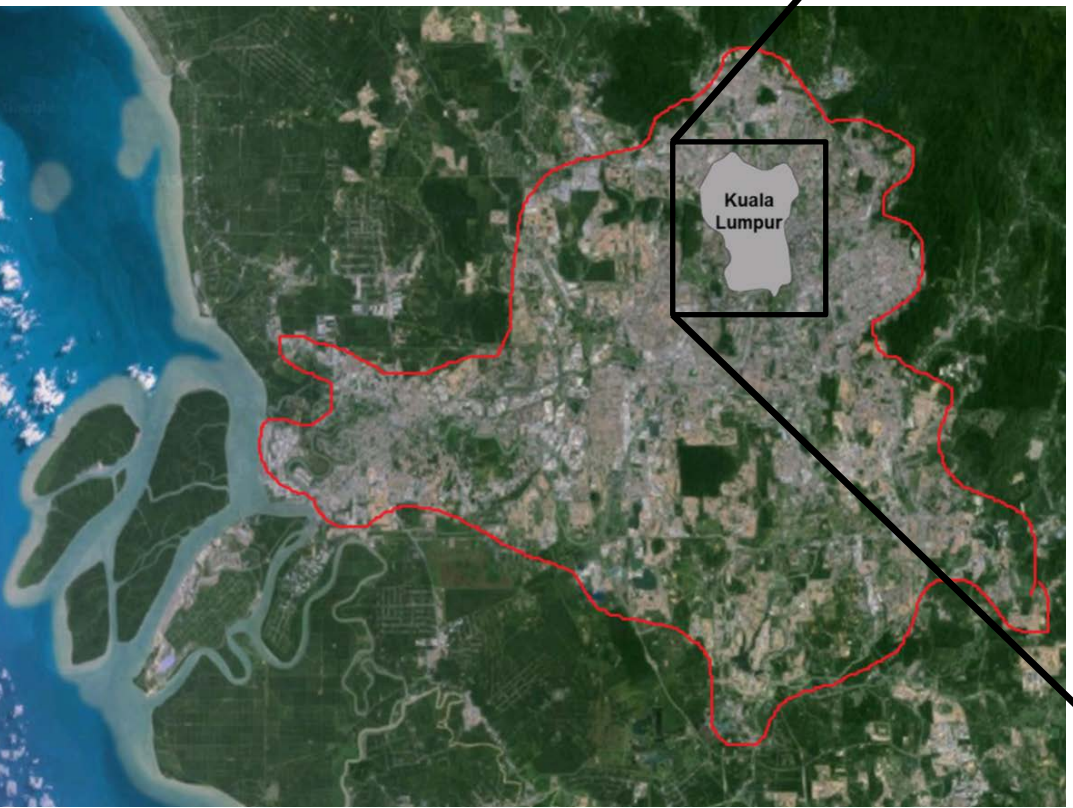
Hypothesis

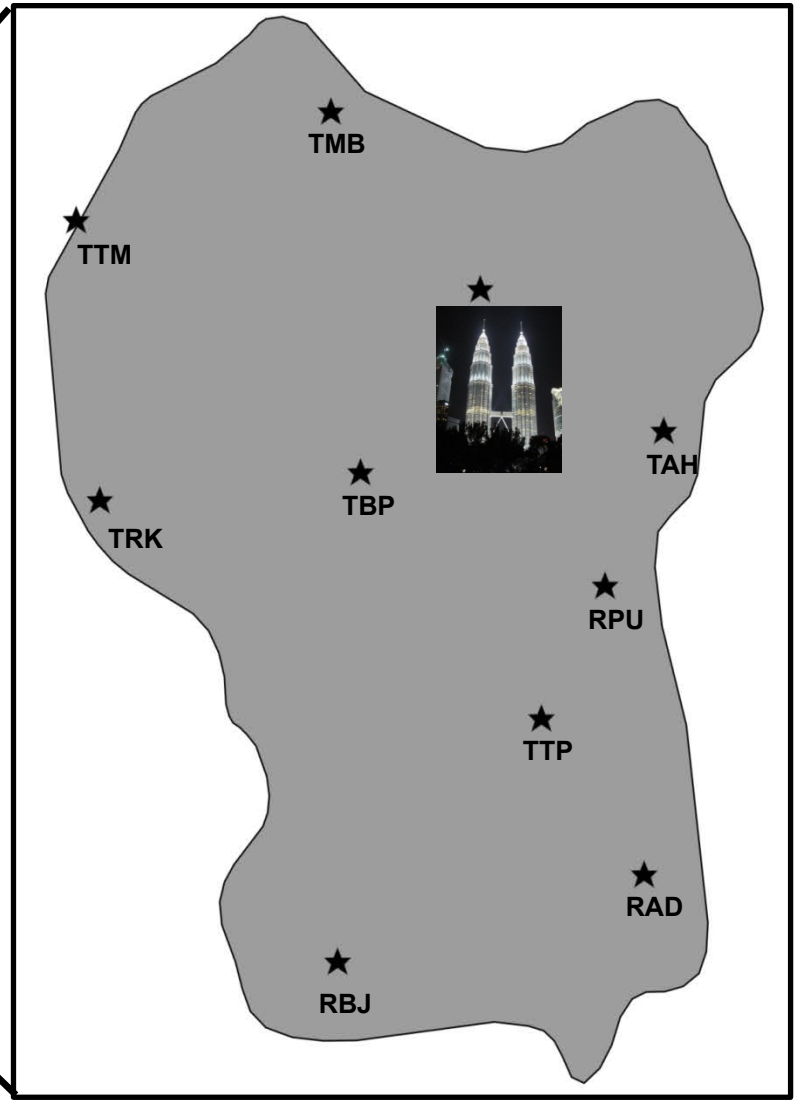
Objectives

1. Species diversity of butterflies in city parks Kuala Lumpur

2. Relationships between butterfly species richness and the park's age, size and distance to the central business district

Federal Territory of Kuala Lumpur





“Time survey”

Flowerbed

Hedges

Grove

Unmanaged/Wild

DNA barcoding

Tissue sampling

DNA extraction

PCR amplification

DNA sequencing

OPEN ACCESS Freely available online

PLOS ONE

Building a DNA Barcode Reference Library for the True Butterflies (Lepidoptera) of Peninsula Malaysia: What about the Subspecies?

John-James Wilson[1,2*], Kong-Wah Sing[1], Mohd Sofian-Azirun[2]

1 Museum of Zoology, Institute of Biological Sciences, Faculty of Science, University of Malaya, Kuala Lumpur, Malaysia, 2 Institute of Biological Sciences, Faculty of Science, University of Malaya, Kuala Lumpur, Malaysia

