Urban parks: refuges for tropical butterflies?

Kong-Wah Sing,
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Introduction

> 7 billion people
Urbanisation: Biodiversity loss

Extinctions in Singapore | Projected extinctions in Southeast Asia

Singapore in 1819

Singapore in 1990

Recorded

Inferred

Percentage of species extinct

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

LEGEND:
- Green Area
- Built-up area

Year 1990  
Year 2001  
Year 2010

Norzalawati et al 2013
Urban green spaces
Urban green spaces: biodiversity?
Urban green spaces: butterflies?
Primary consumer
Comparison of butterflies, bats and beetles as bioindicators based on four key criteria and DNA barcodes

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<th>Criterion</th>
<th>Butterflies</th>
<th>Bats</th>
<th>Beetles</th>
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<td>Diversity patterns reflected in other groups</td>
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<td>Overall Rank</td>
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Urbanisation: butterfly loss

Extinctions in Singapore

Project extinctions in Southeast Asia

Singapore in 1819

Singapore in 1990

Recorded

Inferred

Sodhi et al. 2004
Hypothesis

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

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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
• 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
  - TMB
  - RBJ
  - TRK
  - RPU
  - TTM
  - TAH
  - TTP
  - TBP
  - TTT

- **Axis 1 (59%)**
- **Axis 2 (41%)**

- **Park Size** ($R^2 = 0.511$)
- **Park Age** ($R^2 = 0.295$)

- **Distance to central business district** ($R^2 = 0.091$)
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.
• 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

Further work
Management schemes and techniques for conserving butterflies in urban parks
UK-MALAYSIA LINK:
A New Research Network To Study Animal-Plant Interactions In Urban Environments
Thank you!
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