



Incorporating Biodiversity and Conservation in Forest Restoration in Hong Kong

An Overview of Principles and Practices in KFBG

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Location of Hong Kong SAR (270km away from Shantou)



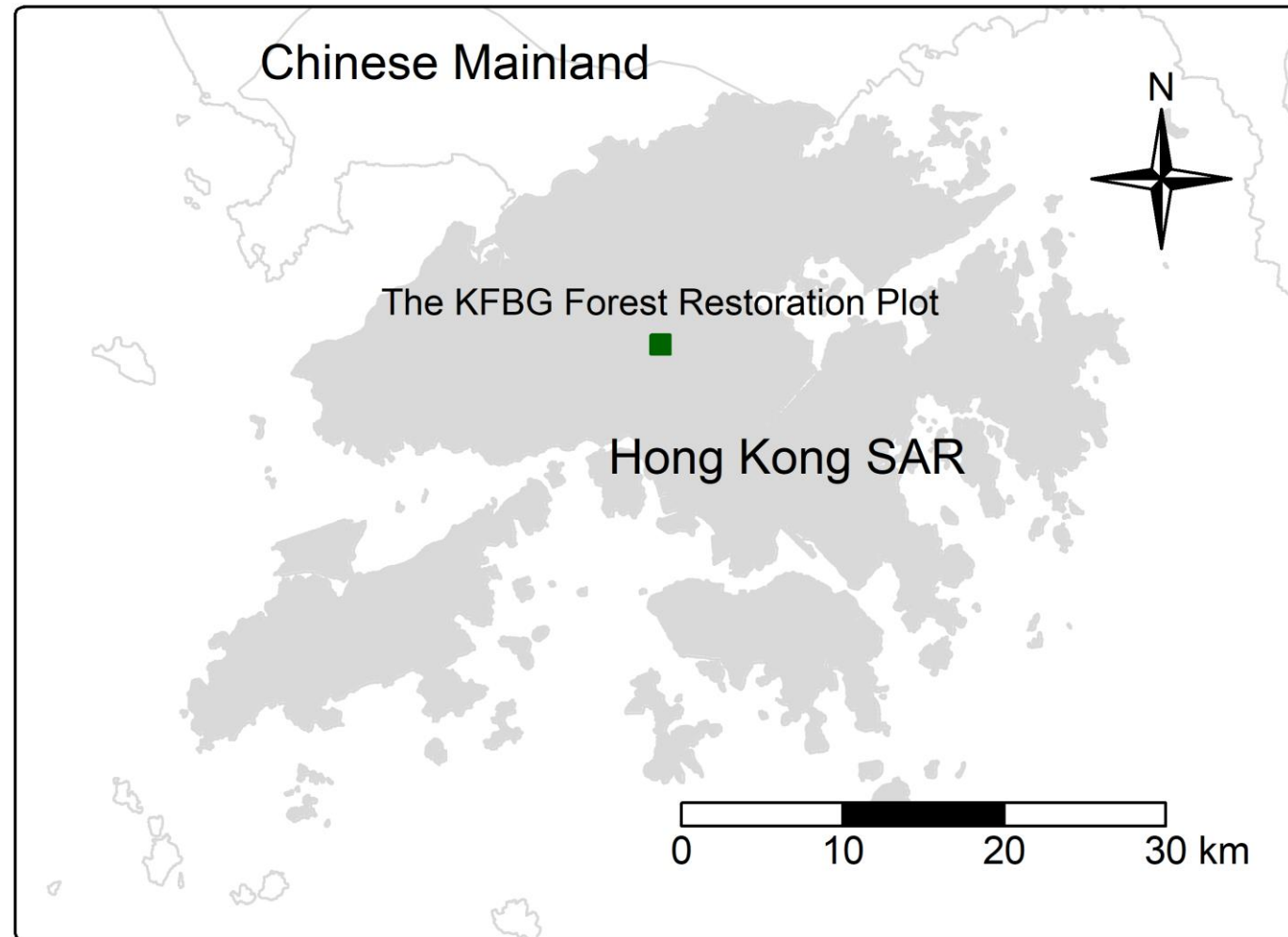
