香蕉湾残存热带海岸林在1974-2005年间之植被变迁

Vegetation Dynamics of a Remnant Tropical Coastal Forest during 1974 and 2005 in Banana Bay, Southern Taiwan

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王相华　林业试验所

Coast forest fragmentation in Taiwan

- Old-growth forest almost disappear
- Only small area designed as Nature Reserve or Protected Area
- Few research data supporting management application

Guandou

(mangrove)

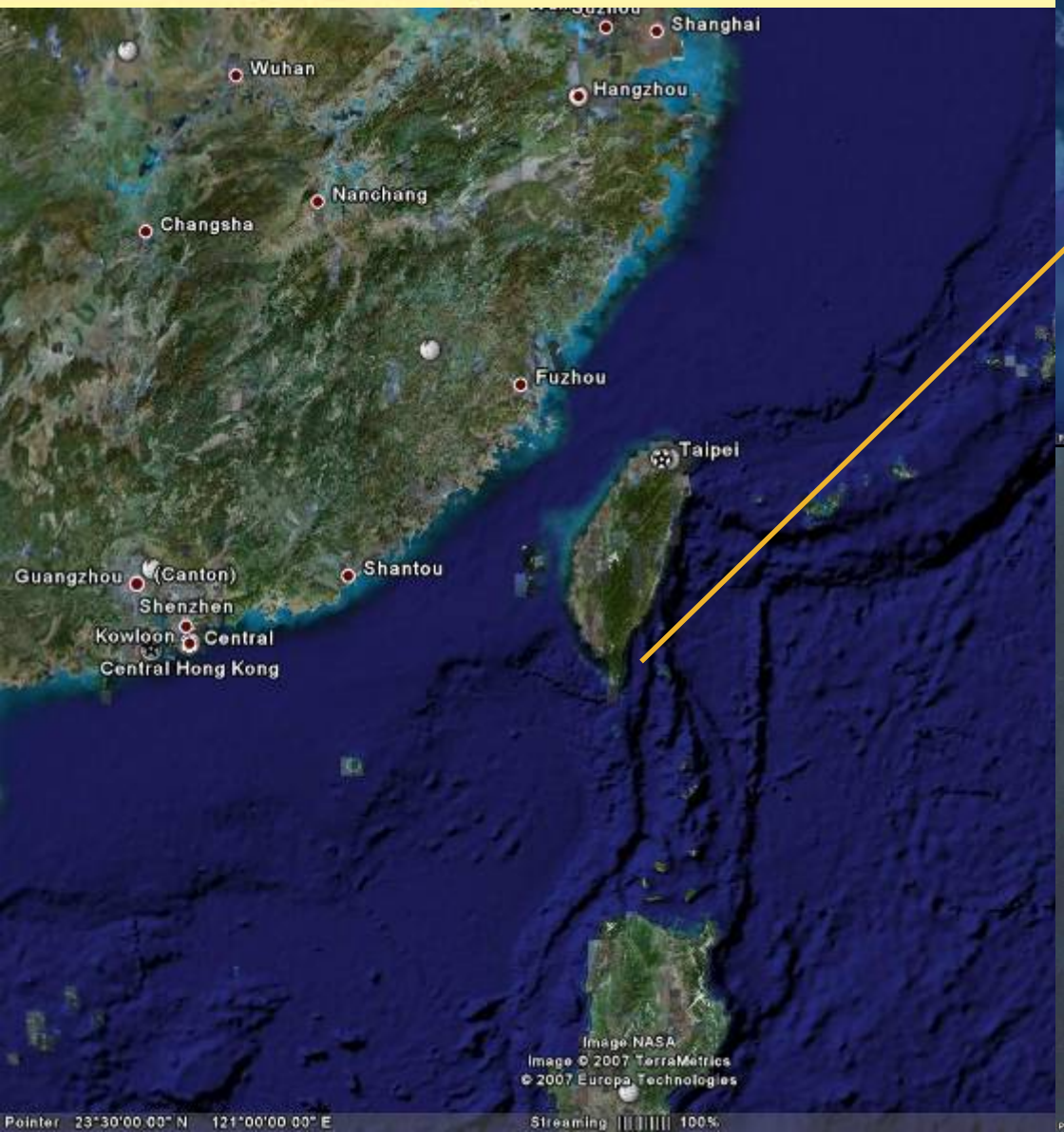
Ushibi

(low-mountain coast forest)

Banana Bay

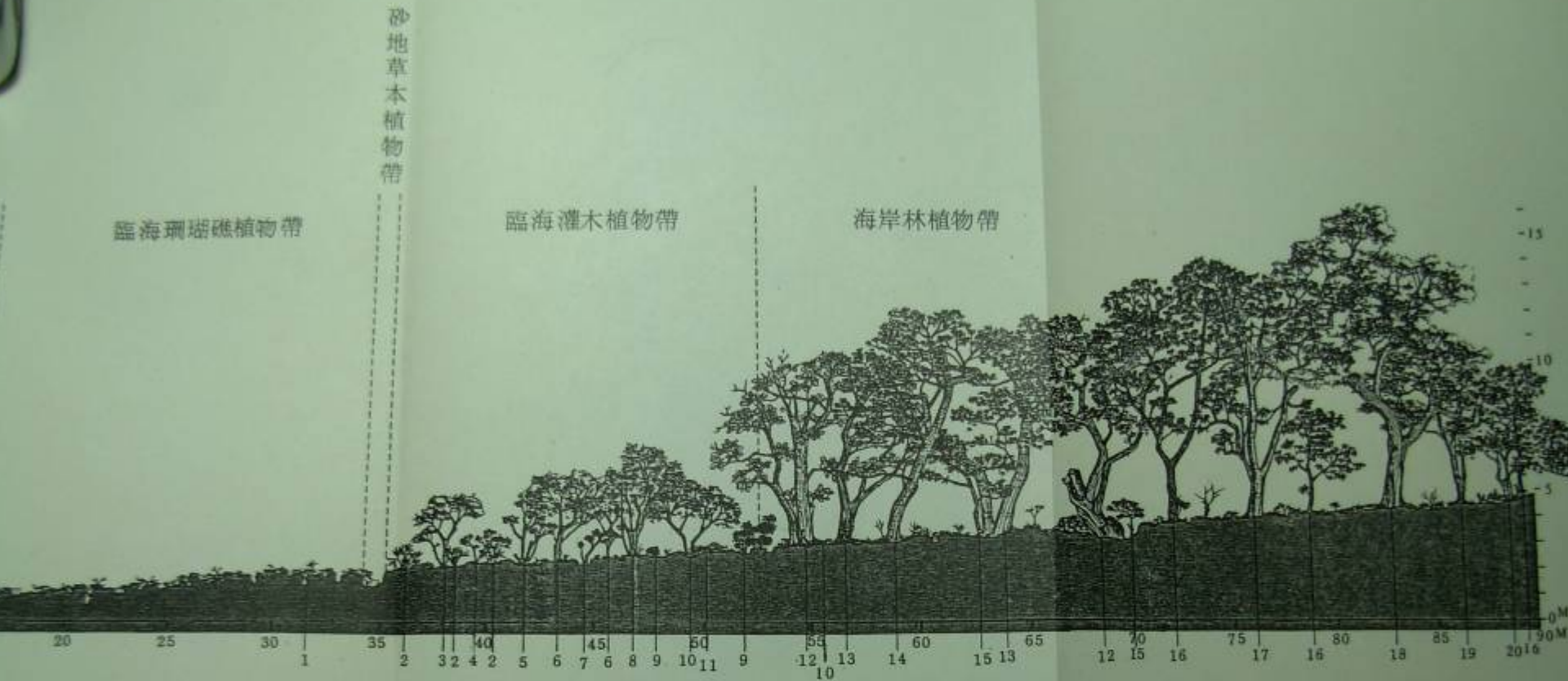
(tropical coast forest)

Study site


Shanghai
Wuhan
Hangzhou
Nanchang
Changsha
Fuzhou
Taipei
Guangzhou (Canton)
Shantou
Shenzhen
Kowloon
Central
Central Hong Kong
Image NASA
Image © 2007 TerraMetrics
© 2007 Europa Technologies
Pointer 23°30'00.00" N 121°00'00.00" E
Streaming 100%


