

# Recovery Rates in Hong Kong's Secondary Forests Based on Deforestation Qualities

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## INTRODUCTION & BACKGROUND

Hong Kong's original forest cover was deforested centuries ago. Secondary forests, that were planted with help from the locals, soon followed to succeed the original forests (Hong Kong Herbarium, 2020). There are also older forest patches known as the feng shui woodlands that are now protected and being maintained from forest cutting and fires. These feng shui woodlands are now the oldest form of tree cover that Hong Kong has to offer, and they display the closest to what the original forests of Hong Kong contained (Liu et al., 2017).

## Motivation

- There has been research conducted looking at woody species recovery in secondary forests in China, but not Hong Kong. Like Hong Kong, China was largely deforested as a result from human disturbance (Zhang & Song, 2006).
- This information gathered will allow for future policies and research to further protect the forests of Hong Kong and the evolving traits they provide.
- **We propose to evaluate how various deforestation methods and time frames have impacted Hong Kong forest succession and recovery rates.**

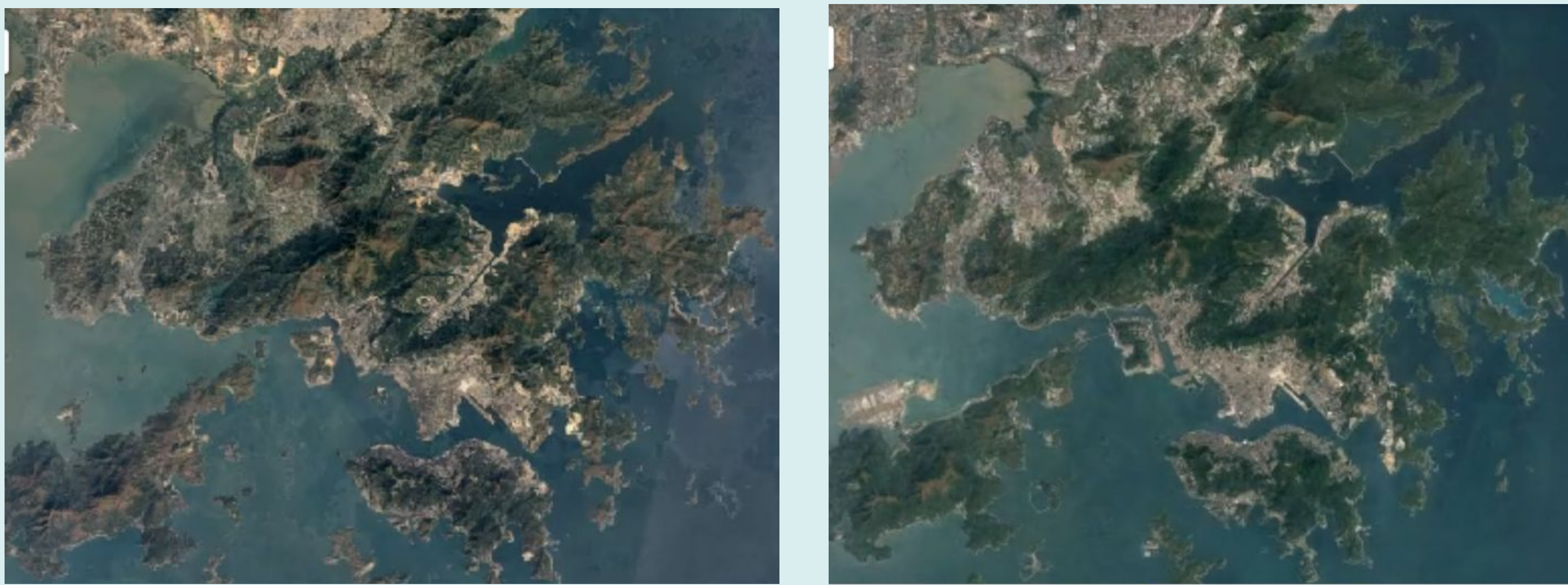
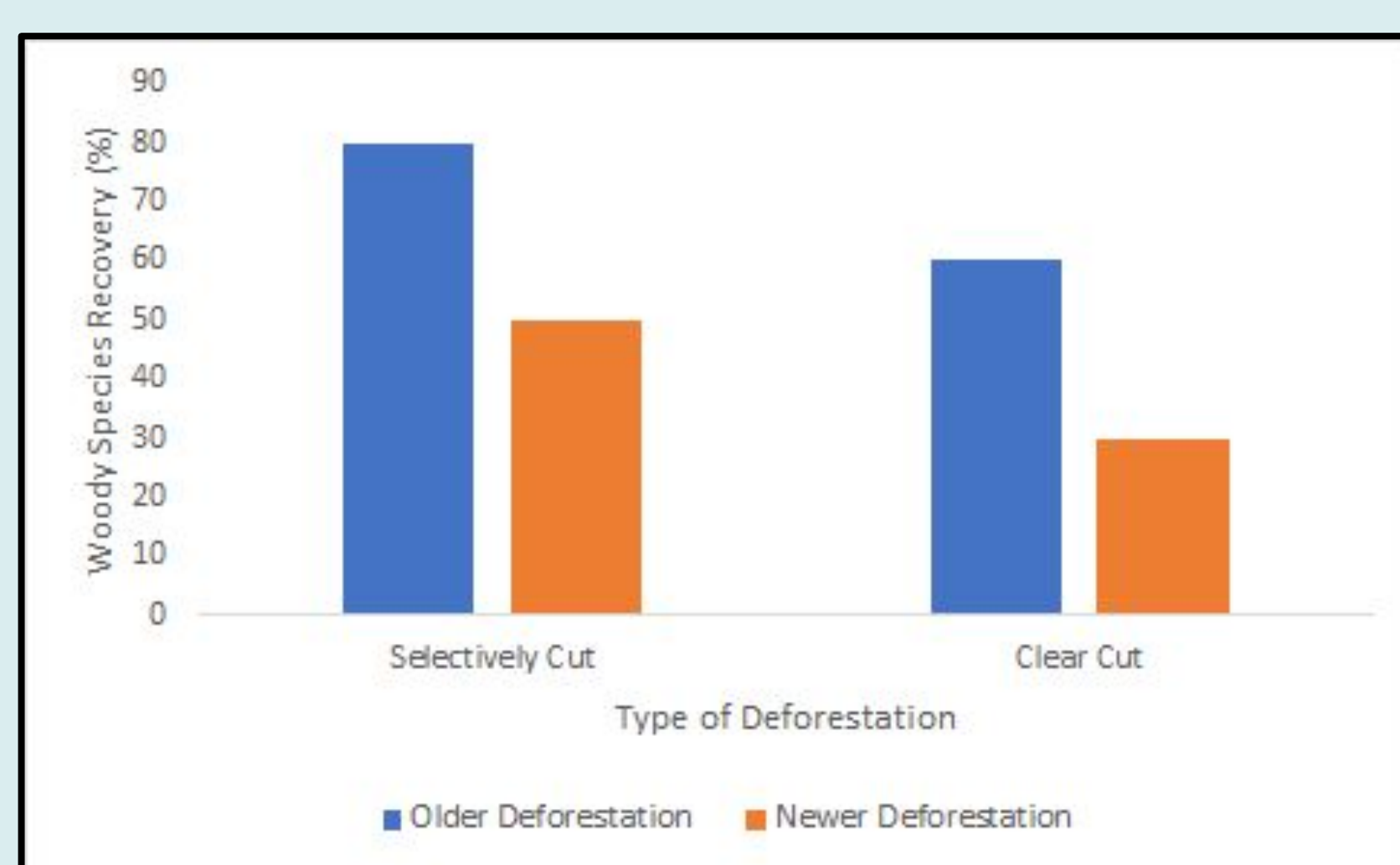


