

Technical Assistance for Cadastre Integration, Natural Resources Valuation and Resilient Planning in Cities

International Workshop
Oct 2024

Pluralistic valuation of ecosystem services in Singapore

新加坡生态系统服务的多元估值

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International Workshop

基于综合地籍的城市自然资源评价与韧性评估国际研讨会

Technical Assistance for Cadastre Integration,
Natural Resources Valuation And Resilient Planning In Cities

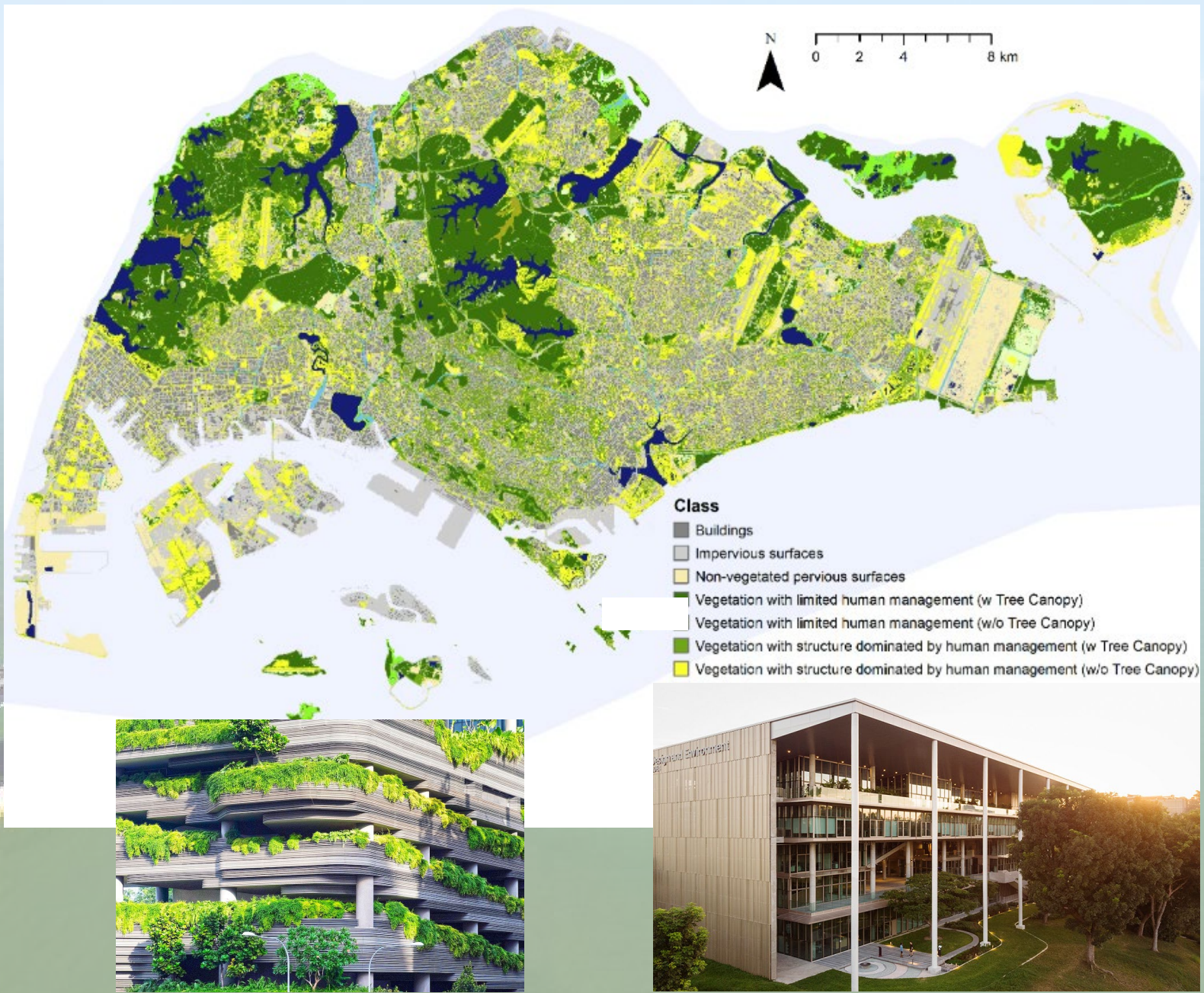
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Lonely Planet