Kenting
Google


Google



1 水芫花　6 紅柴　11 苦藍盤　16 蓮葉桐
2 毛苦參　7 白水木　12 棋盤脚樹　17 皮孫木
3 土沈香　8 葛塔德木　13 大葉赤榕　18 茄冬
4 草海桐　9 林投　14 欖仁　19 山柚仔
5 黃槿　10 止宮樹　15 銀葉樹　20 水黃皮

圖8　海岸林剖面圖，可見其植被的水平分布與層狀結構

Species close to the sea

草海桐

臭娘子

黃槿

葛塔德木

Old growth species of interior coast forest

Land-use history in Banana Bay tropical coast forest

- Assigned as Natural Memorial Site in 1933 when Japanese stay in Taiwan
- Disrupted by local people begin at the end of World War Ⅱ (1945)
- Assigned as Protected Forest by Taiwan Forest Bureau in 1973
- Forest dynamics plot set up by Taiwan Forestry Research Institute in 1974 and re-inventoried in 1985 and 2005
- Road expanded along the margin of the plot in 1979

Extrinsic factors affecting remnant forest dynamics

- Area effect
- Distance effect
- Matrix effect
- Time effect

Protected Area: 30 ha (1500X200m)

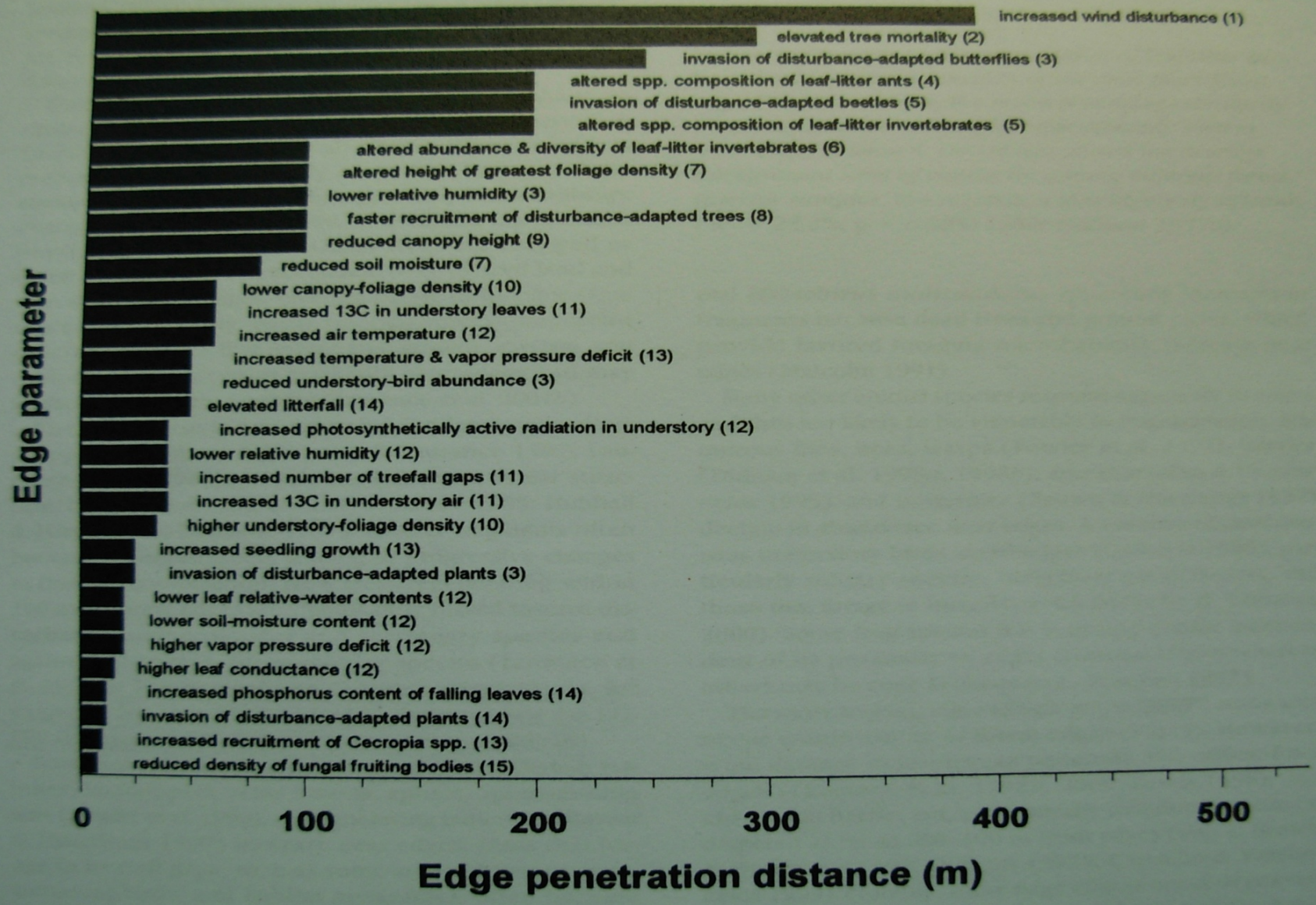
Matrix: medium in which a substance is embedded

基質

Ecological effects of roads on forest community

- Disruption of the physical environment
- Alteration of the chemical environment
- Modification of animal behavior
- Mortality of primary species
- Spread of pioneer and exotic species
- Changes in human land use style

Distance of edge effect



Questions

- How species richness and vegetation structure change? Does it change a lot?
- How plant guild structure change?
- Was there any alien invasive species appearance?
- Management implication?

