

# 論文審査の結果の要旨

氏名 チュウ ユ ティング ジョアン

The title of the dissertation is; Contextualizing Urban Biodiversity Conservation: Landscape Perception and Habitat-type Irreplaceability.

Utilizing urban areas for biodiversity conservation has been increasingly seen as a viable option for biodiversity conservation and ecosystem service provision. However, current urban red-list species conservation measures originate from developed countries in the global North and are broadly applied to cities throughout the world. These measures promote red-list species conservation through clustering and increasing “green-spaces” within urban areas and work on the prevailing assumption that “green-spaces” (usually manicured landscapes) are uniformly effective for red-list species conservation in cities throughout the world. This may prove problematic in cities where red-list species richness of natural and urban areas differs significantly.

Furthermore, there has been limited focus on how social perception of urban green-spaces fit together with conservation goals. Previous studies on urban biodiversity conservation have been conducted from the ecological standpoint of general rural-urban species change or surrogate taxa studies. Studies covering the perception of nature at a landscape level are also divided between nature conservation attitudes and scenic aesthetic appreciation as singular drivers of landscape valuation.

This study therefore aims to provide recommendations for contextualizing urban biodiversity conservation through thorough consideration of the inter-relationships between ecological and social factors of (1) habitat-type irreplaceability of red-list species and (2) landscape-level nature conservation intent and landscape preference (collectively termed landscape perception) of urban-dwellers. Cities chosen for analysis are three highly urbanized centers: Singapore, Tokyo (23 Wards) and Vancouver. Although situated in different ecological zones [Singapore: Tropical, Tokyo (23 Wards): Warm Temperate; Vancouver: Cold Temperate], the three cities have adopted similar strategies for urban red-list species conservation (originating from the global North).

Results of the ecological investigation in this thesis (1) on habitat-specific occurrence (post-2000) records of red-list species from five taxa in each study site reveal that Singapore, a tropical study site, was found to harbor the highest number of red-list species (1,116 species), followed by Tokyo (23 Wards) with 967 red-list species and Vancouver with 301 red-list species. Habitat-type irreplaceability of manicured landscapes and urban areas for all five taxa was found to exhibit the same pattern (0.329 in Vancouver, 0.310 in Tokyo and 0.188 in Singapore on a scale of 0: completely replaceable to 1: completely irreplaceable). Landscape types that were found to

contain the highest conservation potential also differed between the three sites. The highest within-site habitat-type irreplaceability value corresponded to a collection of all natural and manicured landscape types in Vancouver (0.329), a combination of primary and secondary habitats in Tokyo (0.342) and primary habitats in Singapore (0.360). The ecological analysis conducted in this study emphasizes that conservation of red-list species within manicured urban greens is comparably less effective in Singapore, followed by Tokyo, but is relatively effective in Vancouver. However, it also shows that urban areas hold promise for conserving at least a quarter (about 20%) of the total red-list species, even in tropical areas.

With regards to the social acceptance of landscape types (aim 2) which would contribute to maximal red-list species conservation in urban areas, findings of the landscape perception survey was not completely optimistic. Although respondents significantly valued the preservation of nature over its utilization regardless of location, landscapes that were preferred were not always those which supported red-list species conservation. The majority of the respondents in all cities were found to significantly prefer non-complex landscapes. This resulted in manicured landscapes being increasingly preferred over naturalistic landscapes in the order of Singapore to Tokyo (23 Wards) to Vancouver. Accordingly, Vancouverites exhibited a “best case scenario” whereby preferred landscapes coincided with landscapes with the highest habitat-type irreplaceability values (natural and manicured landscapes). Tokyoites’ and Singaporeans’ preferences were less consistent and inconsistent with habitat-types best suited for conservation (Tokyo: secondary and manicured landscapes; Singapore: manicured landscapes). From open-ended questionnaire answers and interview responses, reasons driving landscape selection were given to be predominantly aesthetic in all three cities, with the exception of Vancouverites citing biodiversity conservation as an additional motivator.

Results therefore reveal the possibility that in tropical and warm temperate cities like Singapore and Tokyo (23 Wards), nature conservation intent functions less as a predictor of landscape preference than scenic aesthetics. This is possibly due to the existence of a landscape “complexity preference limit” inherent in urban dwellers, where landscapes having too much biodiversity are deemed as visually chaotic and potentially unpleasant. Accordingly, across all three cities, preferred, non-complex landscapes were those that contain less than 300 unique red-list species. However, in cold temperate cities, and to a certain extent, warm temperate cities, non-complex habitat types included natural landscapes with significant habitat-type irreplaceability values.

In totality, the results of this study support city-specific social and ecological uniqueness. In accordance with prevailing social preference and habitat-type irreplaceability, it is easier to naturalize urban landscapes and conserve red-list species by default in Vancouver, as compared to Tokyo and Singapore (most difficult). This highlights the need for contextualized urban biodiversity conservation, especially in non-complex landscapes (i.e. manicured landscapes) in Singapore and Tokyo (23 Wards). Some recommendations are provided as follows:

A) Encourage a mindset change among policy-makers and practitioners towards realizing the potential of urban areas for conservation. This research has shown that urban areas are home

to at least 100 different red-list species regardless of location.

- B) Maintain existing urban landscape aesthetics while increasing conservation capacity through micro-habitat modification especially in Singapore and Tokyo (23 Wards).
- C) Consider the inclusion of non-invasive exotic species in non-complex landscapes insofar as they aid in the stabilization of microclimates. These species should also ideally be those which already function as familiar/ cultural species within urban manicured landscapes. Considering such species as part of the natural urban biodiversity allows the creation of biodiversity "focal points" that would facilitate a wider public acceptance of a more biodiverse city.
- D) Among survey respondents who indicated preference for both naturalistic and manicured landscapes, policy-targetable factors for increasing acceptance of naturalistic landscapes are conservation education in Singapore and encouraging frequent park-going behavior in Tokyo (23 Wards). A positive feedback spiral could then exist between promoting (A to C) and D as positive correlations were also found between experience of biodiversity, intent to preserve nature and naturalistic landscape choice.

The achievements of the study listed above are expected make a significant contribution to the progress of sustainable landscape planning in urban areas. Therefore, the committee hereby confirms to confer a degree of the Doctor in Sustainability Science to Khew Yu Ting Joanne.

(1070 words)