Introduction 引言

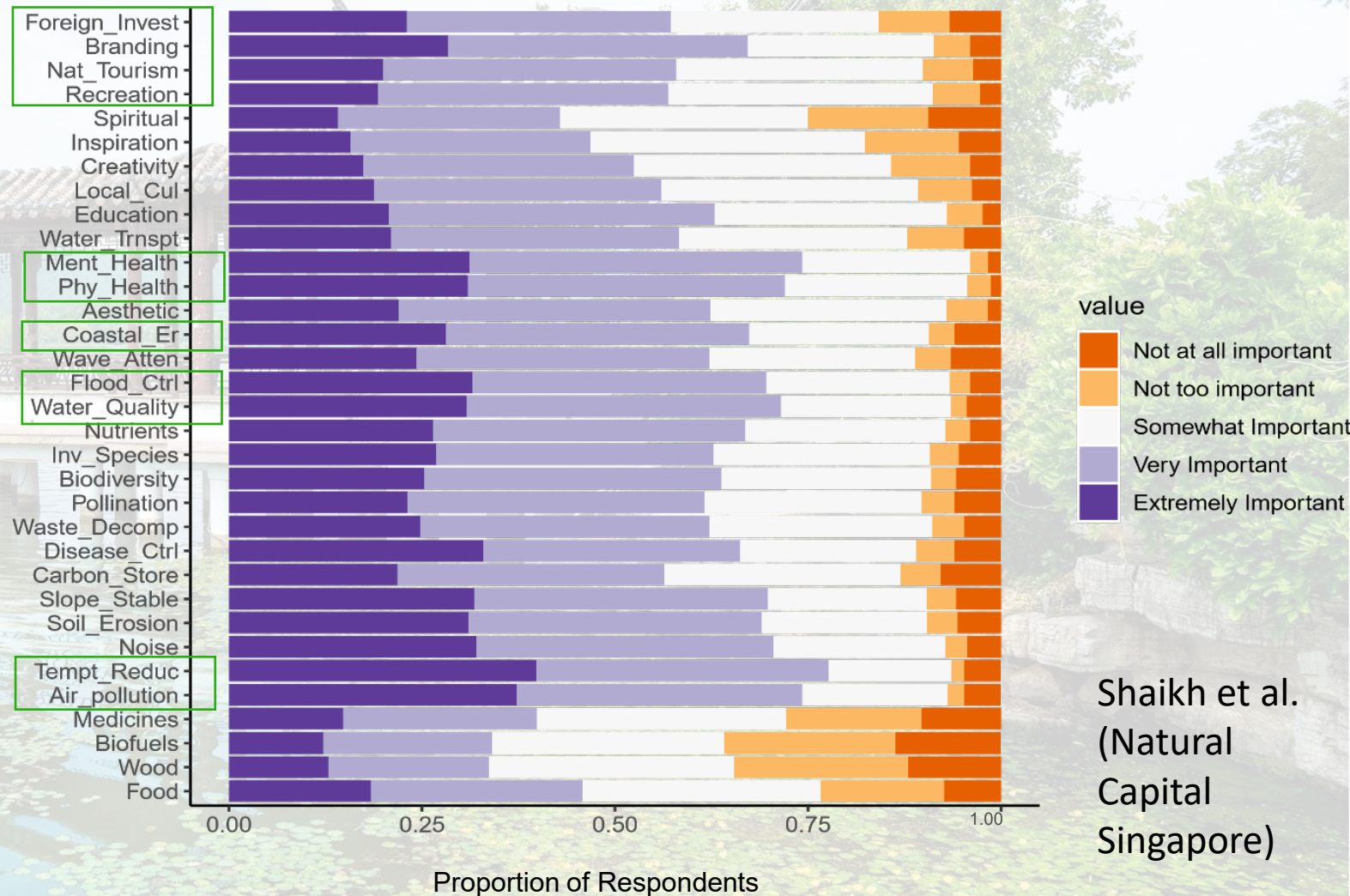
- Ecosystem services core to urban planning in Singapore since colonial days.
- 自殖民时代以来，生态系统服务一直是新加坡城市规划的核心。
- Central catchment designed for water regulation and filtration.
- 中央集水区设计用于水的调节和过滤。
- Land-constrained, do more with less, greening in 3D.
- 土地紧张，少花钱多办事，三维绿化。



Ecosystem services importance in Singapore

新加坡生态系统服务的重要性

- Rapid urbanization and transition from provisioning to cultural services.
- City in a Garden to attract investment and increase livability.
- One of the largest tree covers in a city globally (31%).
- 快速城市化和从提供服务向文化服务转型。
- 花园城市，吸引投资，提高宜居性。
- 全球树木覆盖率最高的城市之一 (31%)。



Shaikh et al.
(Natural
Capital
Singapore)

Cadastral System 地籍系统

- Singapore Land Authority (statutory board) handles land title registration.
- Highly digitalized since the 1990s.
- GIS platform used by other agencies for land-use planning.
- Urban Redevelopment Authority (URA) urban planning into 15-year Master Plans.
- Ecosystem services recognized in Master Plans under the Biophilic Town Framework.