Methods – sampling plot

18 X 18 m
(subplot)

270 X 54 m
(plot)

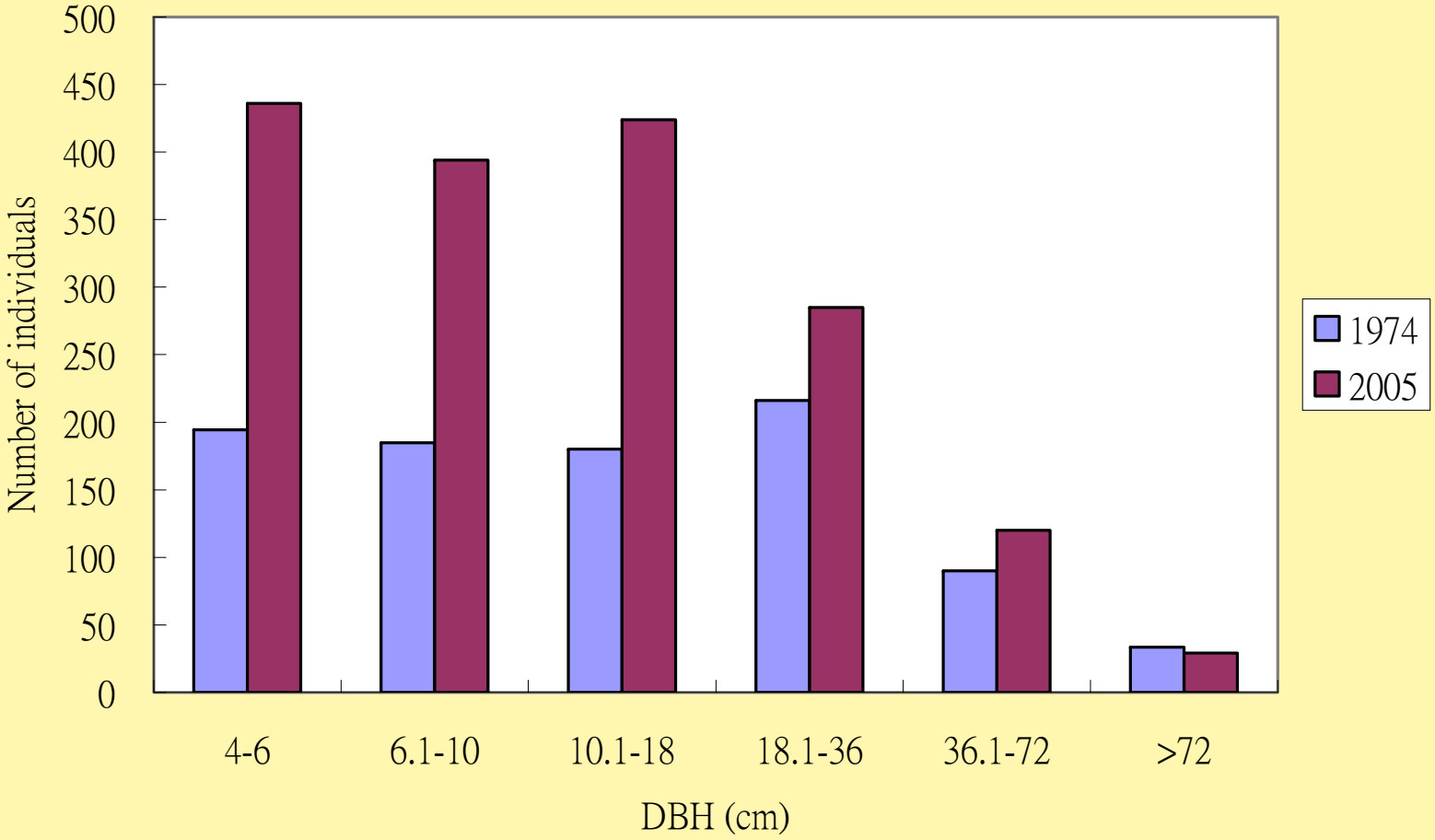
Investigation

- Time : 1974 and 2005
- Target : tree species
- Dbh : $\geqslant$ 4 cm

Change in species richness and vegetation structure

Year	1974	2005
Species	41	51
Density (trees/ha)	506.9	1157.8
Basal area (m^2/ha)	38.90	53.53
Basal area (m^2/ tree)	0.077	0.046

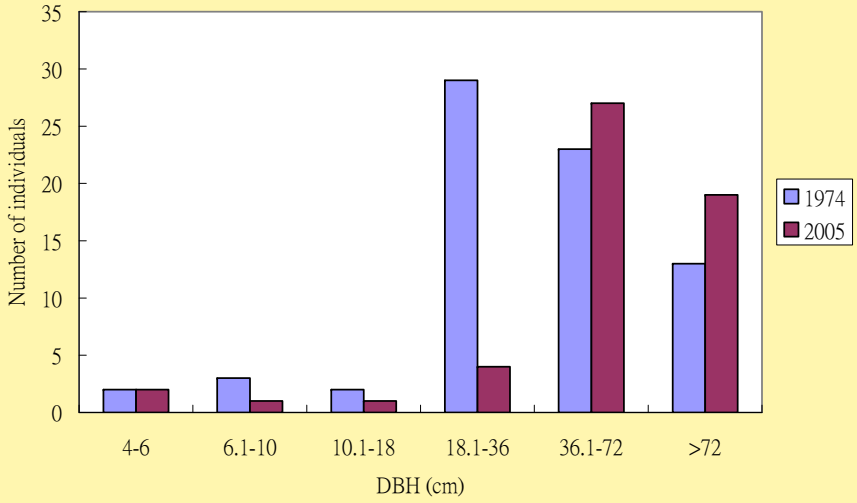
Change in vegetation structure



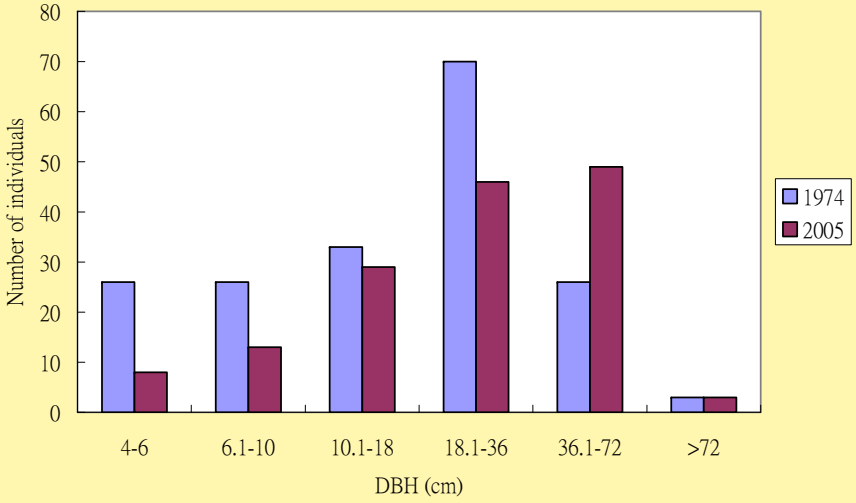
Change in population structure of guild tree species