Abstract

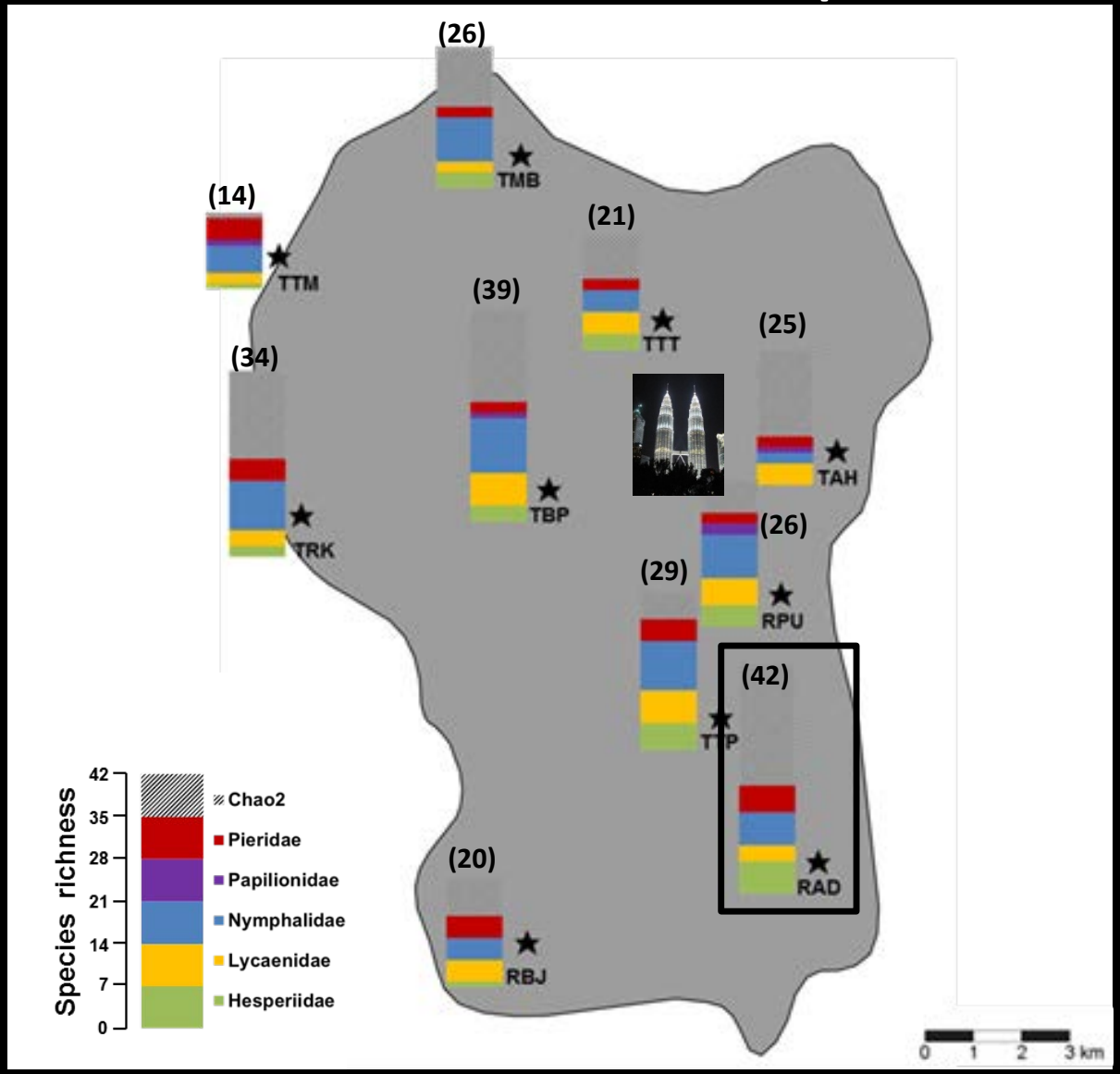
The objective of this study was to build a DNA barcode reference library for the true butterflies of Peninsula Malaysia and assess the value of attaching subspecies names to DNA barcode records. A new DNA barcode library was constructed with butterflies from the Museum of Zoology, University of Malaya collection. The library was analysed in conjunction with publicly available DNA barcodes from other Asia-Pacific localities to test the ability of the DNA barcodes to discriminate species and subspecies. Analyses confirmed the capacity of the new DNA barcode reference library to distinguish the vast majority of species (92%) and revealed that most subspecies possessed unique DNA barcodes (84%). In some cases

Statistical analysis

- Species richness (EstimateS)
- Microhabitat types (Kruskal-Wallis)
- Correlations between species richness and park age, size and distance to central business district (Spearman's correlation coefficients)
- Determine the similarity of the butterfly assemblages (Canonical Correspondence Analysis)

Results

572 butterflies; 60 species

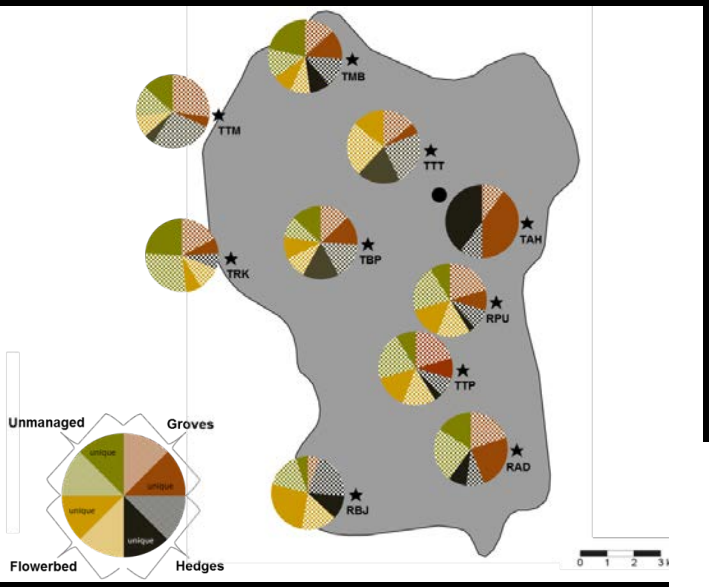


Dominant species (57%)