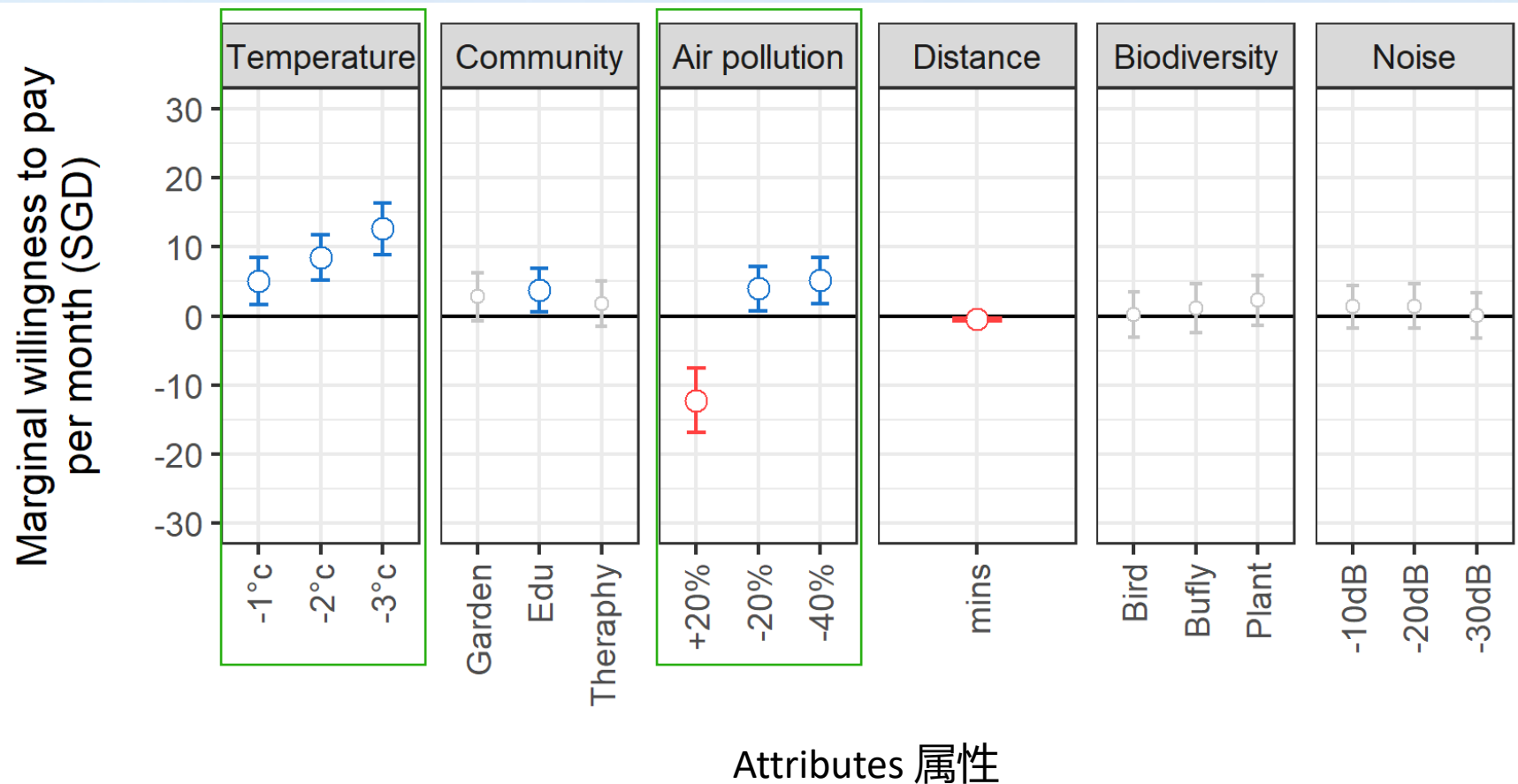
- **新加坡土地管理局（法定机构）负责土地所有权登记。**
- **自 20 世纪 90 年代以来高度数字化。**
- **其它机构使用 GIS 平台进行用地规划。**
- **将城市重建局（URA）的城市规划纳入 15 年总体规划。**
- **亲生物城市框架下的总体规划中认可的生态系统服务。**