Area: 1104 km²

Population: 7.5 million

Tai Mo Shan (957m a.s.l.), Hong Kong's highest peak



Location of Kadoorie Farm and Botanic Garden (KFBG)



Kwun Yum Shan, Kadoorie Farm and Botanic Garden, KFBG

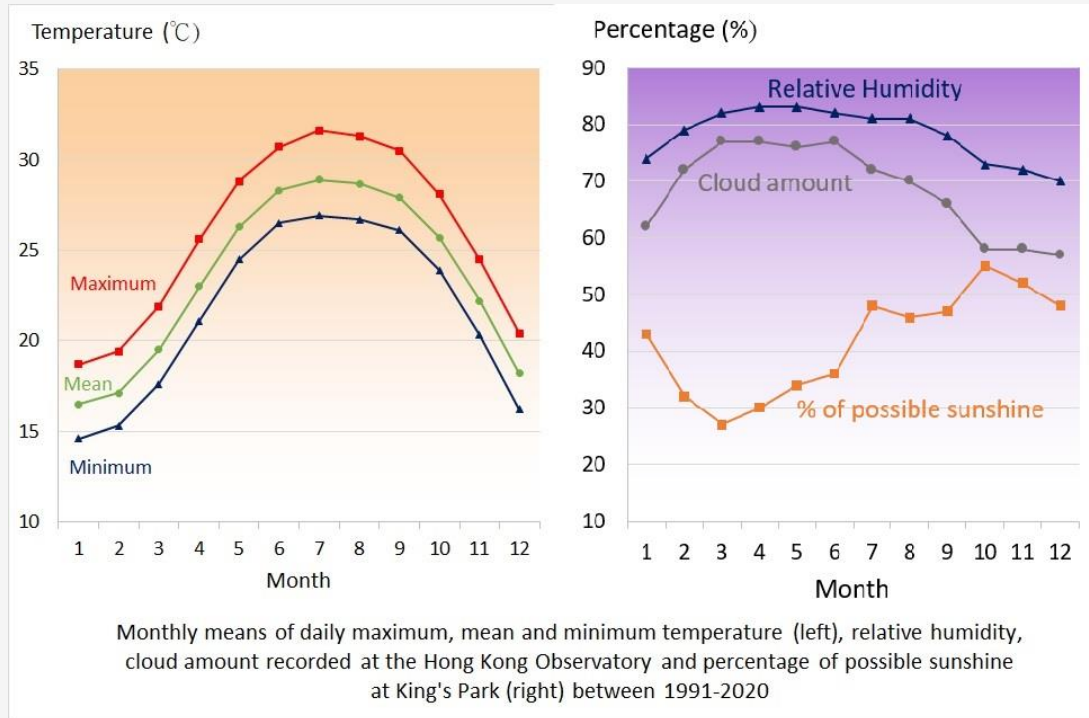
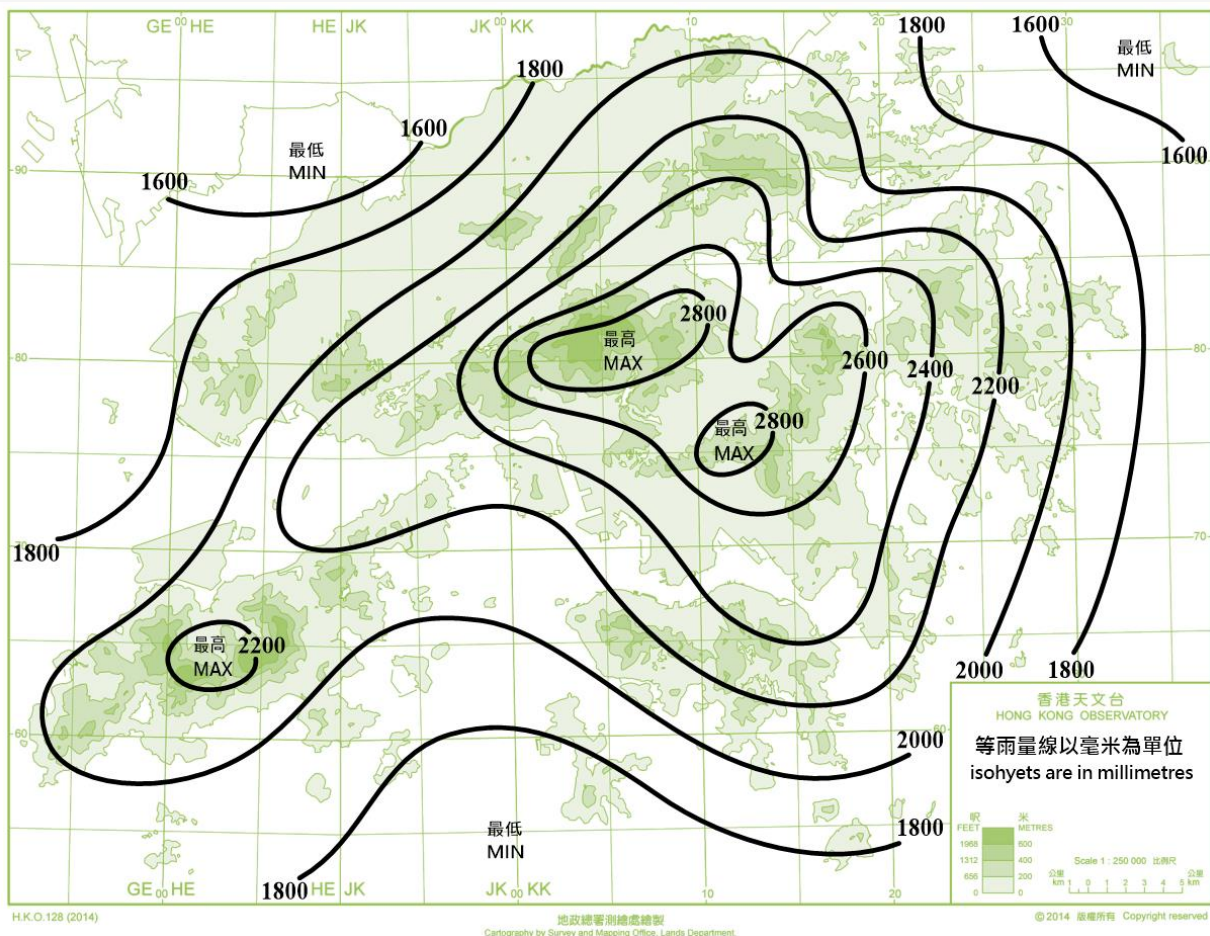