Old growth species

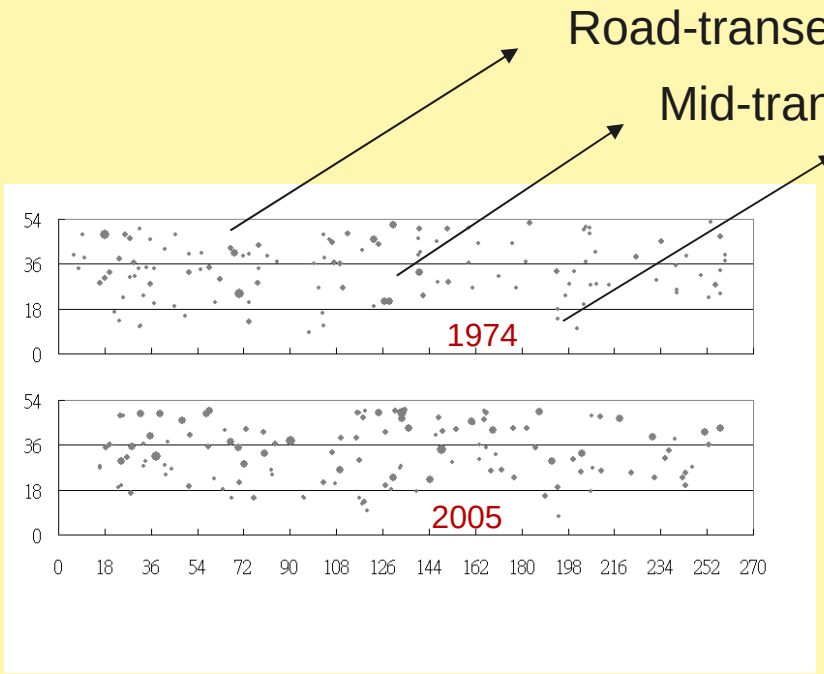
Barringtonia asiatica

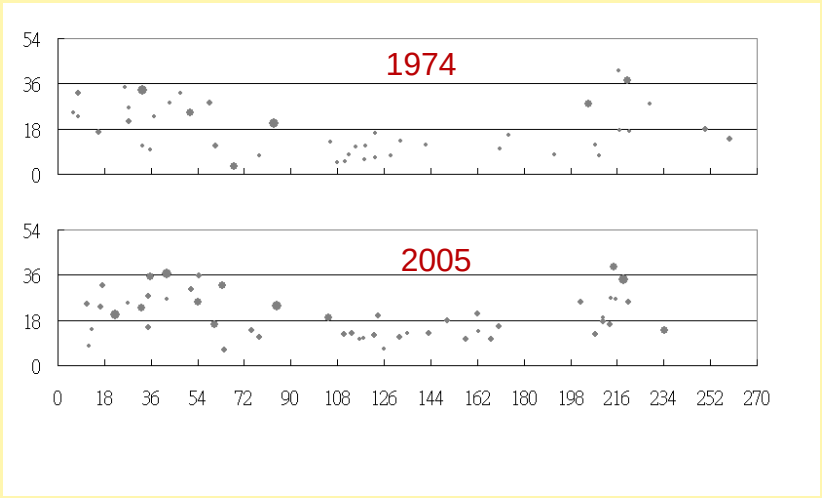


Hernandia nymphiifolia



Spatial and temporal pattern of guild tree specie





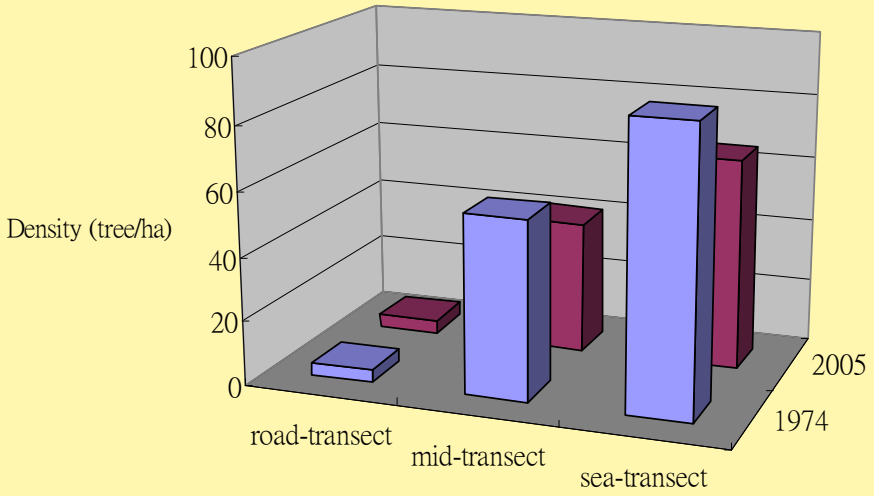
Hernandia nymphiifolia

Barringtonia asiatica

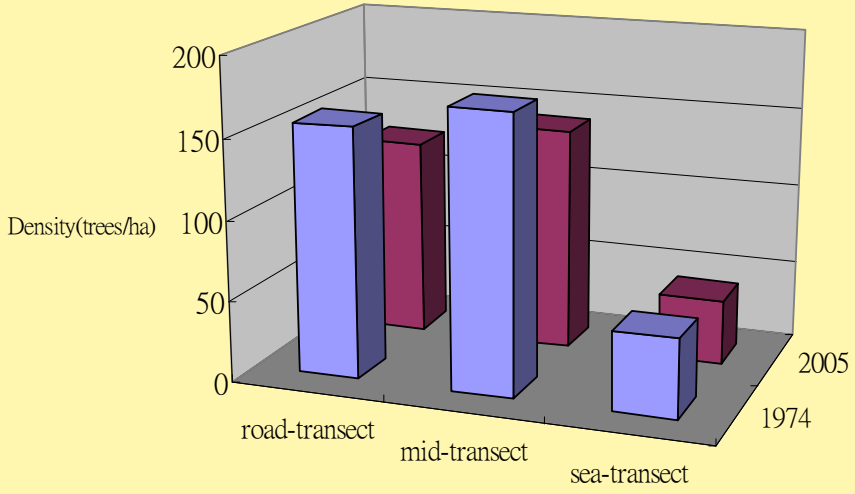
Old growth species

Density dynamics of three transect

Old growth species



Barringtonia asiatica

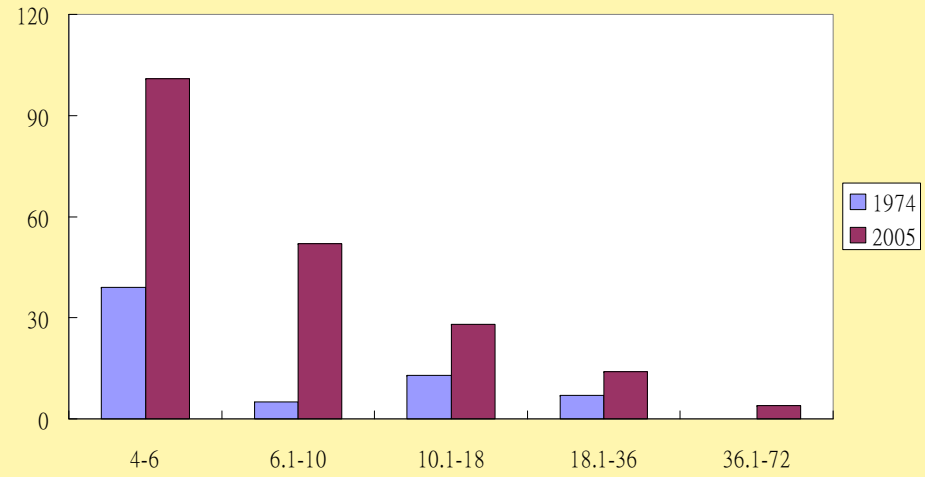


Hernandia nymphiifolia

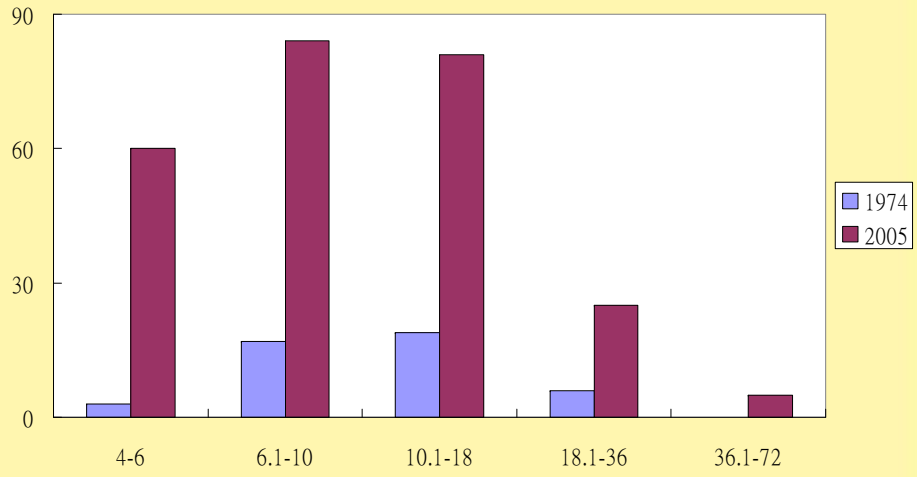
Change in population structure of guild tree

Sub-canopy species

Aglaia formosana



Hibiscus tiliaceus



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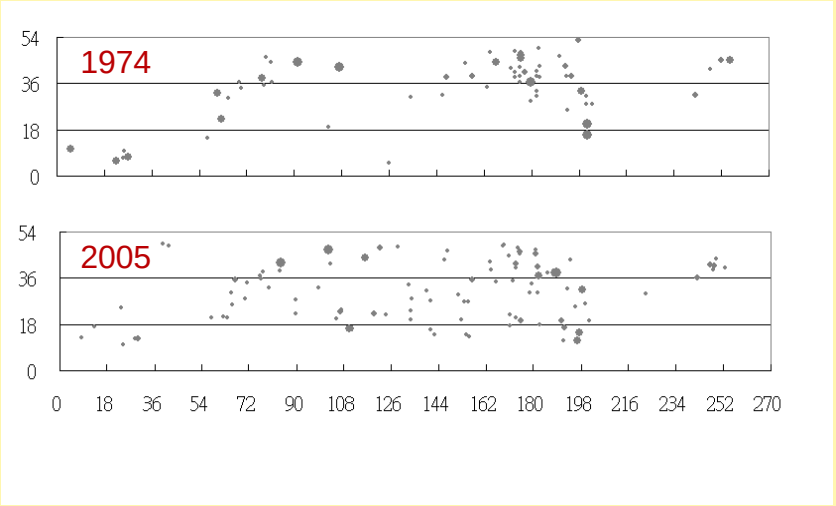
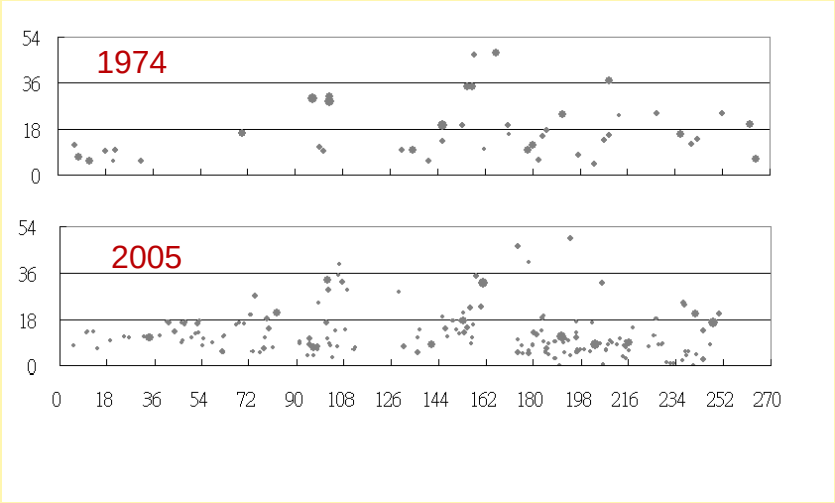