Natural Resources Valuation (economic) 自然资源评估 (经济)

Economic valuation of marginal Willingness to Pay using discrete-choice modeling
for **neighborhood green spaces in Singapore**

使用离散选择模型对**新加坡社区绿地**边际支付意愿进行经济评估

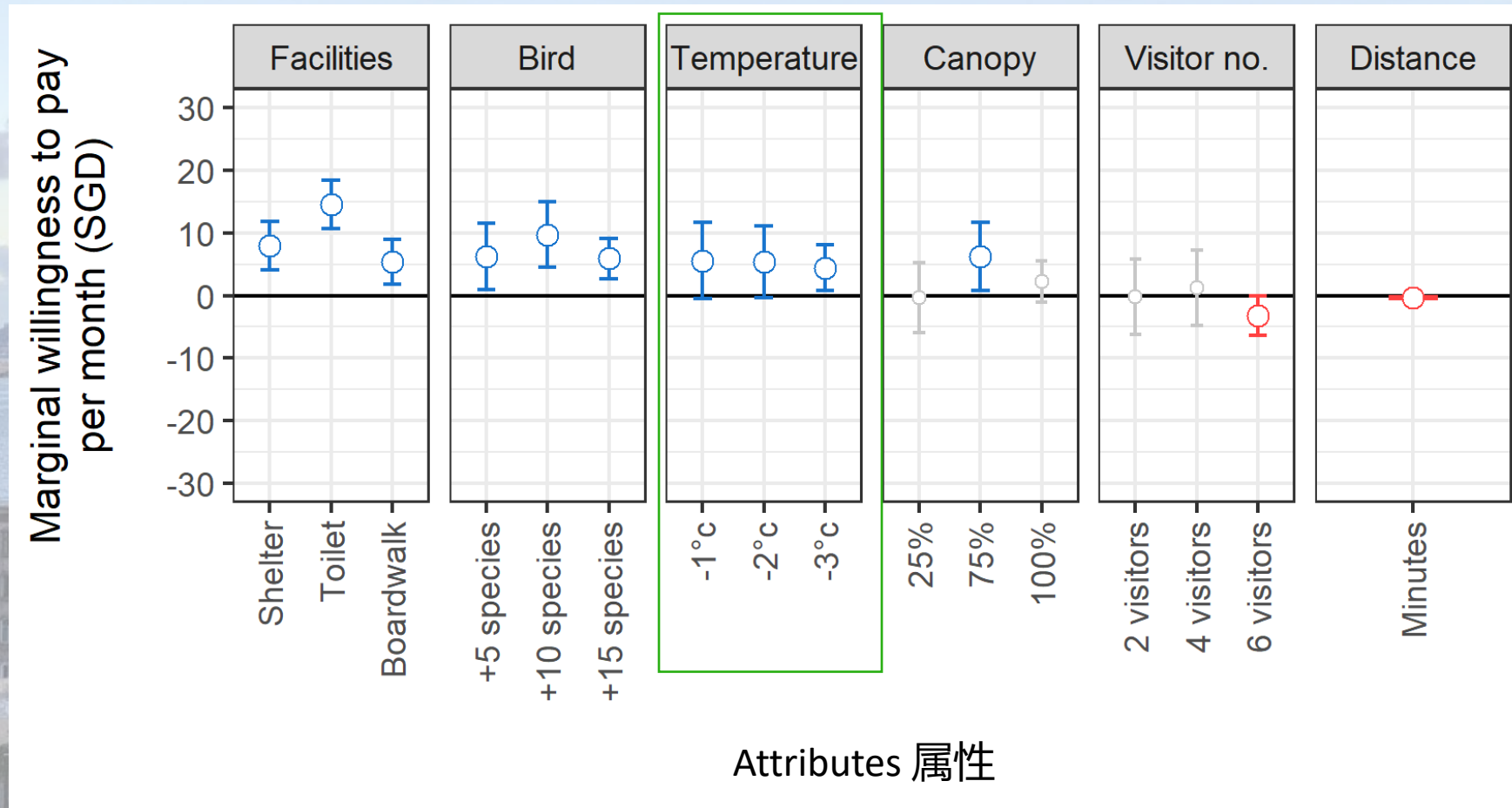


Jaung et al. (2021)