Lower Hillside of KFBG



Started in 1956, became a non-governmental organization in 1995

As part of South China, Hong Kong is very warm and humid



Annual Precipitation: 1800-3000mm

Annual Mean Temperature: 22°C

Source: Hong Kong Observatory, 2014

But, it was “treeless”



Hong Kong: Botanical Gardens and Albany, 1873 (Decaudin, 2019)

Some of the habitats are badly degraded

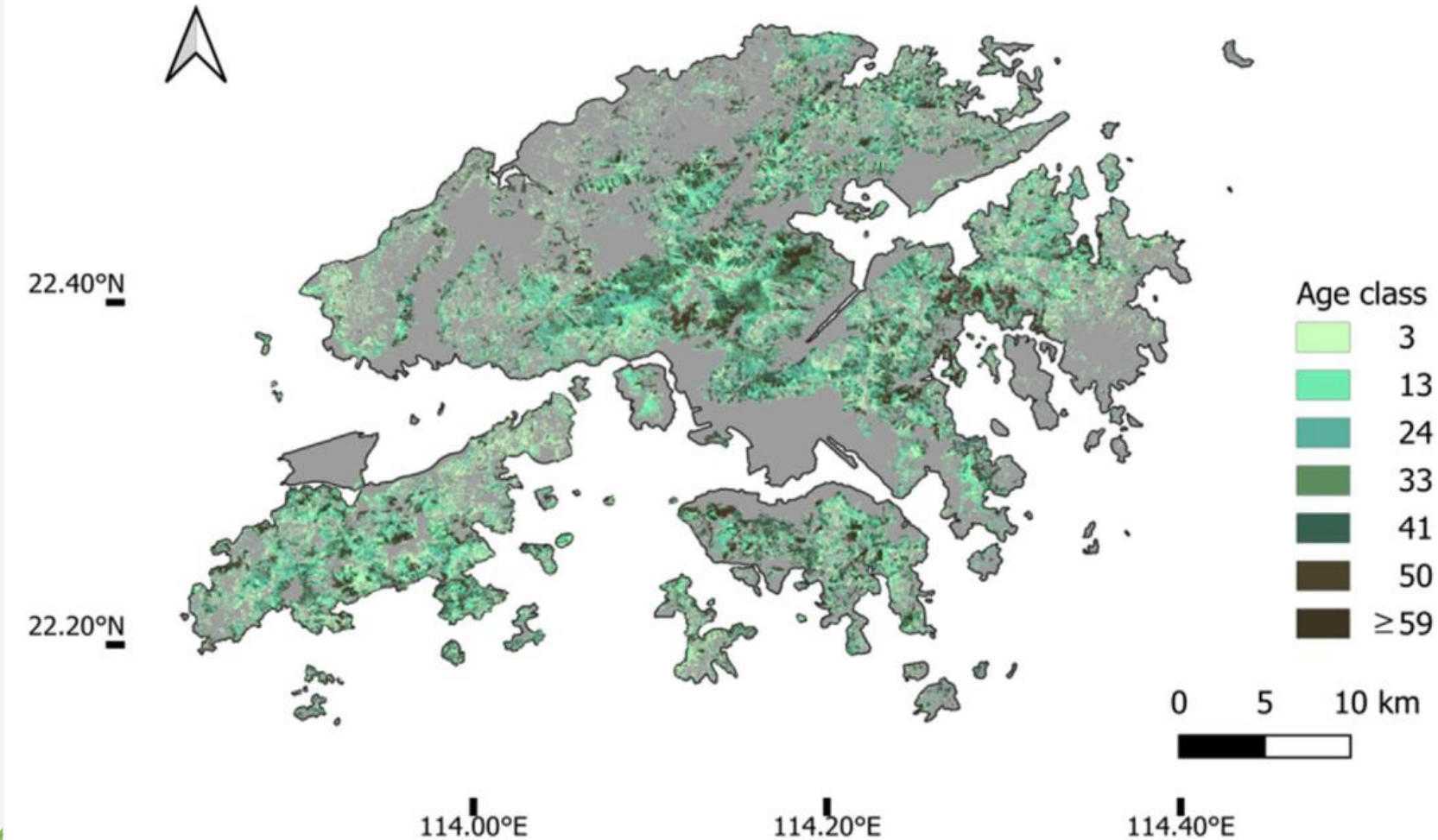


In some areas, forests are naturally recovering



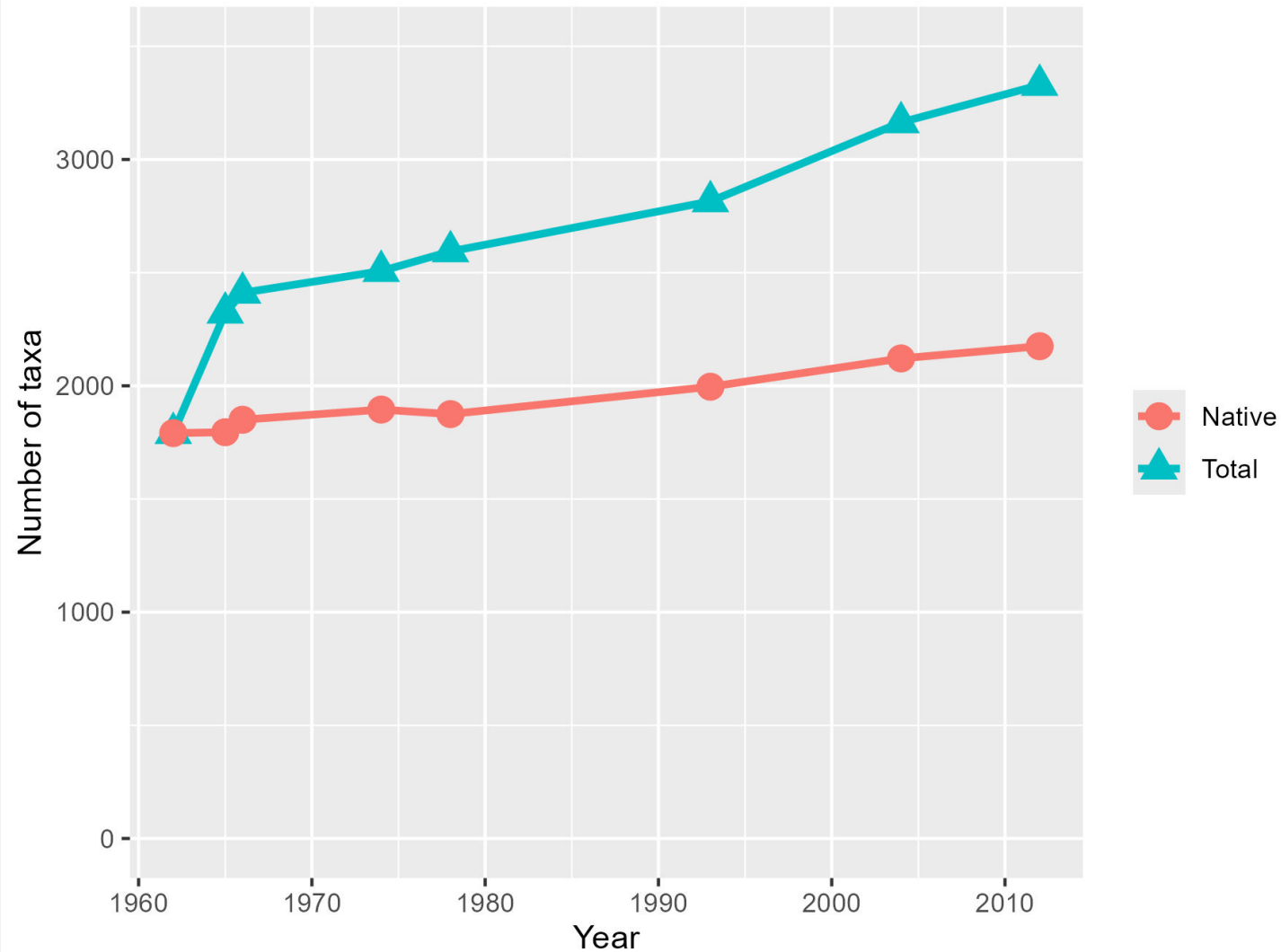
Forests are generally young in Hong Kong