Fig. 1. Hong Kong forest cover in 1984 and 2018. Photos by Google Earth Engine.

## Predictions

- In the secondary forests, as the number of woody species counted per each randomly selected plot increases, that means that the recovery percentage for that secondary forest is increasing (Fig. 2).
- The percent recovery will be greater in the older, selectively cut deforested areas compared to the younger, clear-cut deforested areas (Fig. 2).

Fig. 2 Our predictions for the type and age of deforestation on percent recovery in secondary forests..



- As the woody plants counted per plot increases, we predict that the species diversity will increase as well (Fig. 3).

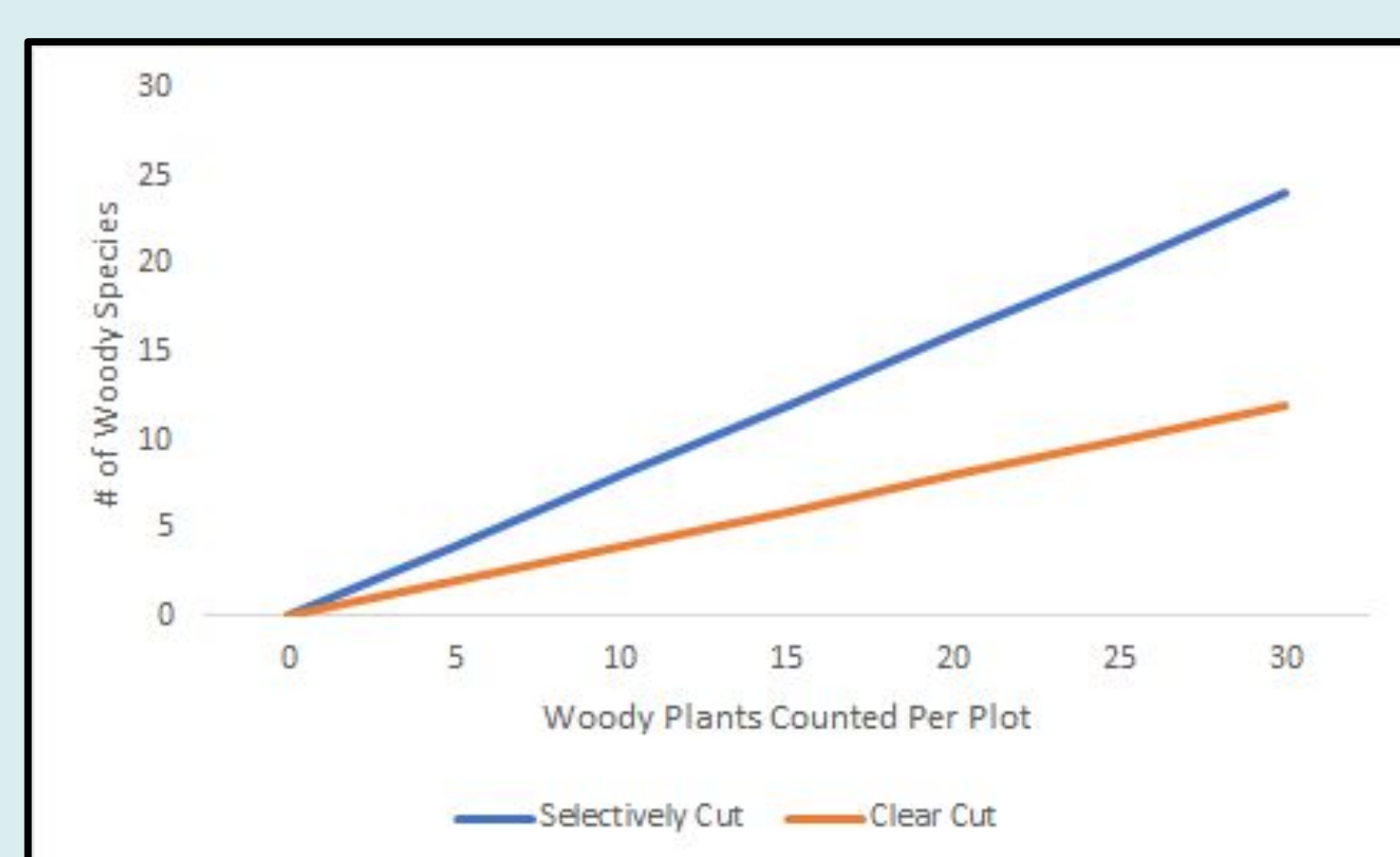


Fig. 3 Predictions for the species diversity for each type of secondary forest.

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## Hypothesis

- We hypothesize that there is a relationship between the type of logging used in historic deforestation in Hong Kong and the recovery percentage seen today in these now called secondary forests. The timeframes of deforestation also impact this relationship.
- The feng shui forests will have a greater abundance of different vegetation species compared to the secondary forests in Hong Kong, thus producing more biodiversity in mammal populations. The feng shui woodlands will be used as a control for recovery comparison.

## METHODS

### Experimental Design:

- Random sampling will be used to pick plots within the feng shui woodlands and the secondary forests. 5m x 5m plots will be used within these forests to identify and record vegetation species.

- Meta analysis with tree plots to compare species similarities in primary and secondary forests.
  - Also done in a research paper comparing data across China and other regions (Zhuang & Corlett, 1997).