Natural Resources Valuation (economic) 自然资源评估 (经济)

Economic valuation of marginal Willingness to Pay using discrete-choice modeling
for **nature reserves**

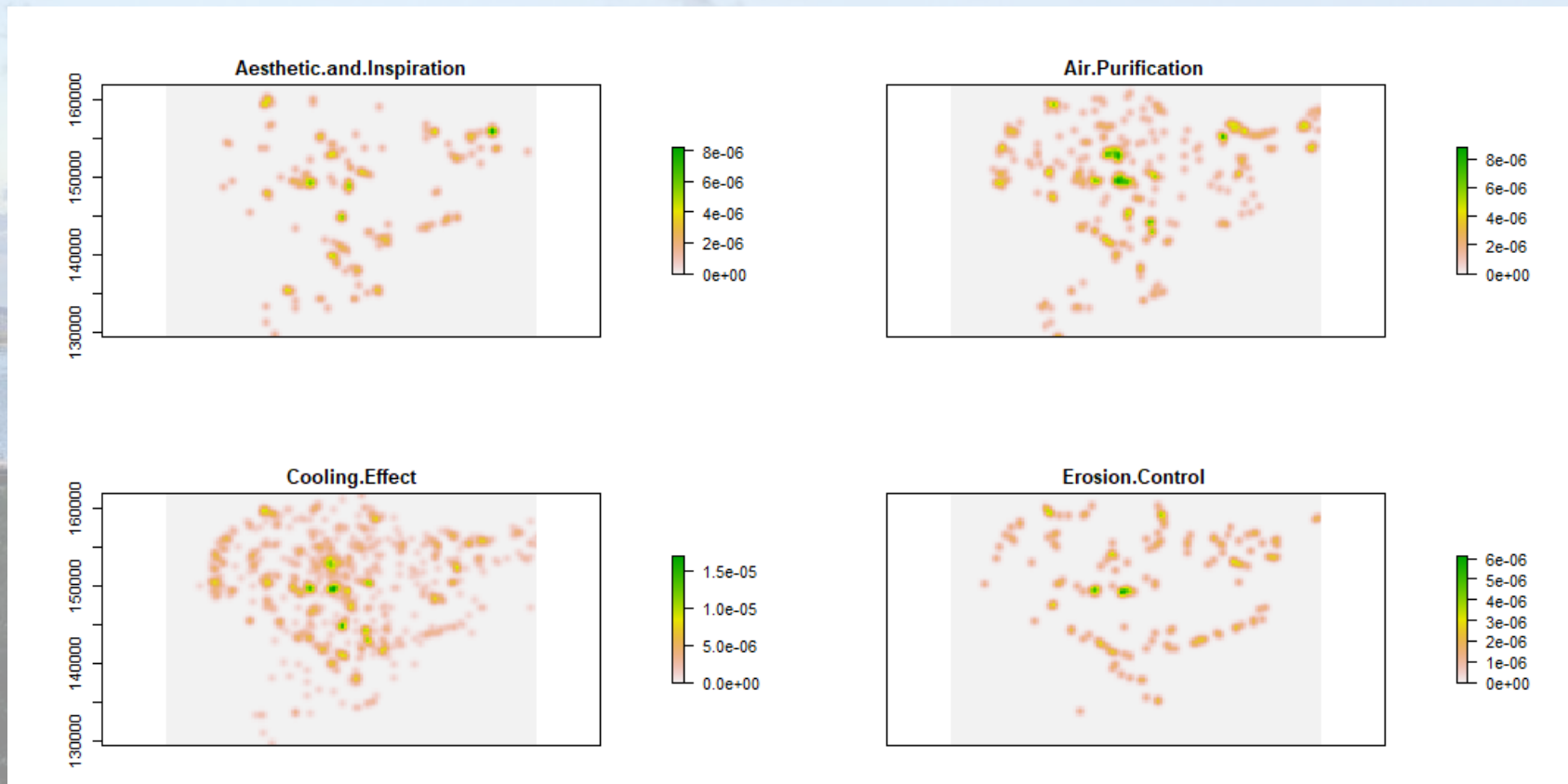
使用离散选择模型对**自然保护区**边际支付意愿进行经济估值



Natural Resources Valuation (social) 自然资源评估 (社会)