Source: Law et al.,
2025



But diversity is still high

Number of plant taxa recorded in Hong Kong



More than 2200 native vascular plant species have been reported

Biodiversity is very rich in Hong Kong



Some endemic species

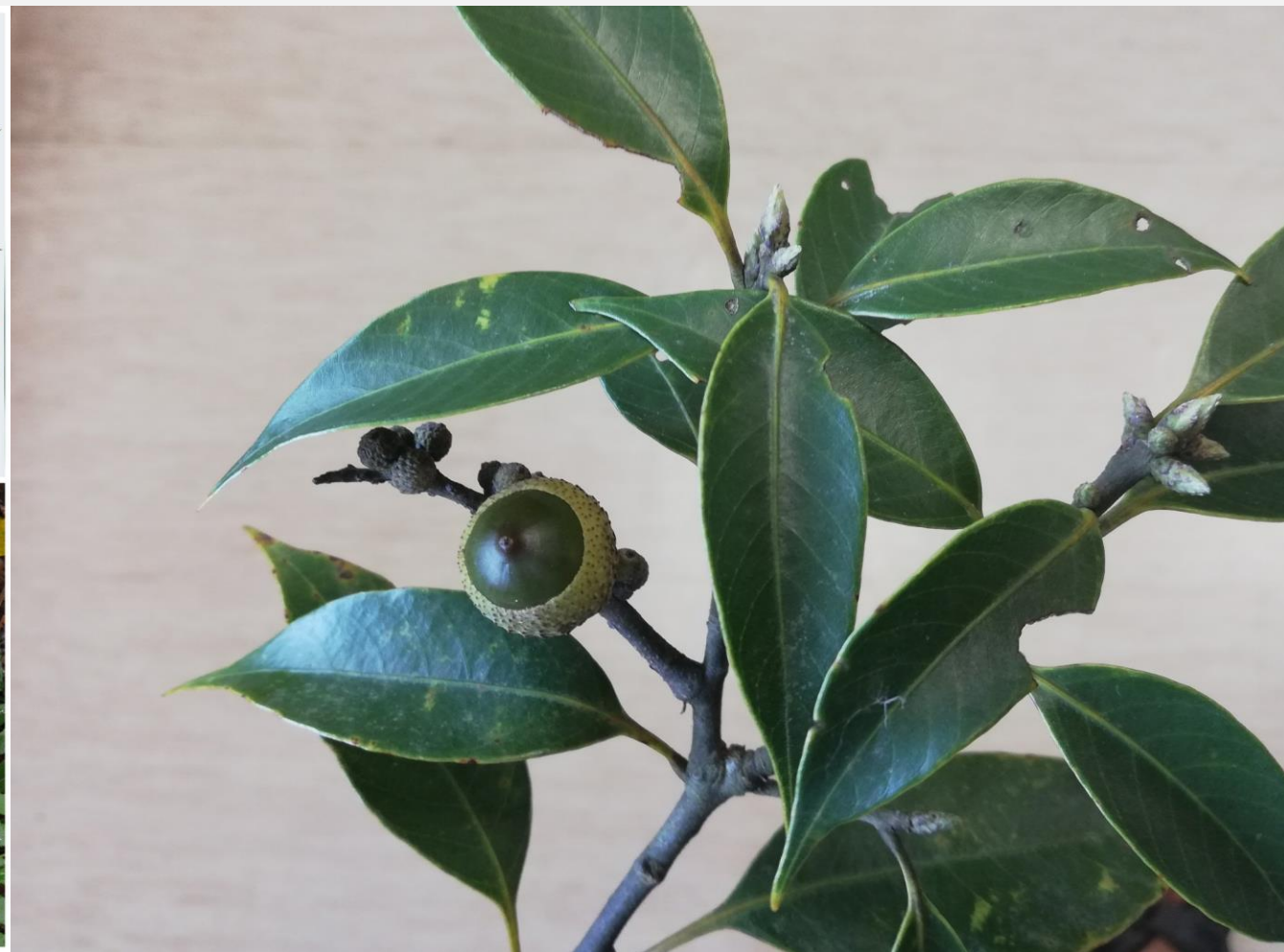


The KFBG herbarium

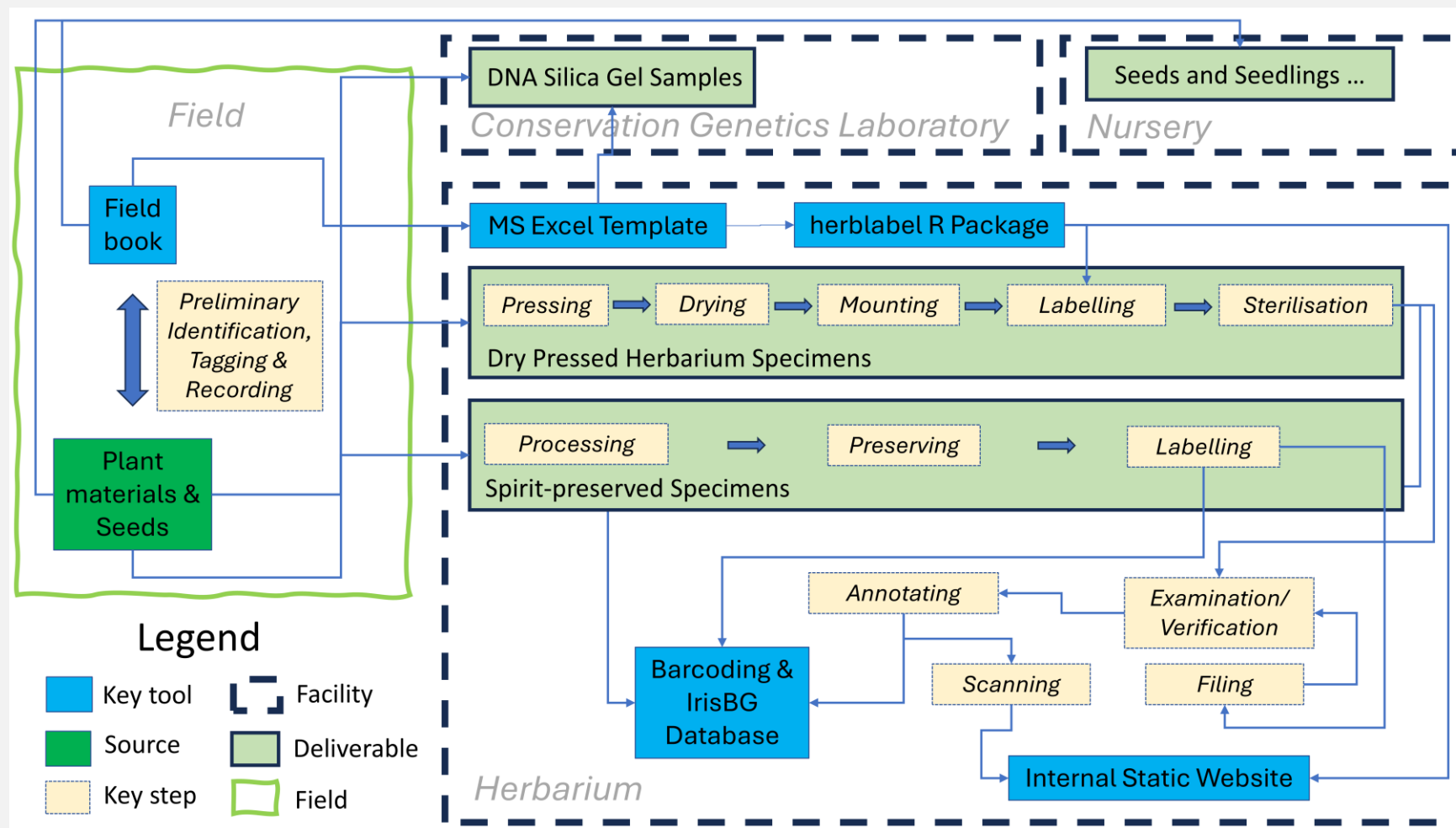


KFBG Botanists have reported more than 50 species/taxa newly recorded in Hong Kong since 2018

New Records to Hong Kong reported by KFBG Botanists



Role of the Herbarium in KFBG



Factors affecting forest recovery



1. Degraded soil
2. Lack of dispersal agents
3. Depleted species pool
4. Competition from weedy/winner species
5. Order of species arrival
6. Arrested succession
7. Extinction debt
8. Lack of effective pollinators/pollination
9. Existence of threats (invasive species, contaminants, fire, and poaching)
10. Modified soil microorganisms
11.

Plants are not happy in degraded soil



Acronychia pedunculata growing on the eroded soil at the Castle Peak, Tuen Mun

Habitat is dominated by a few 'winner' species







RESTORATION
ECOLOGY
The Journal of the Society for Ecological Restoration

SER

REVIEW ARTICLE

Priority effects and ecological restoration

Emanuela W. A. Weidlich^{1,2,3} , Cara R. Nelson⁴ , John L. Maron⁵, Ragan M. Callaway⁵, Benjamin M. Delory¹ , Vicky M. Temperton¹ 