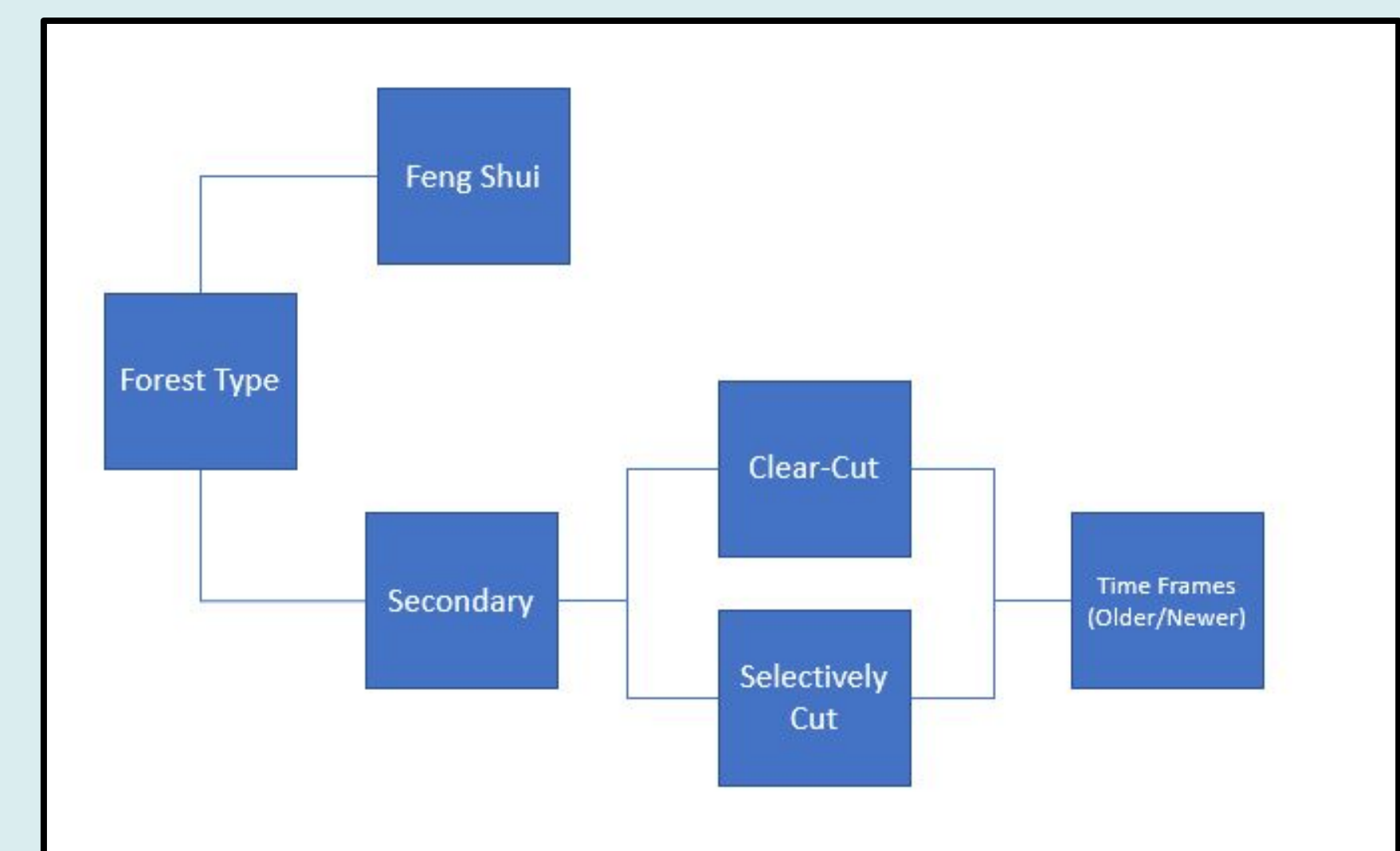


Fig. 4 . Categories of forests and woody species

## Intended Analysis

- Since our dependent variable is the percentage of woody species recovered, which is continuous, and our independent variable is the type of deforestation used (clear and selectively cut) and time since deforestation (less than and greater than 50 years since cutting), which is categorical with >2 groups, we will analyze the data using an Analysis of Variance Analysis (ANOVA).
- The output from the ANOVA will help us identify if there is a difference in woody species recovery for selectively cut and clear cut forests, and if the time since deforestation impacts the amount of woody species and diversity present. We are limited to the Hong Kong area for our study space, so that is what our inferences will be based on.
- We will also be using a regression analysis to determine how the number of woody plants in a plot impacts the species diversity (the number of species identified divided by the total number of woody plants). Both variables observed are continuous. This output will help us identify if there is a correlation between plant abundance and number of different species.

## Benefits and Future Research

- This study could provide information for the sustainable management of secondary forest resources, improve the assessment of forest recovery, provide a deeper insight into the resilience of secondary forests, and lead to a deeper understanding of biodiversity alterations.
- Further research could include phylogenetic diversity, species similarity, stand structure, or functional traits composition, which all play a role in the resilience of the forest ecosystem (Hu, et al., 2011).



Fig. 5. Wong Chuk Yeung feng shui woodlands at Sai Kung and feng shui at Luk Keng Area. Photos by Hong Kong Herbarium