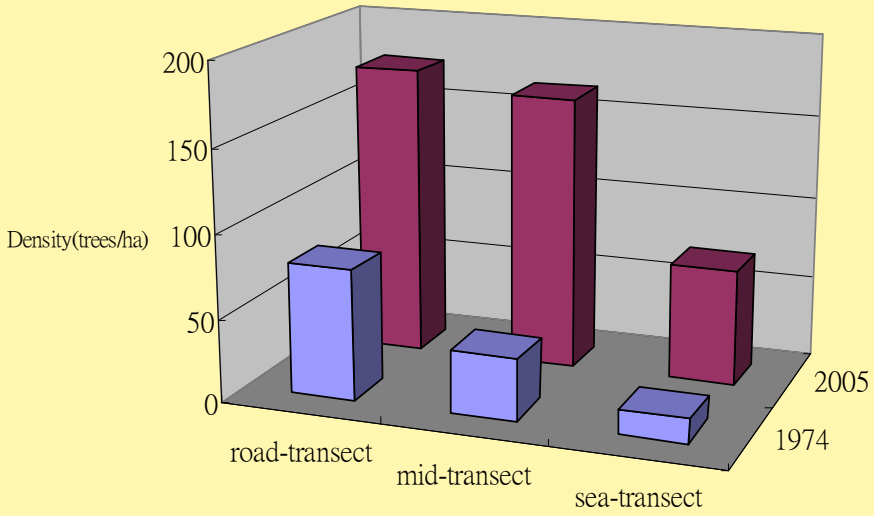
Aglaia formosana



Hibiscus tiliaceus

Density dynamics of three transect

Sub-canopy species



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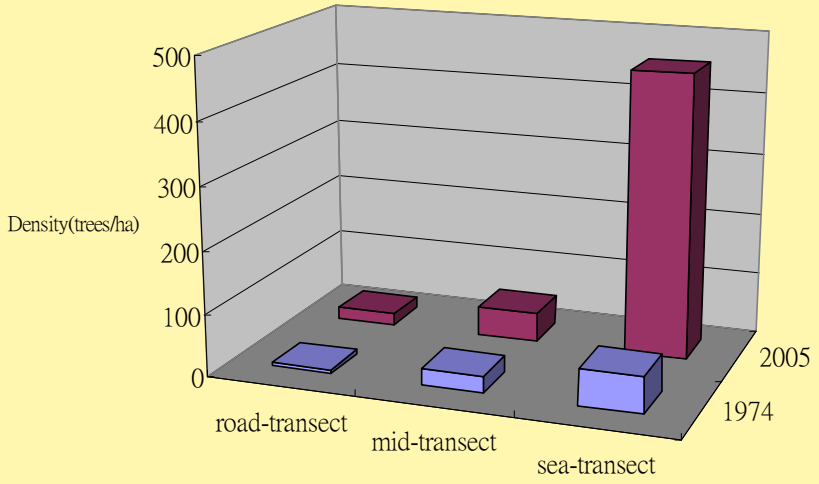
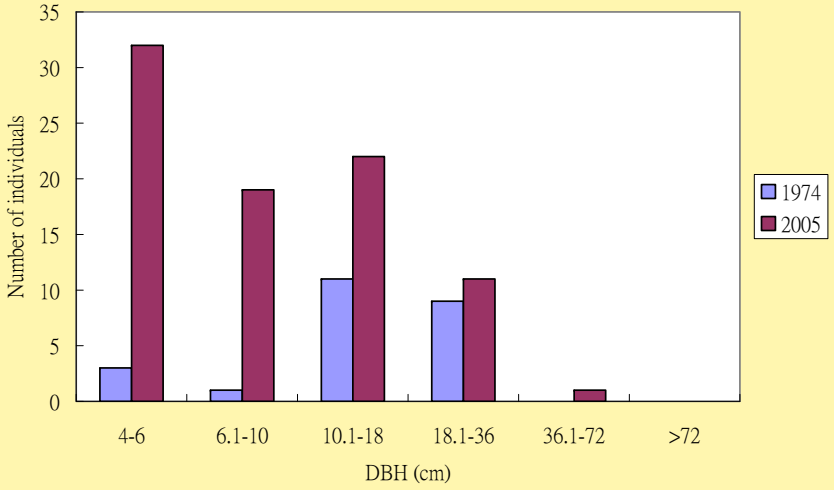


Hibiscus tiliaceus

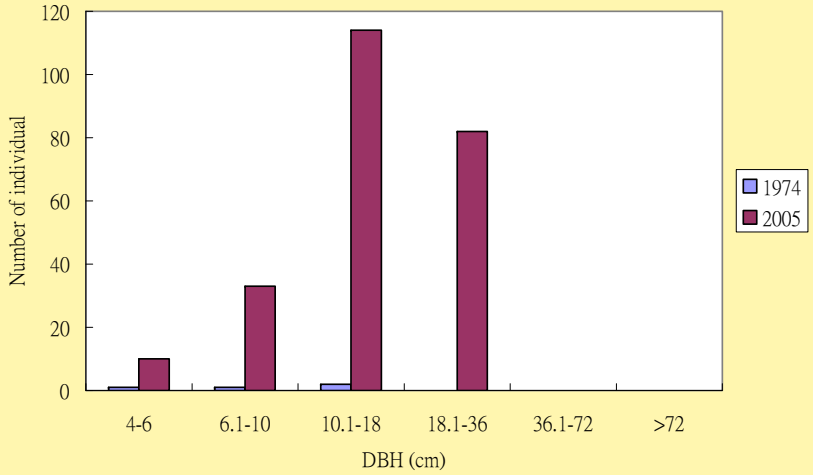
Change in population structure of guild tree species