Lepidosperma chinense on the top of Mount Parker

Fire is still very common in Hong Kong

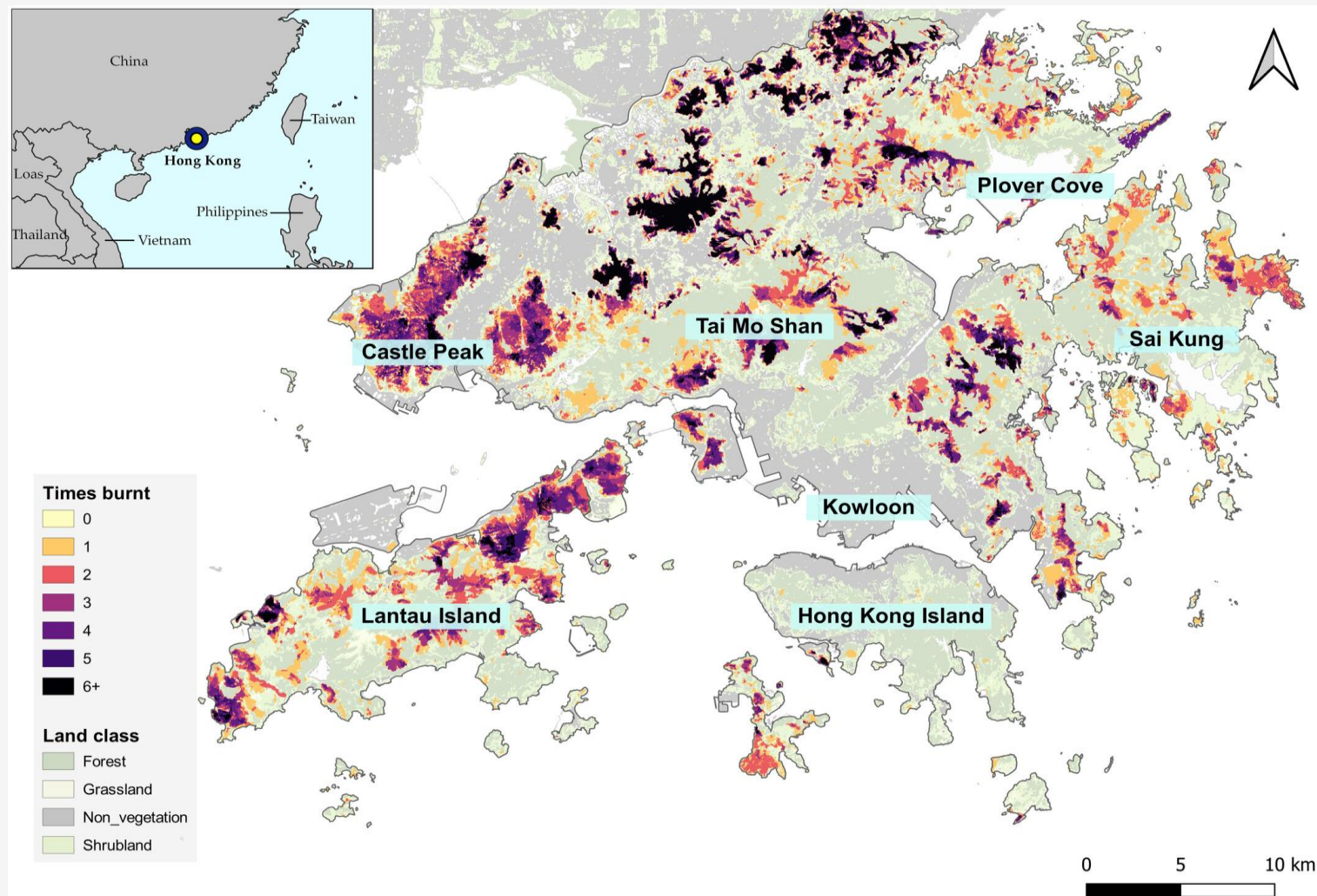


圖3-21 - 發生山火的山頭火光黑烟。(伍滿祥攝)

Partial Recovery (Upper Part of the mountain are dominated by grasses)



The understorey of a recently recovered forest



Natural
regeneration in
the understorey is
very limited

How to over come these limitations?

What to do?

- Stop Planting Non-native Species
- Build a reference model (restoration target)
- Focus on the restoration of species composition, structure and ecological functioning (rather than canopy coverage and biomass only)
- Establish nurseries that propagate seedlings for both restoration and conservation
- Improve soil (Using mulch, Biochar, Compost etc.)
- Silvicultural Management (long term, 10-20 years)
- Increase genetic diversity of seedlings
- Monitor and share the findings (long term, 10 – 20 years)
-

Using ecological and silvicultural knowledge to guide restoration

The Plant Nurseries of KFBG

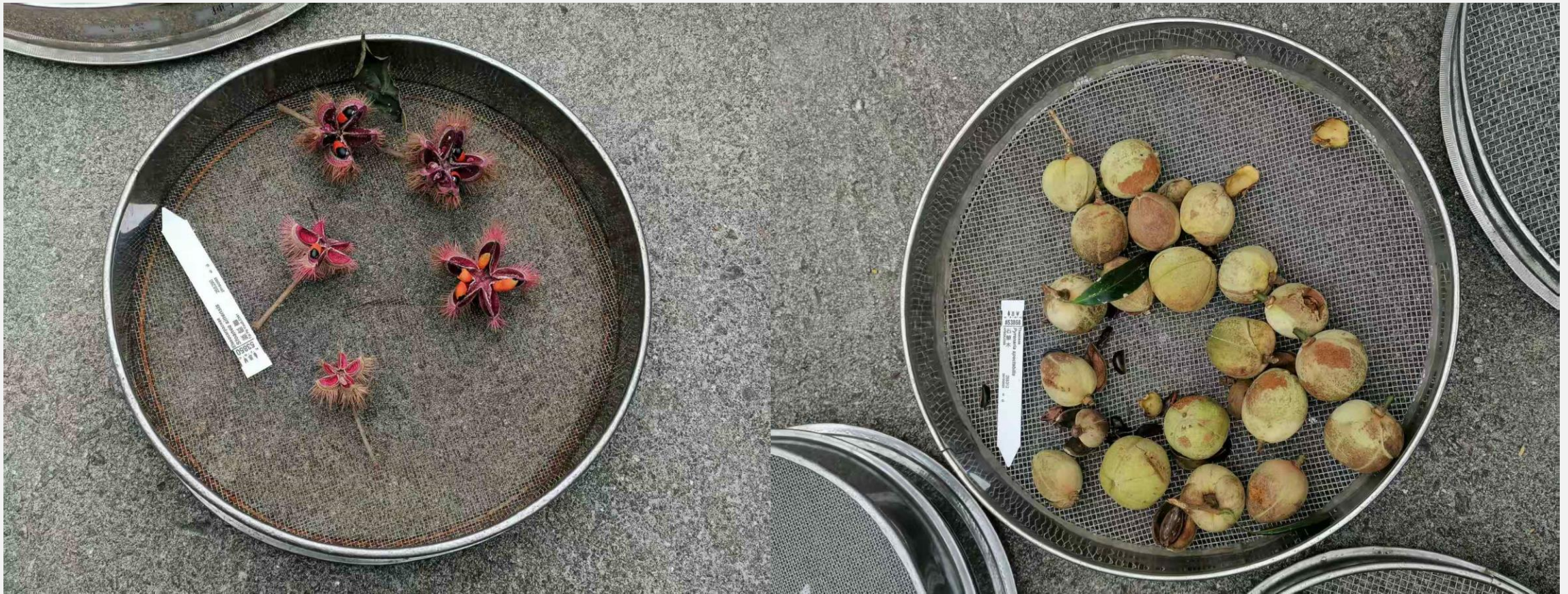


The Native Tree Nursery

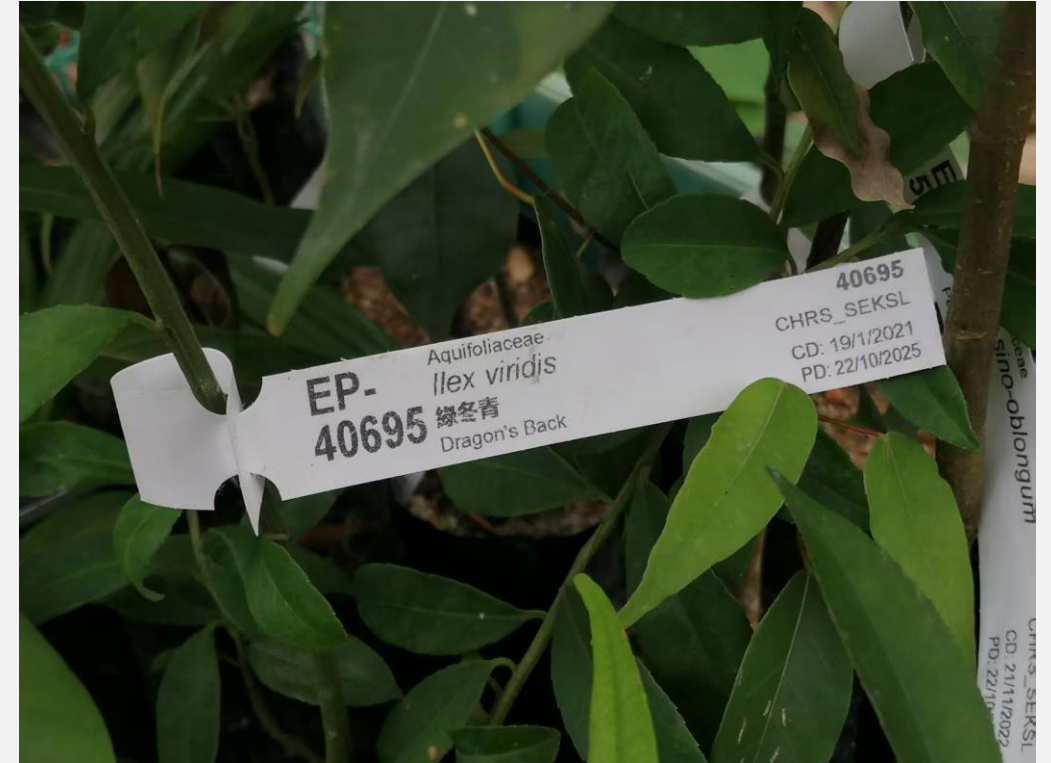


Native Herbs, Shrubs and Climbers Nursery

Provenance data are carefully recorded (like herbarium specimens)



