

Forest Structure

Group A~!!

Present outline

- Objective
- Tree layers and growth form
- Forest stand characteristics
- Biodiversity and Endemism

Objective

- Different life forms (trees, shrubs, vines, herbs, grasses, saprophytes etc) and why
- Forest stand characteristics (canopy, layering, litter composition etc)
- Relationship with biodiversity, endemism
- Find out their relationship

Forest Structures

- 5 layers of structure
 - emergent
 - canopy
 - young tree
 - shrub
 - undergrowth



Emergent Layer

- 50m tall
- Parent trees, providing seeds for regeneration
- Board tree crowns
- Scatter and is not continued layer
- Thick tree trunk
- Buttress root
- Small leaves to prevent evapotranspiration by wind in high elevation



Canopy Layer

- 30-40m in height
- Continuous tree canopy layer
- Absorb and block 90% of the sunlight
- Therefore, productivity is the highest among the 5 layers

Young trees layer

- 25m tall
- Due to the dense cover of the canopy layer, air is stagnant
- Humidity is high as well
- Trees are waiting for canopy to open up for its growth

Shrubs

- Below 10m
- Less than 3% of sunlight due to interception
- If there is a gap for sunlight absorption, the growth rate can increase rapidly

Undergrowth

- Sparse plant growth
- Less than 1% of sunlight can penetrate to the forest ground, so there are few green plants
- Due to interception, only two third of precipitation can reach the ground

Different life forms in Smithfield

- Trees
- Weeds
- Vines
- Epiphytes
- Saprophytes
- Shrub
- Herbs
- Ferns
- Stranglers
- Parasites
- Climbers

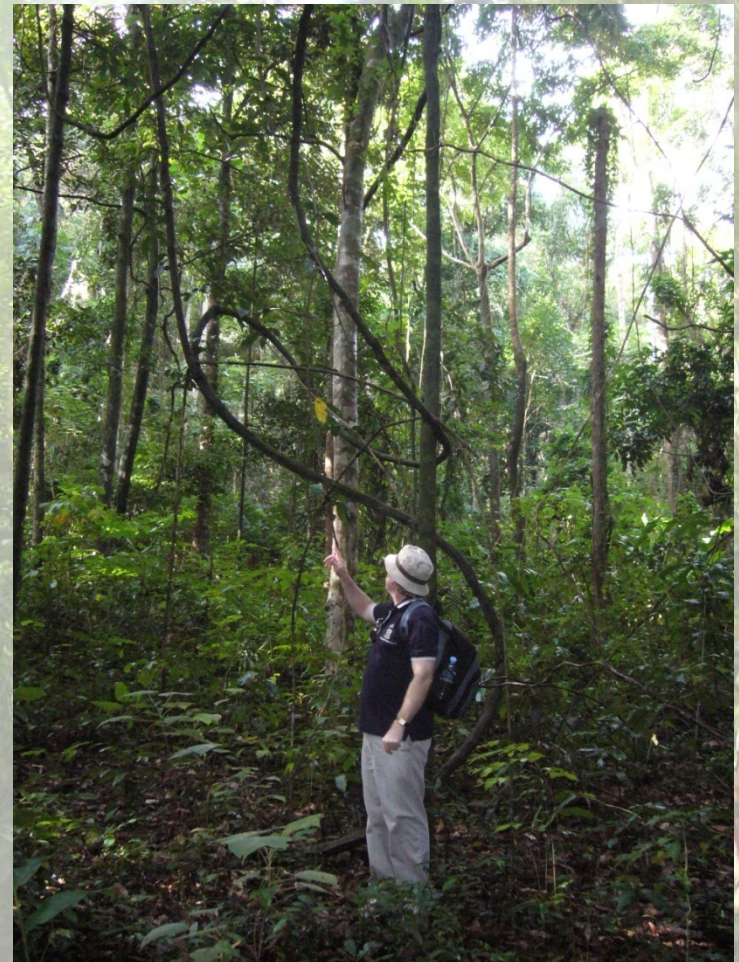


Reasons of different life forms

- The favorable climate
 - Strong intensity of sunlight and high rainfall throughout the year
- Nutrient cycling is rapid and tight
 - Large amount of litter from dense canopy
 - Decomposition rate is fast (active bacteria activities)
 - Energy efficiency is high