Pioneer species

Melanolepis ltiglandulosa

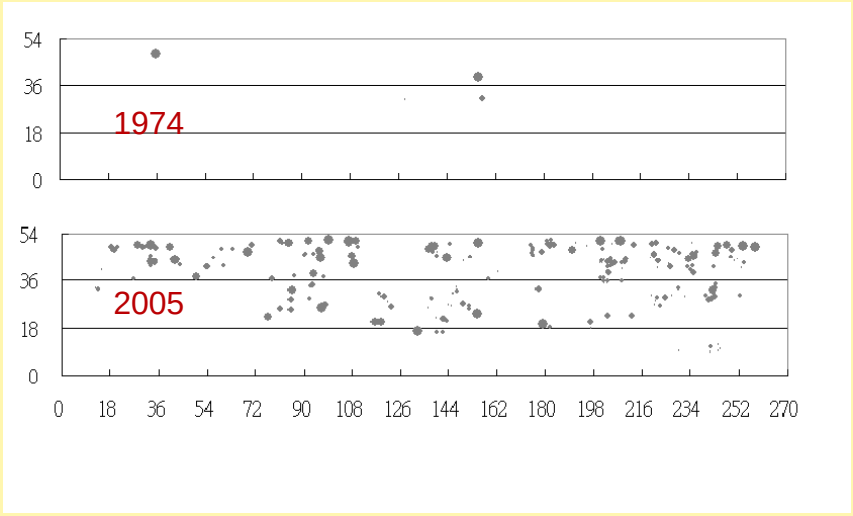


Macaranga tanarius

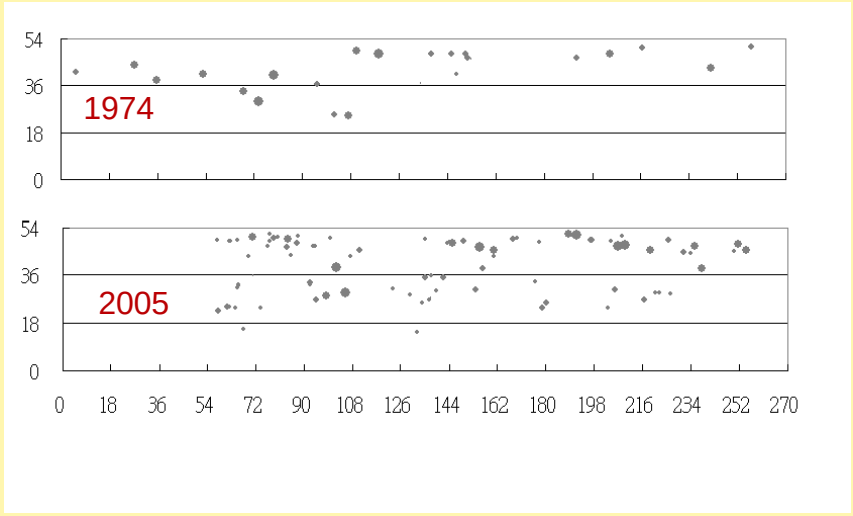


Spatial and temporal pattern of guild tree specie

Pioneer species



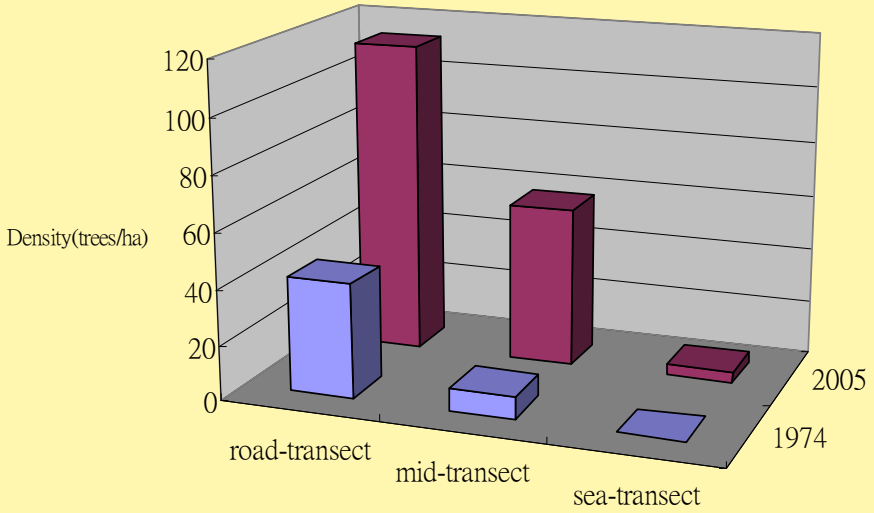
Macaranga tanarius



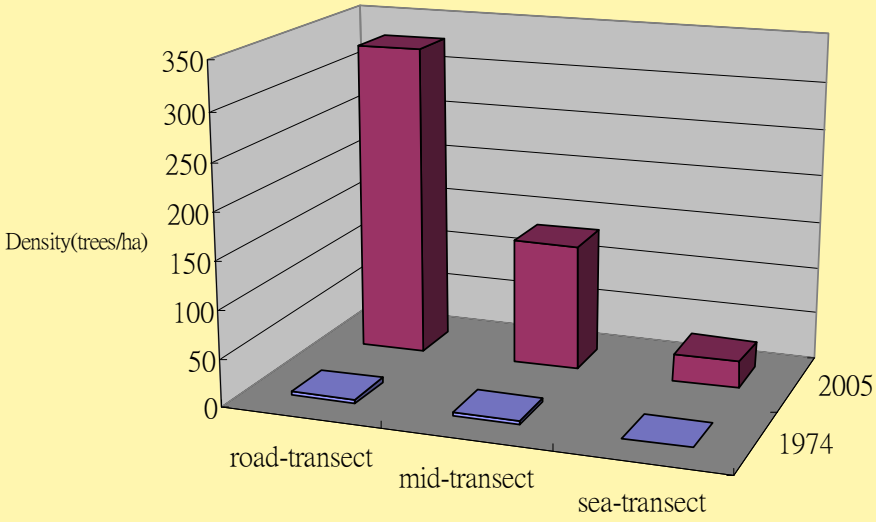
Melanolepis ltiglandulosa

Density dynamics of three transect

Pioneer species



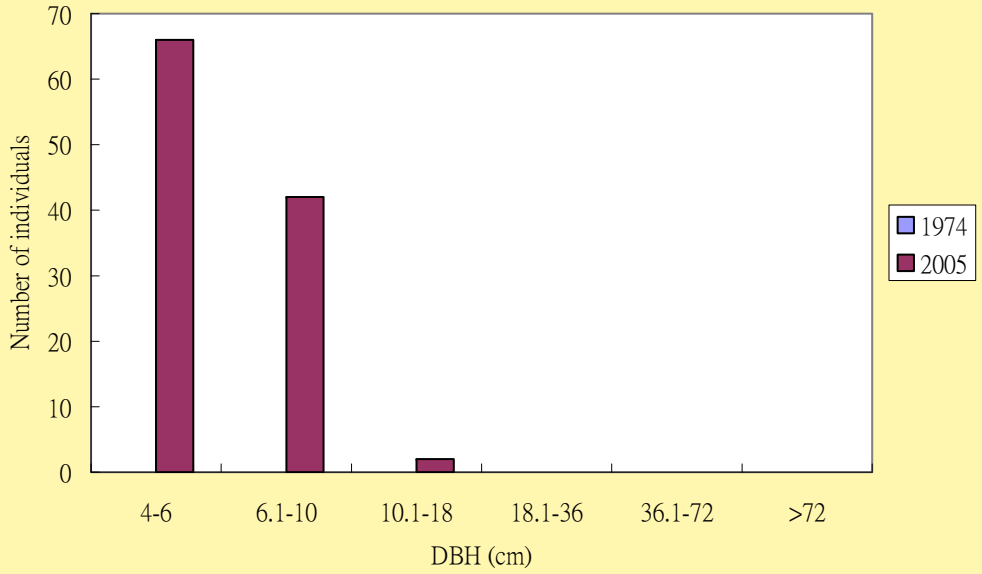
Melanolepis ltiglandulosa



Macaranga tanarius

Change in population structure of guild tree species

Invasive species: *Leucaena leucocephala*



Spatial and temporal pattern of guild tree specie

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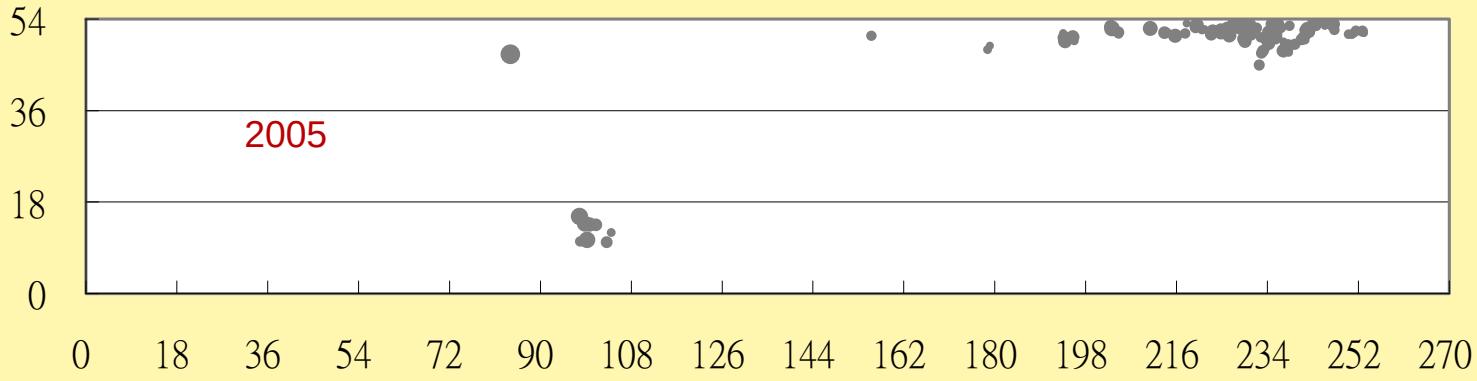