All seedlings are labelled



Air Pruning Pots



KFBG's upper hillside after the fire, 2004



The beginning in 2004

photo: Billy Hau

Tree Planting Activity in 2013



Tai Mo Shan and the Forest Restoration Plot in 2013



Forest Restoration Plot in 2016



Forest Restoration Plot in 2025



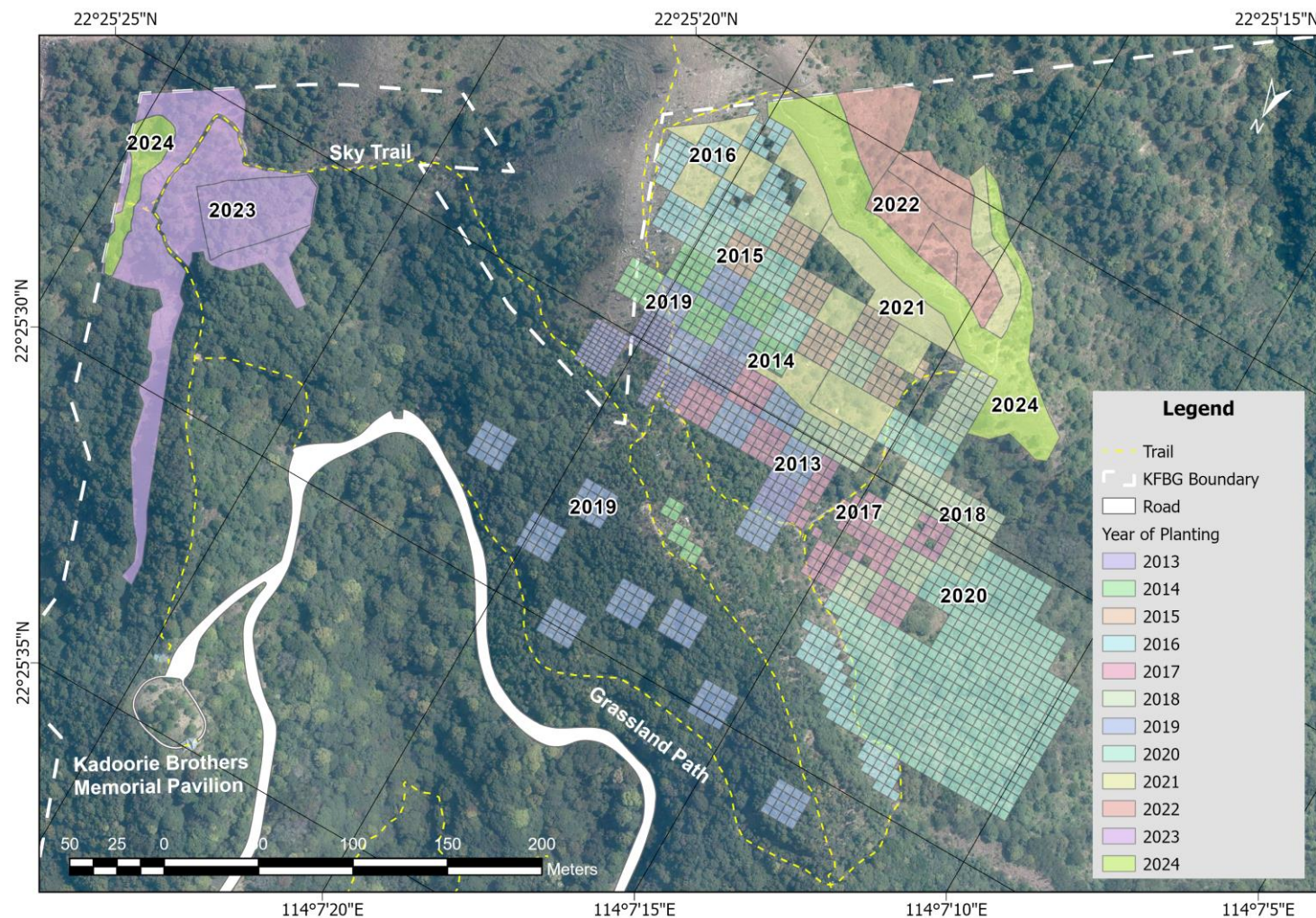
photo: Cyrus Cheung

Forest Restoration Plot in 2025



Some individuals
are 15m already

Map of the Forest Restoration Site



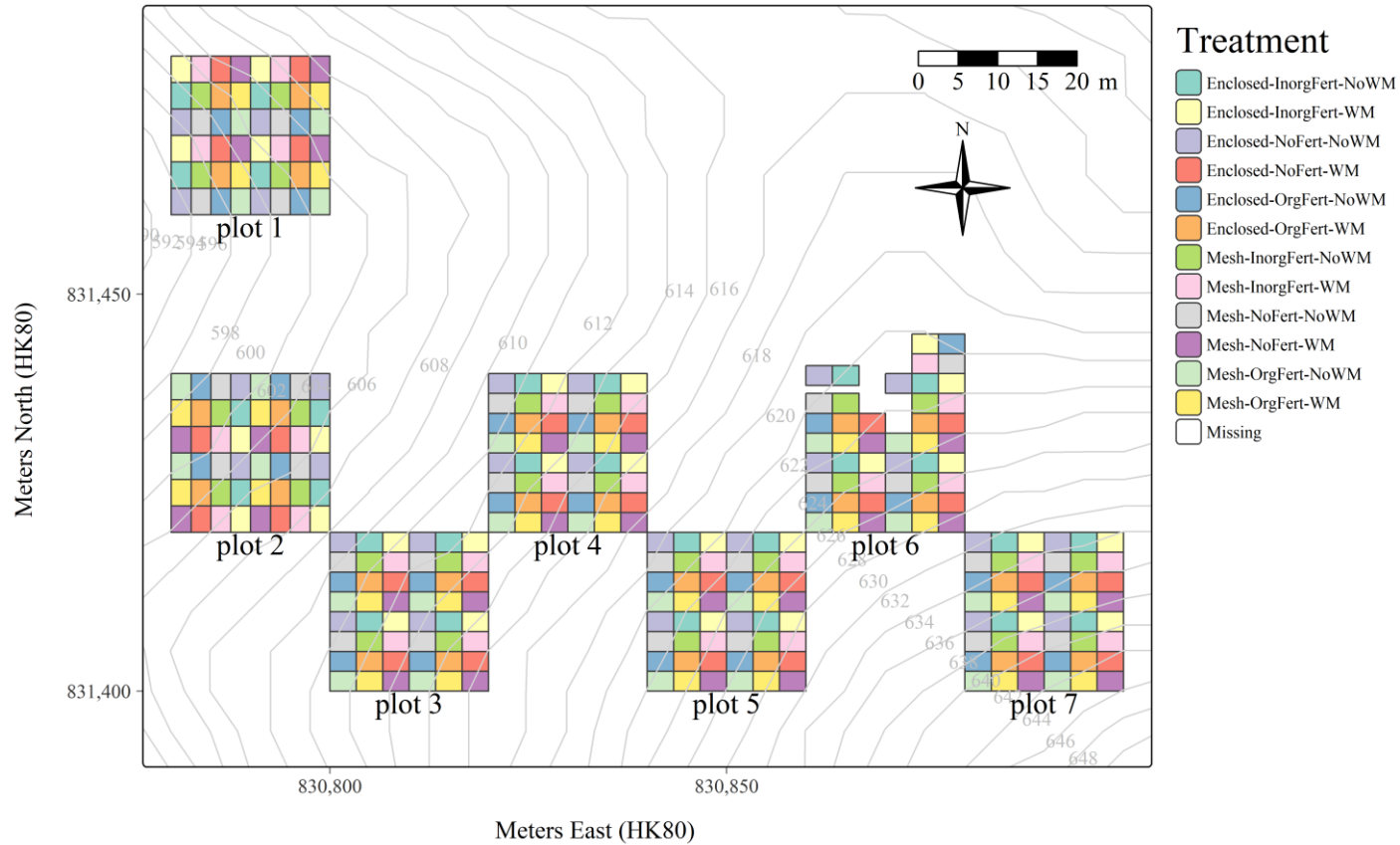
About 10ha

Each year, a different species mix was used, about 30 to 40 species with restoration treatments:

Tree guard + Mulch/compost + Weeding

In total, more than 300 native tree, shrub and herbaceous species, more than 100,000 individuals

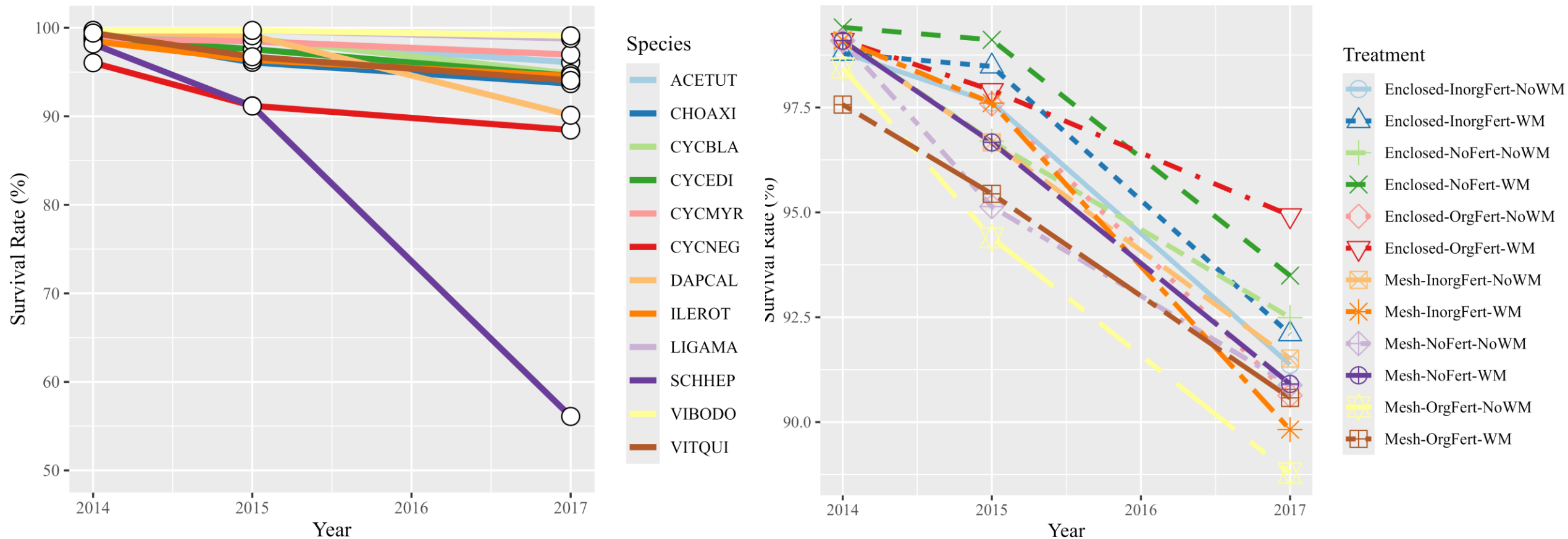
Forest Restoration Treatments in 2013



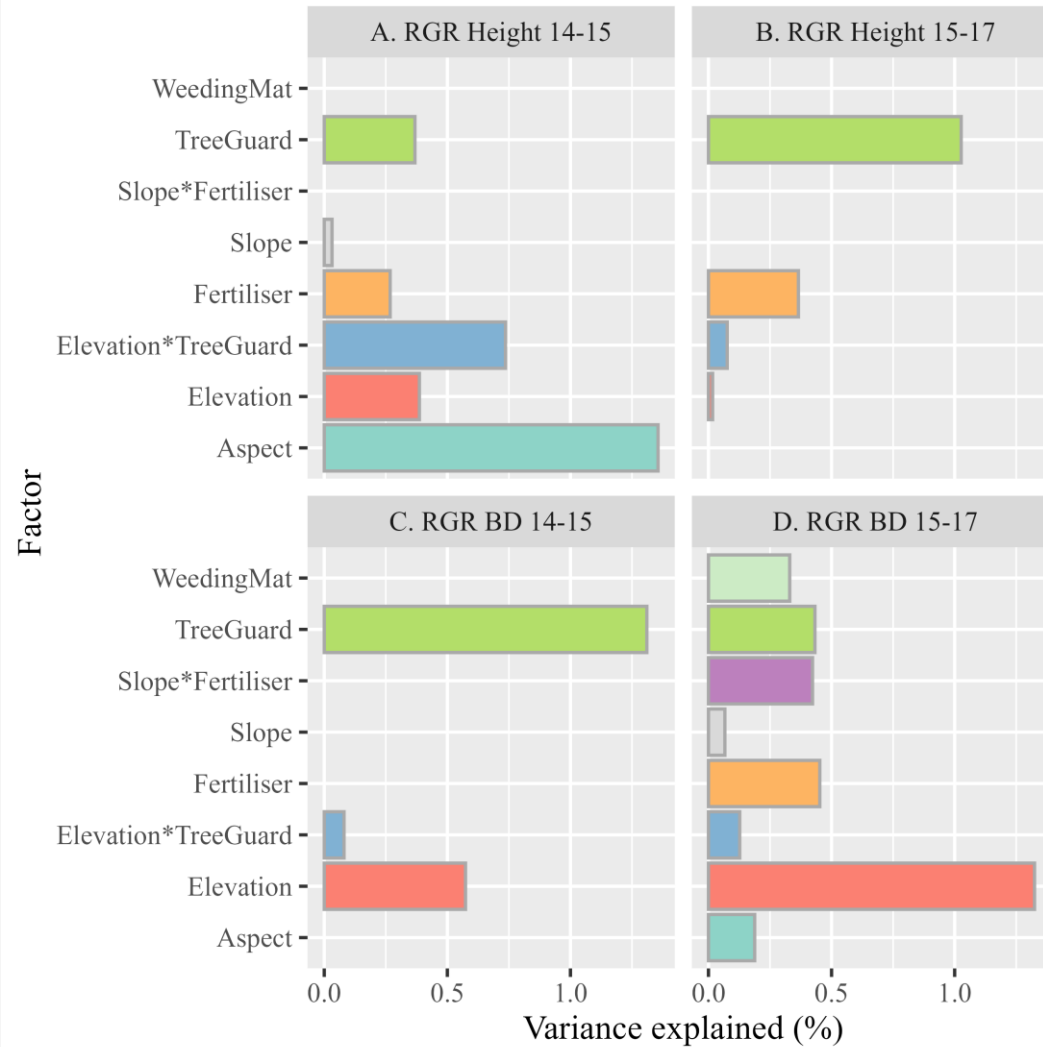
In total, 12 species,
nearly 4000 seedlings

Zhang et al., 2025

Survival rates (by Species and by Treatment)