Reasons for different life forms

- Different types of plant adaptation
 - Canopy layer blocks most of sunlight so that plants will use their ways to strive for sunlight
 - E.g. young trees layer

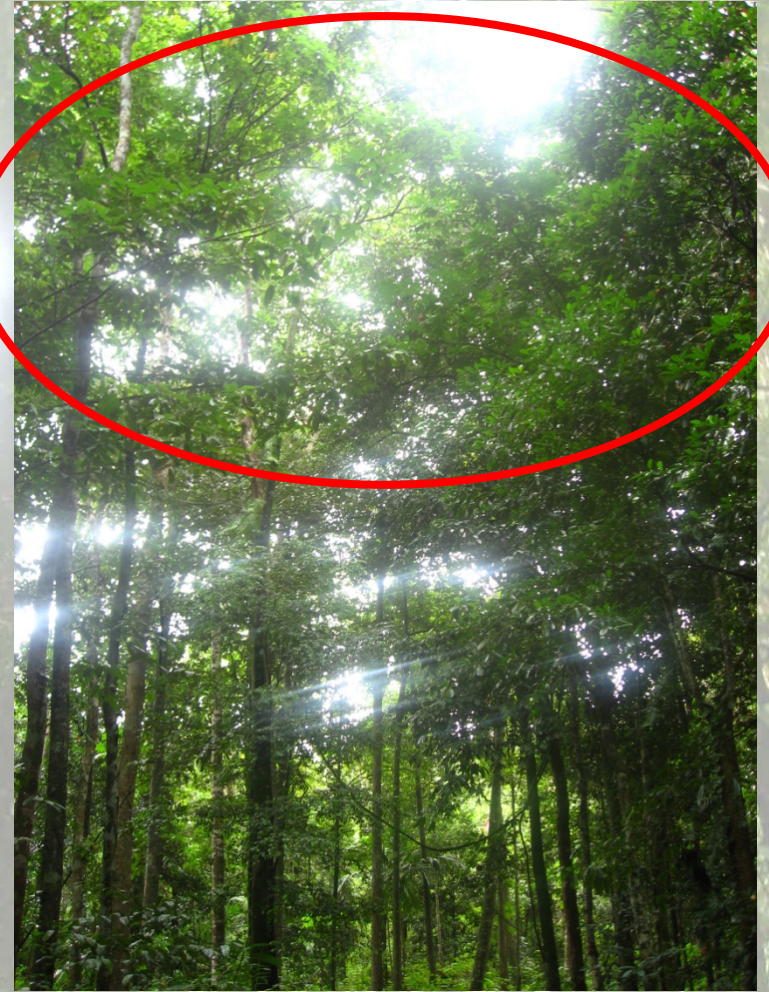


Forest Stand Characteristics

- Importance of different layers
- Canopy layer
- Understorey
- Litter layer

Canopy Layer

- Closed canopy
- Lack of gap between canopy
- Leading to absence of sunlight reaching the forest ground
- Provide food for mammals and birds in the forest



Understorey

- Lack of forest gap
- Seedlings remain immature
- The probability of survival is
- 1: 70,000,000
- Diverse species of seedlings, eg. sand paper



Litter layer

- Due to efficient nutrient cycling
- Thin litter layer
- Litter layer composition
 - branches, leaves, humus



Ecological Succession

- Abandoned sugarcane plantation
- Invasive plants dominate around the edge of tropical rainforest, eg. *Alphitonia* sp.
- Quickly form the canopy layer
- Potentially to develop as a part of tropical rainforest

Ecological Succession

- Secondary forest around rainforest : Acacia mangium
 - nitrogen fixation
 - Soil improvement
- Invasive weeds
- high demand in sunlight
- Unfavourable for the forest environment



A photograph of a dense forest with sunlight filtering through the trees, creating a bright, dappled light effect. The text is overlaid on the image.