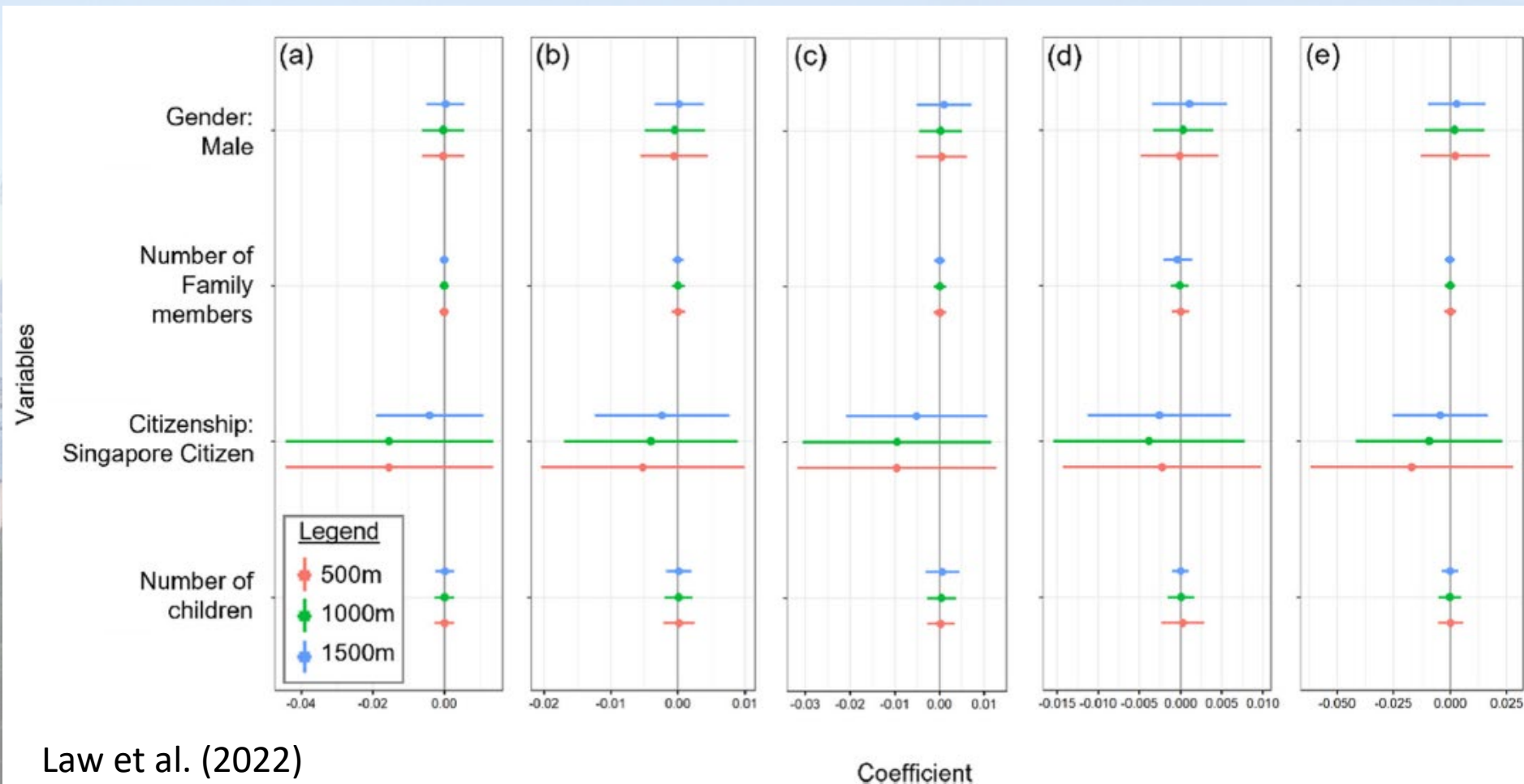
Social valuation of the importance of ecosystem services with policymakers, NGOs, and academics using **participatory mapping**

与政策制定者、非政府组织和学术界人士一起，利用**参与式制图**对生态系统服务的重要性进行社会评估



Natural Resources Valuation (social) 自然资源评估 (社会)