Density dynamics of three transect

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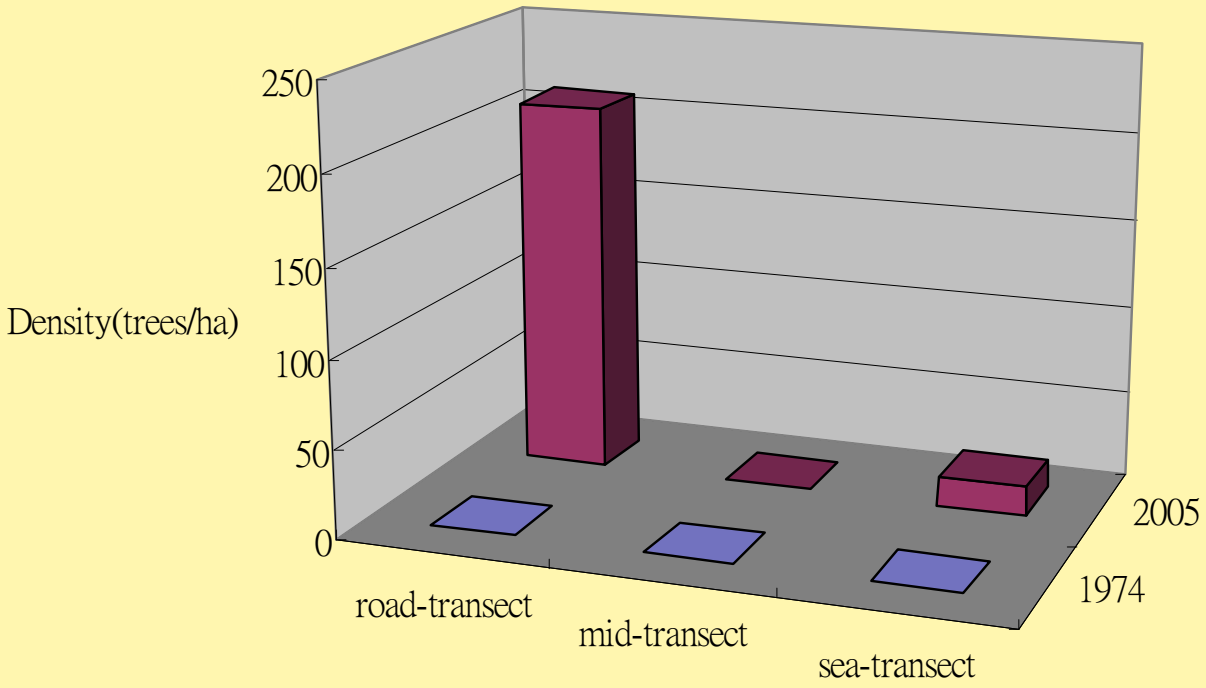


Discussion

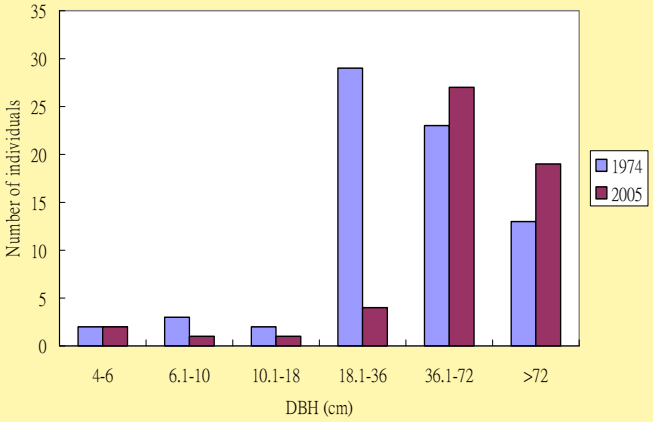
- How this remnant tropical coastal forest structure change?

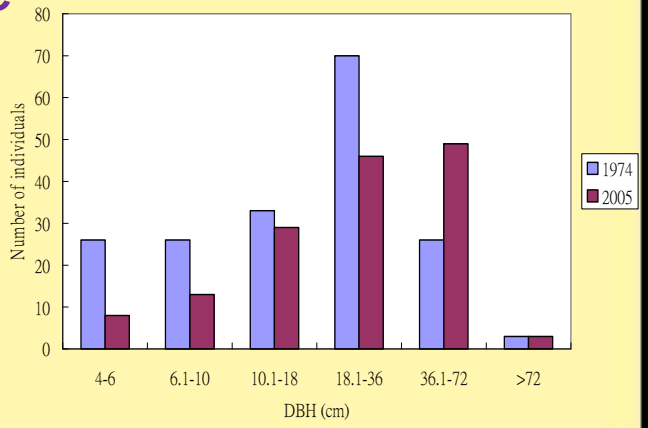
- Management implication

Degradation of old growth species

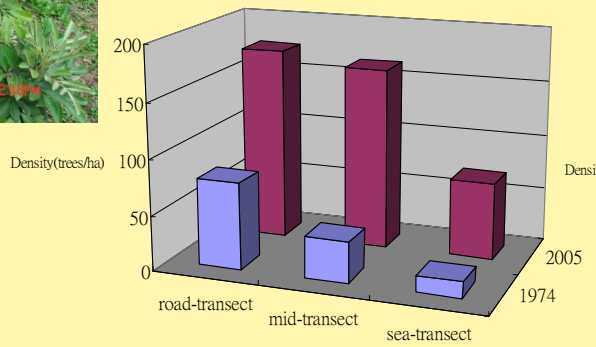
- Poor in regeneration
- Most of big tree still survival but getting senescent
- Reduce in canopy coverage

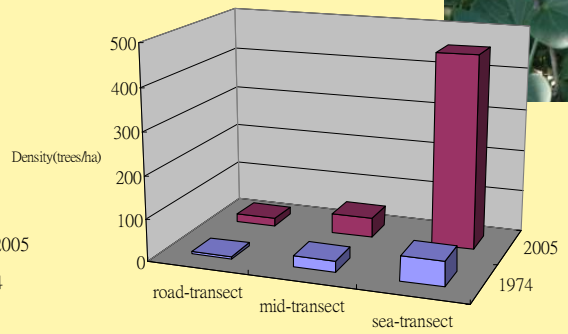
老兵不死但逐渐凋零

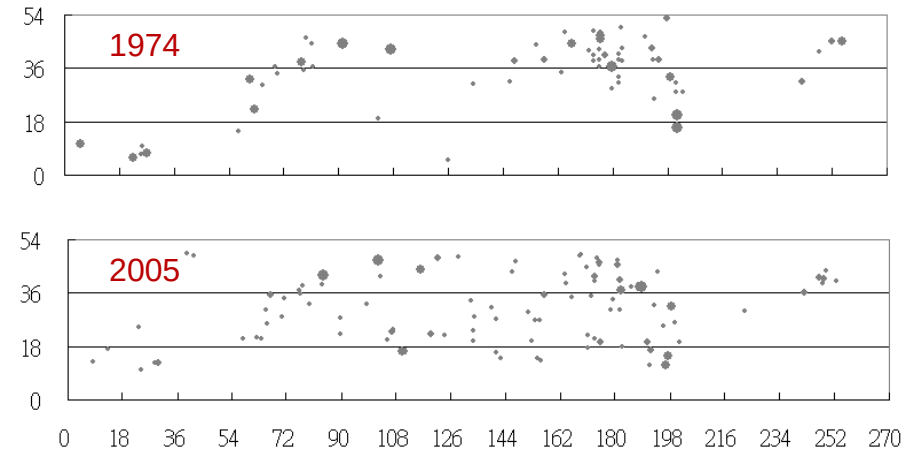




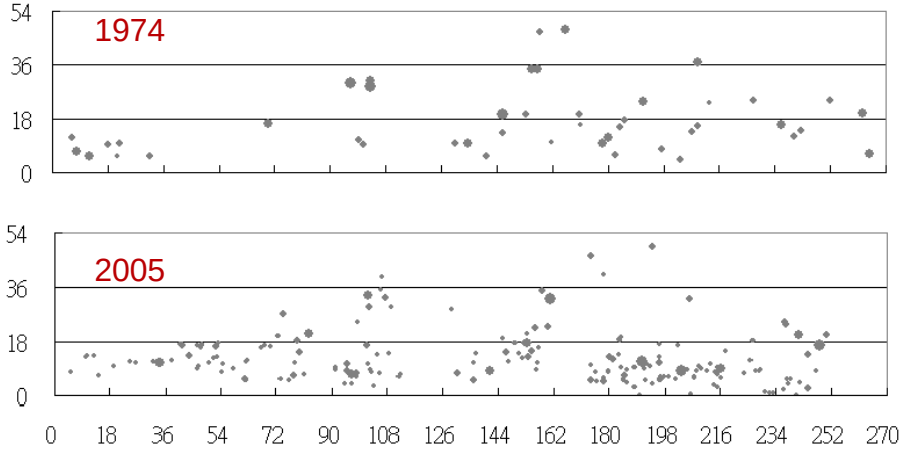
Sub-canopy species Increase in mid-transect and sea-transect