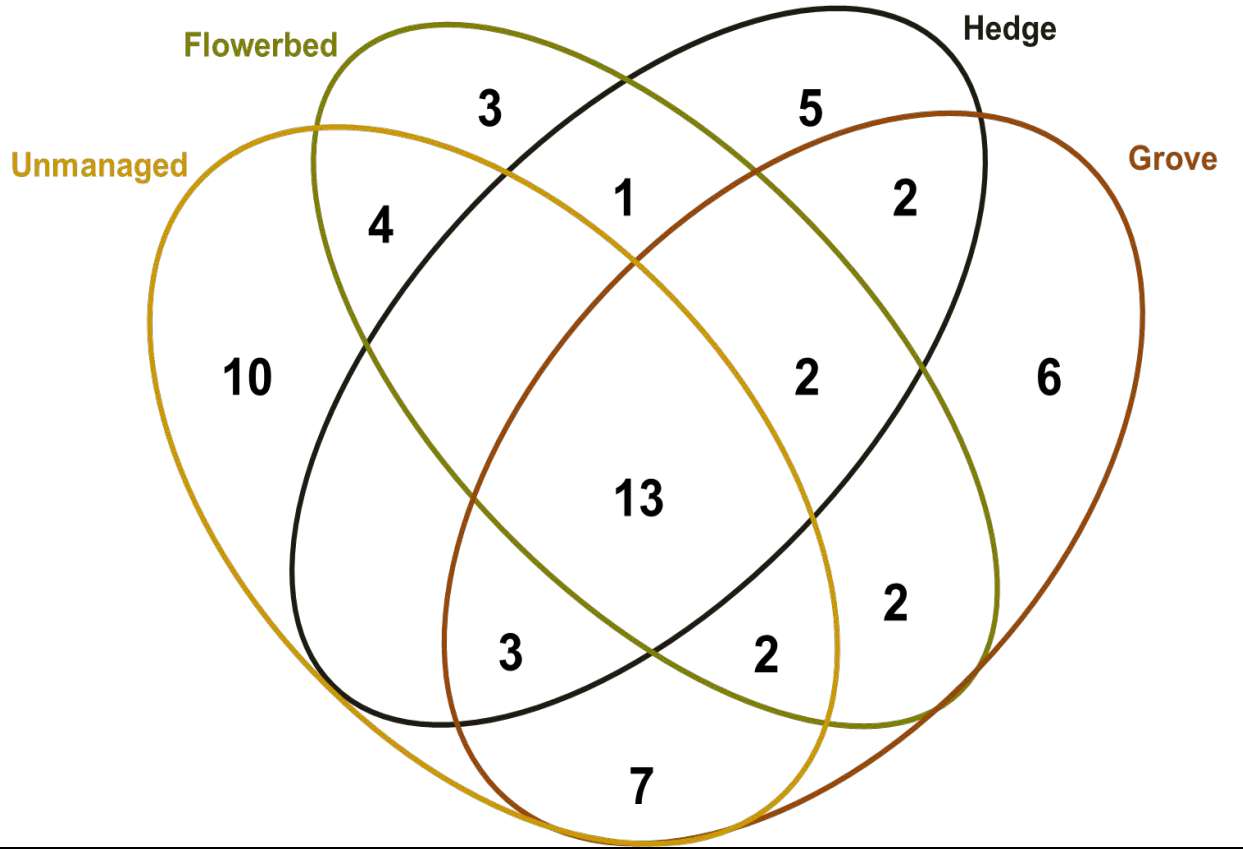
Zizina otis

Ypthima spp

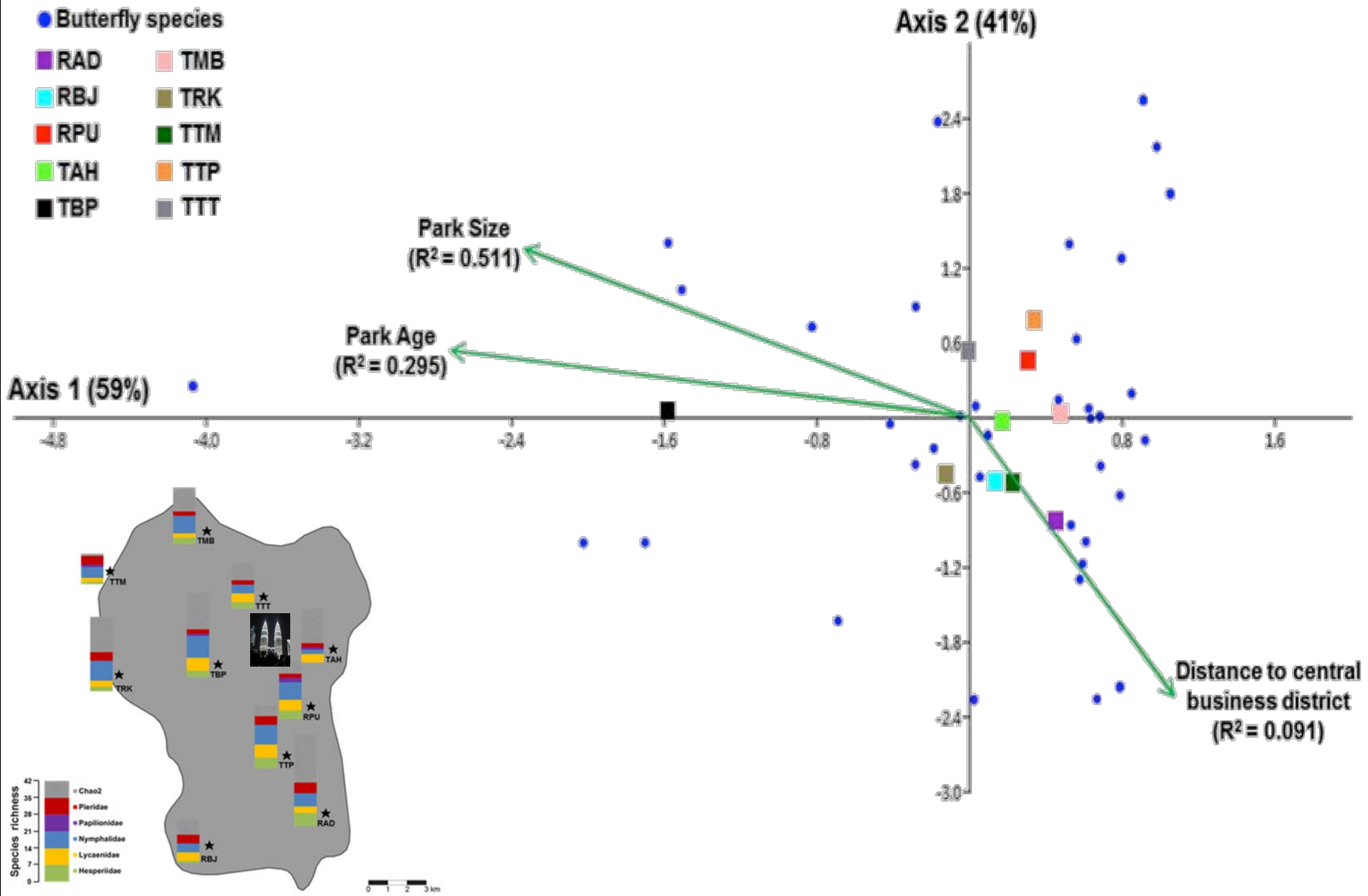
Results



60% species found in unmanaged

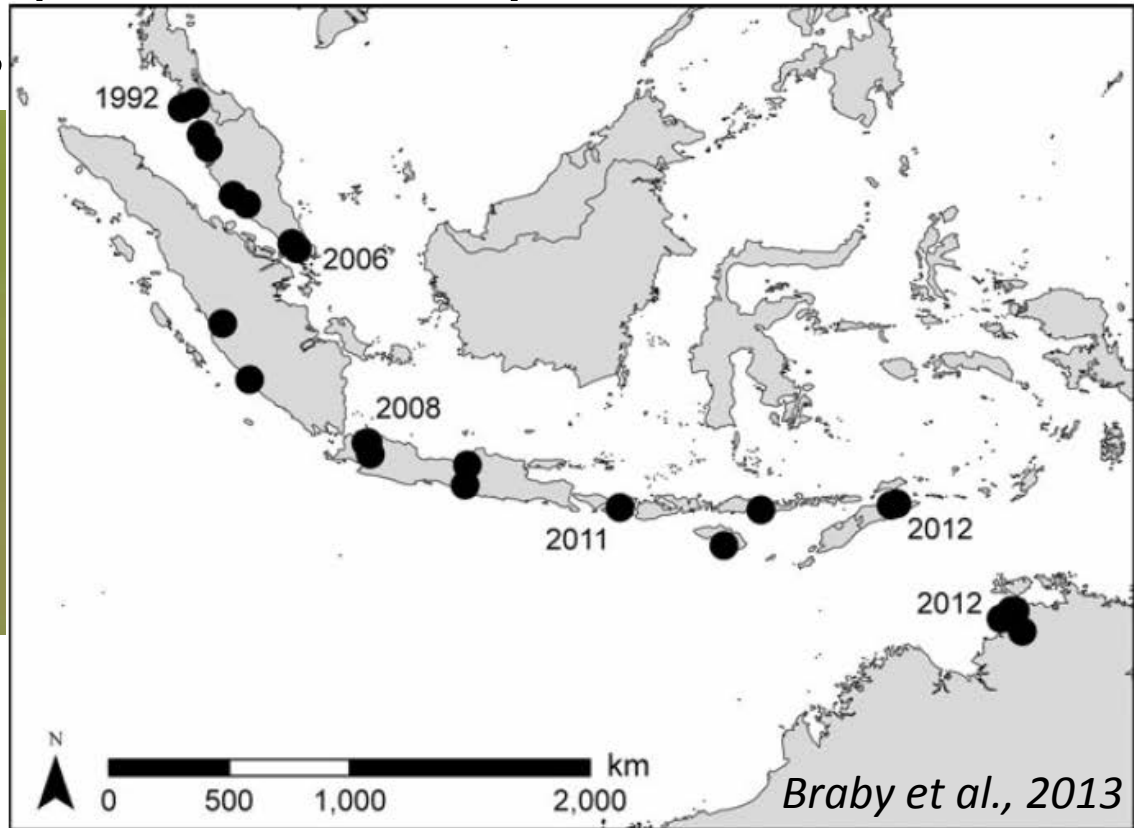


Results


Butterfly species
RAD
RBJ
RPU
TAH
TBP
TMB
TRK
TTM
TTP
TTT
Axis 2 (41%)
Axis 1 (59%)
Park Size
(R² = 0.511)
Park Age
(R² = 0.295)
Distance to central
business district
(R² = 0.091)
2.4
1.8
1.2
0.6
-0.6
-1.2
-1.8
-2.4
-3.0
-4.8
-4.0
-3.2
-2.4
-1.6
-0.8
0.8
1.6
TMB
TTM
TTT
TAH
TRK
TBP
RPU
TTP
RAD
RBJ
Species richness
Chao2
Pieridae
Papilionidae
Nymphalidae
Lycaenidae
Hesperiidae
0 1 2 3 km

Discussion

- 5% of the known butterfly fauna of P. Malaysia
- Widely distributed, “common” species e.g. *Acraea violae*



Braby et al., 2013

Discussion

- Highest species richnesses were observed in larger parks and those with blooming plants

- Further surveys in parks in the outlying suburbs of the Klang Valley conurbation may reveal correlation with distance to CBD

Discussion

- Unmanaged areas, often at an early-successional stage with a high diversity and quality of plants, provide suitable foraging habitat for butterflies

- Unmanaged areas potentially create social conflict e.g. breading ground of vectors

Discussion

- Lack of rare species suggests tropical urban parks are poor substitutes to forest for maintaining populations of rare butterflies

Conclusion

Diverse planting scheme

unmanaged

Further work

Management schemes and techniques for conserving butterflies in urban parks

BRITISH COUNCIL

INSTITUTIONAL LINKS

www.britishcouncil.org

Newton-Ungku Omar Fund

MiGHT
Malaysian Industry-Government Group for High Technology

SCIENCE TO ACTION

UK-MALAYSIA LINK:
A New Research Network To Study Animal-Plant Interactions In Urban Environments

Queen Mary University of London

and

UNIVERSITI MALAYA

Thank you!

singkongwah@um.edu.my