Extreme equality in ecosystem services provision due to housing and greening policies
由于住房和绿化政策，生态系统服务提供方面实现了**极端平等**



a PM₁₀ removal rate
b temperature change
c runoff retention
d soil erosion

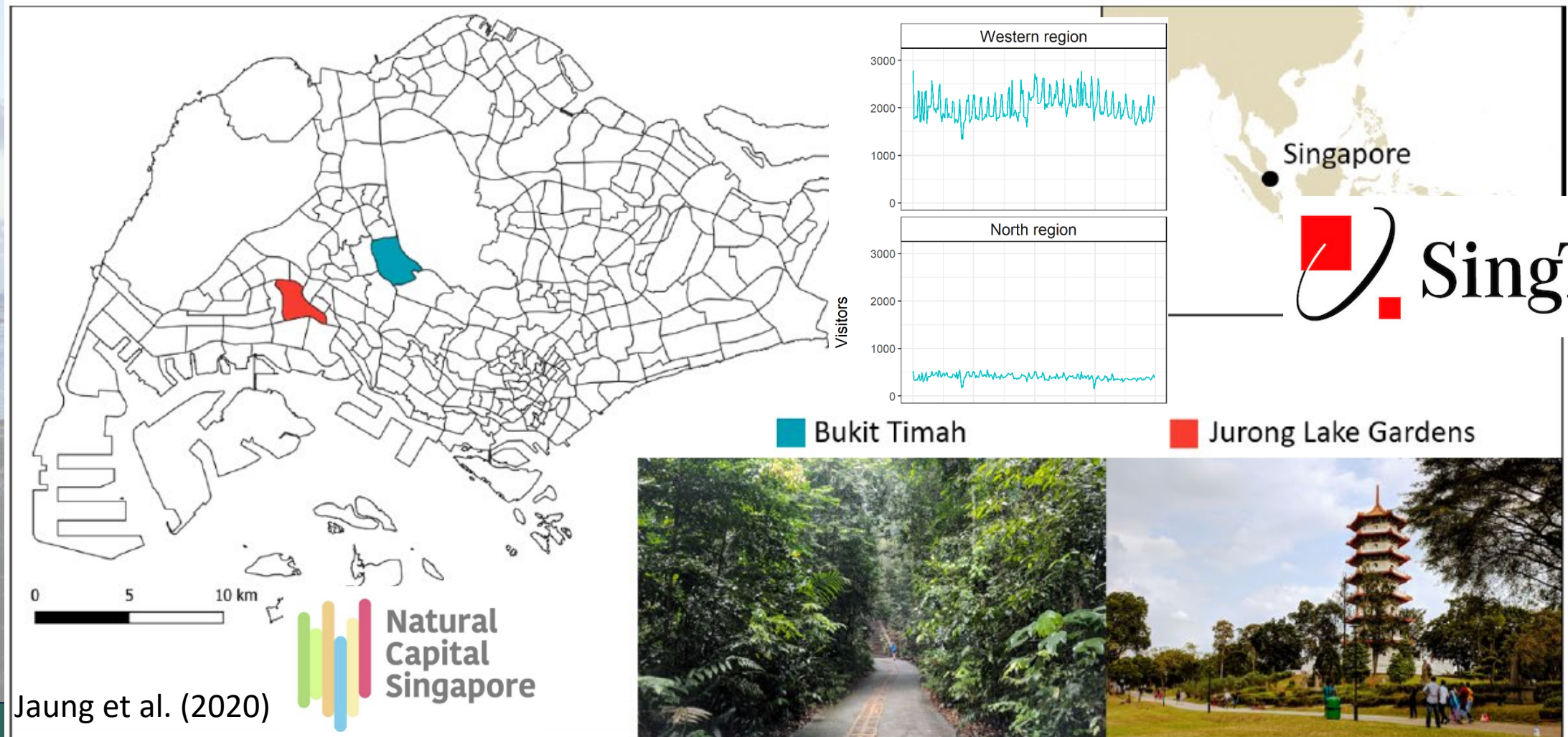
A PM₁₀ 去除率
b 温度变化
c 径流滞留
d 水土流失

Law et al. (2022)

Natural Resources Valuation (big data-assisted)

自然资源评估（大数据辅助）

Travel cost analysis using mobile phone data for nature reserve and neighborhood park
利用手机数据对自然保护区和街心公园进行**旅行成本分析**