Relationship with biodiversity and
Endemism with landscape in that
area

Biodiversity

- Definition:
 - variation of life forms within a given ecosystem
 - indicator of maturity of the ecosystem; the higher, the better
 - Genetic information (30-40 yrs)
 - Species
 - Ecosystem

Relationship with biodiversity

- Reasons for high biodiversity in tropical rainforests:
 - High temperature and rainfall
 - Abundant sunlight
 - Soil
 - Succession (accumulation of biomass)
 - Stable system (without natural / human interruptions)
 - No seasonal changes

Endemism

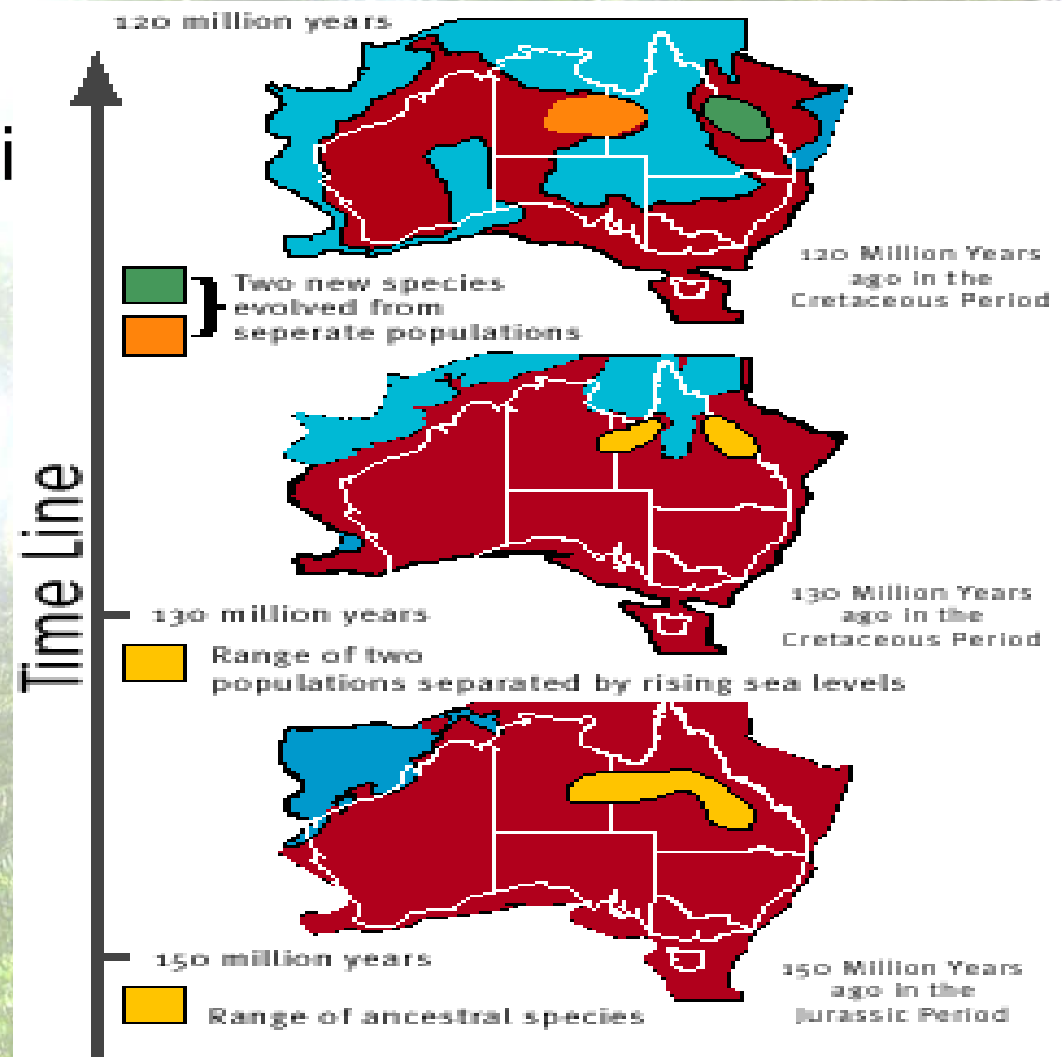
- Definition:
 - High biodiversity and low species density
 - No dominant tree species
 - Mature ecosystem (tropical rainforest)

Why in tropical rainforests?

- Keen competition of:
 - Sunlight
 - Water
 - Nutrients
- Different species have to adapt to the environment via different plant forms
 - E.g. undergrowth needs only few sunlight for growth, saplings can remain small for 30 years

Reasons for endemism:

- Geographical locati (isolation)



This diagram illustrates the evolution of one species into two isolated and distinct new species, from 150 million years ago (bottom map) to 120 million years ago (top map).

Reasons for endemism:

- Competition with other species
- Parasites

A dense forest with sunlight filtering through the trees, creating a bright and airy atmosphere. The text "The End" is overlaid in a large, teal, sans-serif font.

The

End