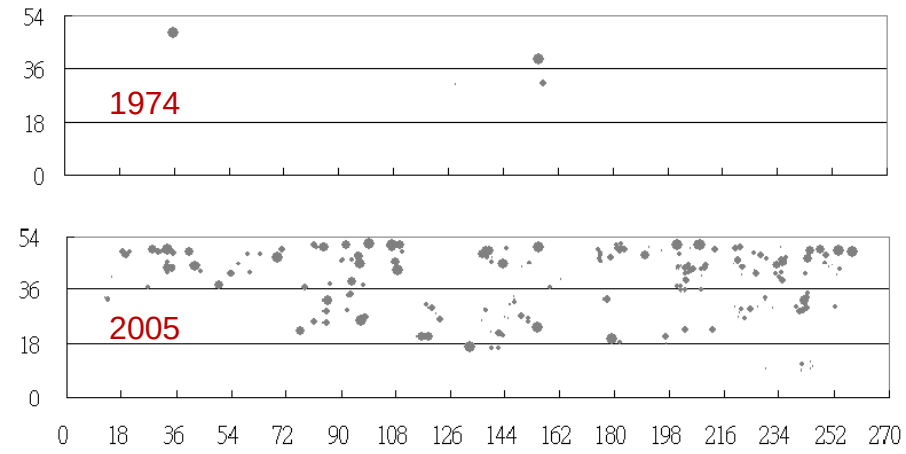


Aglaia formosana

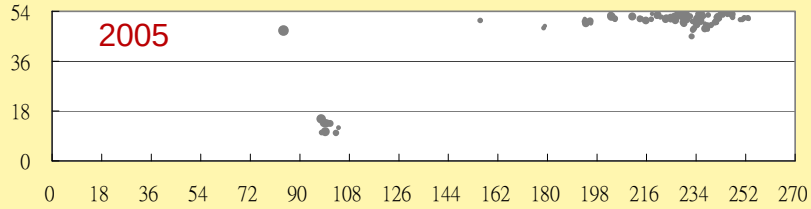


Hibiscus tiliaceus

Alien and pioneer species invade from road-transect



Macaranga tanarius



Leucaena leucocephala

Discussion

- How this remnant tropical coastal forest structure change?

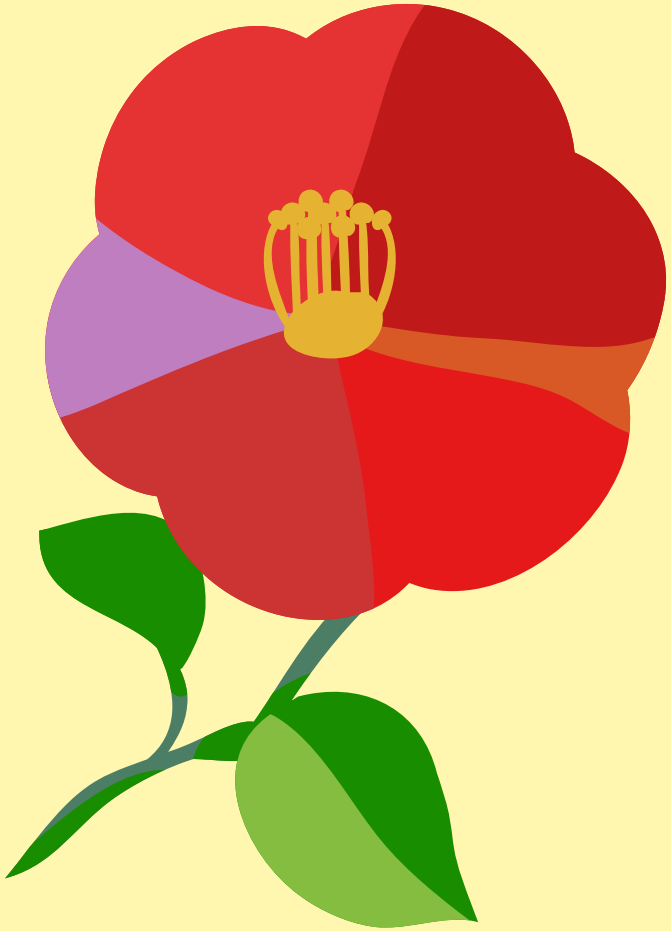
- Management implication

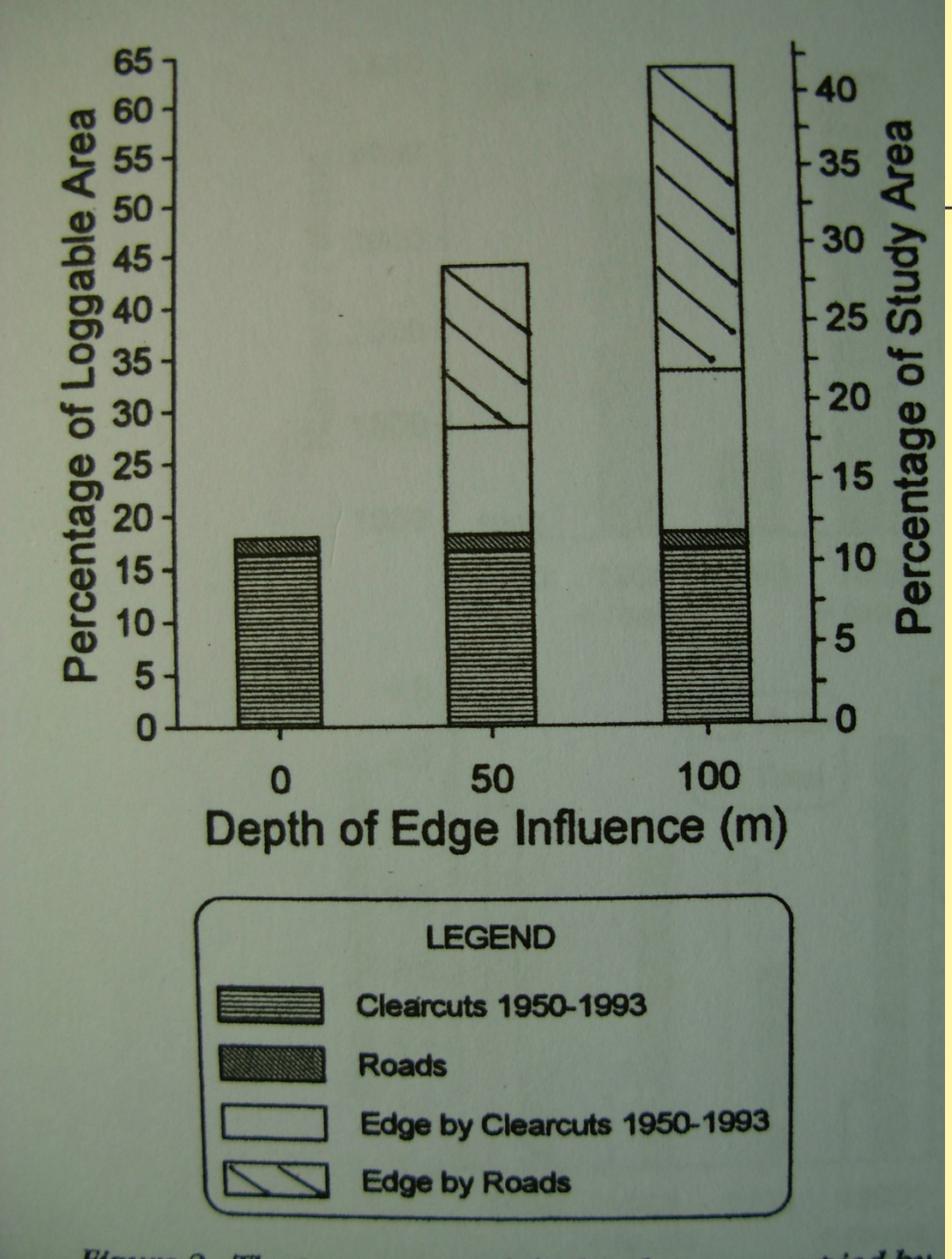
How to help the tropical coast forest for long-term existence

Human-interference is necessary

- Invasive species eradiation
- Conserve the genetic diversity of the old growth species
- Tropical coast forest restoration

谢谢聆听!　Thanks!





Contribution of road to forest fragmentation

Contribution of road to forest fragmentation