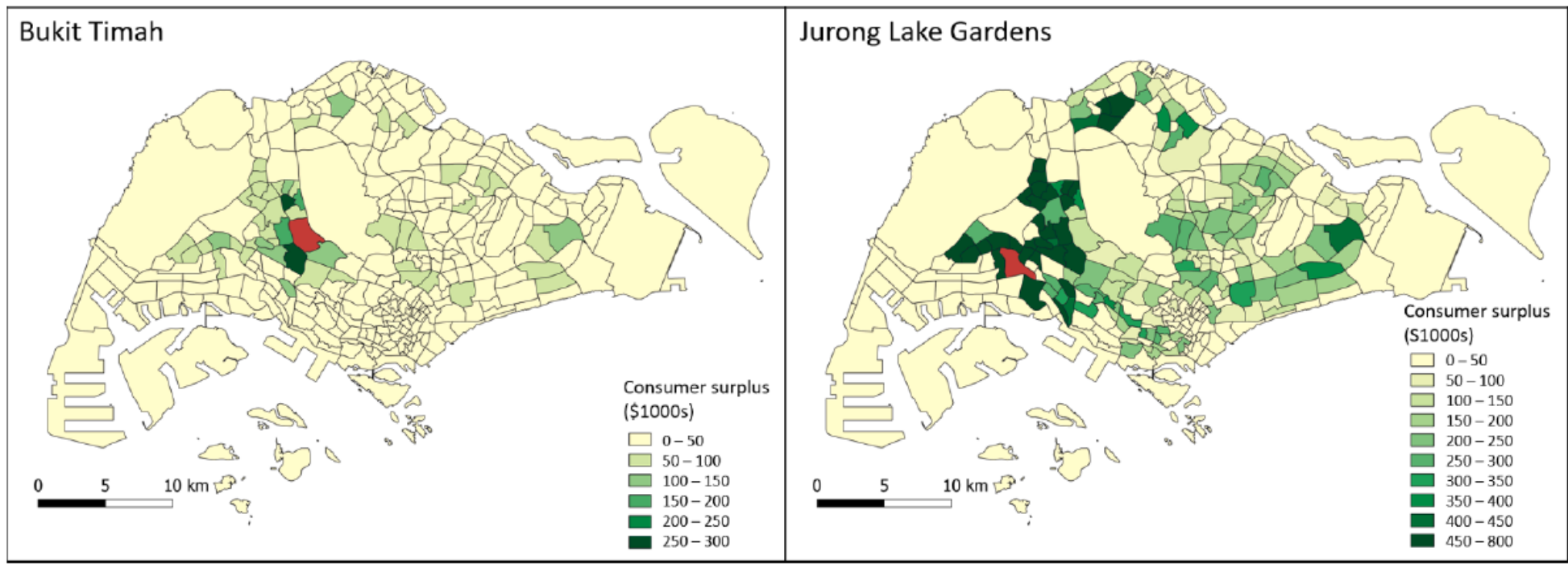


Natural Resources Valuation (big data-assisted)

自然资源评估（大数据辅助）

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利用手机数据对自然保护区和街心公园进行**旅行成本分析**

Distribution of annual consumer surplus. 年度消费者盈余的分布
\$8 million/year for Bukit Timah and \$61 million/year for Jurong Lake Garden
武吉知马每年 800 万美元，裕廊湖花园每年 6100 万美元



Impact of Natural Resources Valuation 自然资源估值的影响

- Ecosystem services valuation not done explicitly by government agencies in Singapore.
- Ecosystem services value implicitly influential to planning of the City in Nature (cooling, mental restoration, water regulation).
- Environmental Impact Assessment strengthened with NParks Biodiversity Impact Assessment (BIA) Guidelines.
- Ecosystem services demand monitored by annual parks visitation and use survey.
- 新加坡政府机构没有明确进行生态系统服务评估。
- 生态系统服务价值对 "自然之城" 的规划具有隐性影响 (降温、精神恢复、水调节)。
- 根据国家公园生物多样性影响评估 (BIA) 指南加强环境影响评估。
- 通过年度公园游览和使用调查监测生态系统服务需求。



Research Technical Note
Urban Studies Series

Park Usage and Satisfaction Survey

Author: Victor Tan

Conclusion 结论

- Ecosystem services supply central for urban planning in a land-constrained, high-density, hot city.
 - Advanced research in pluralistic valuation of ecosystem services.
 - Singapore as climate change "city from the future".
 - Three-dimensional greening and doing more with less.
 - Extreme equality in green space and ecosystem service provision.
-
- 在一个土地有限、高密度、炎热的城市中，生态系统服务是城市规划的核心。
 - 生态系统服务的多元化估值里的高阶研究。
 - 新加坡作为气候变化的“未来之城”。
 - 立体绿化，少花钱多办事。
 - 绿地和生态系统服务提供方面的极端平等。