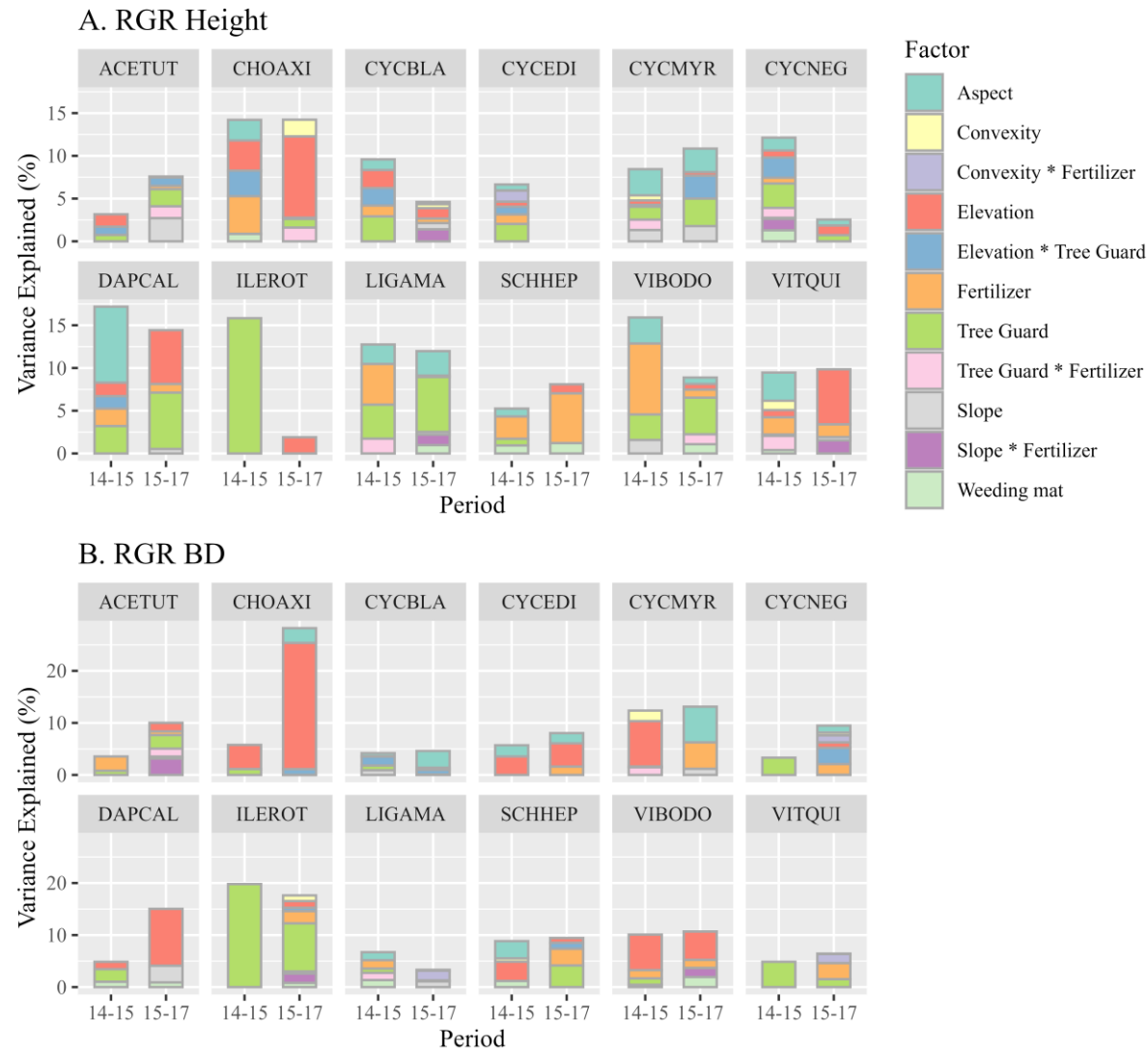


Different factors play different roles in different stage (total)



Zhang et al., 2025

Different factors play different roles in different stage (species level)



Elevation is almost always the most important factor explaining the relative growth rates

Zhang et al., 2025

Enrichment Planting in the Understorey



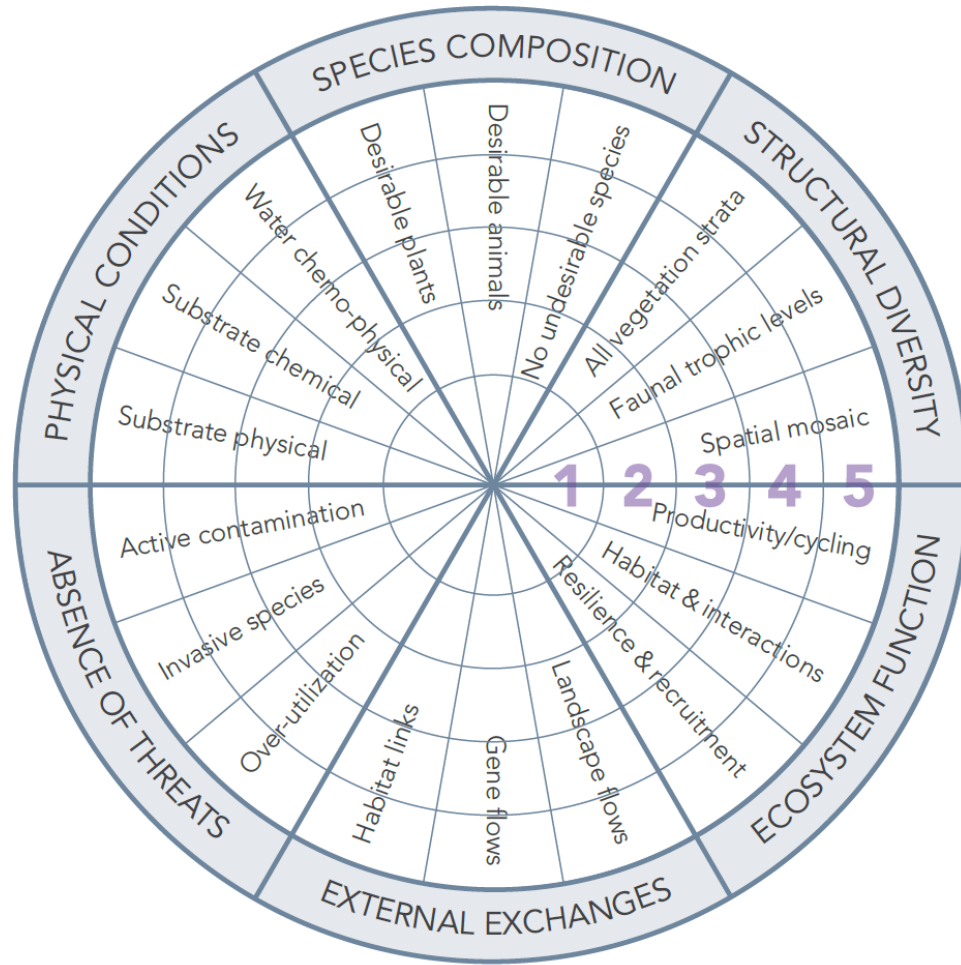
Naturally regenerated low diversity forest was thinned to create artificial canopy gaps. Then, a diverse mix of tree species was planted in the understory

Enrichment of epiphytic plants



Photo by Cyrus Cheung, 2025

The Restoration Wheel and TGBS



Gann et al., 2019



The Global Biodiversity Standard

KFBG is the first site globally to achieve Premium Tier status

The Global Biodiversity Standard Training Workshop at KFBG in Dec 2024



How far away are we from the primary forest?



Forest in Jianfengling, Hainan

How far away are we from the primary forest?



Forest in Heishiding, Guangdong

Summary

Question: Is it possible to recreate a truly diverse fully-functioning forest?

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Kadoorie Farm and Botanic Garden

CLP...



Thank You