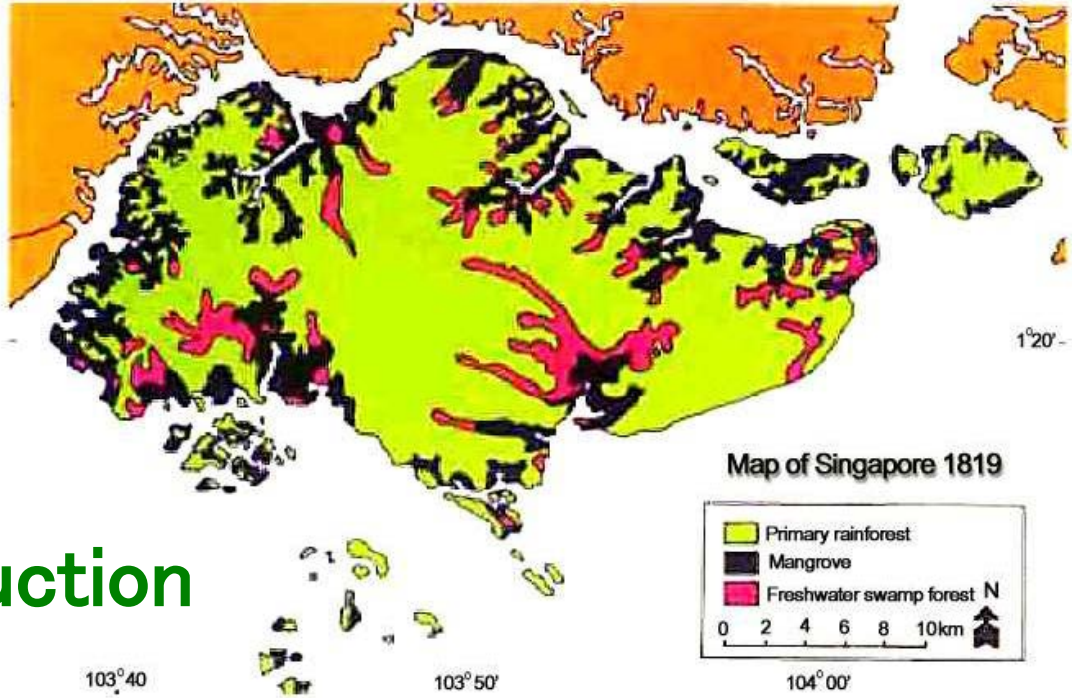
Environmental Education and Protection through long-term ecological research and partnership:

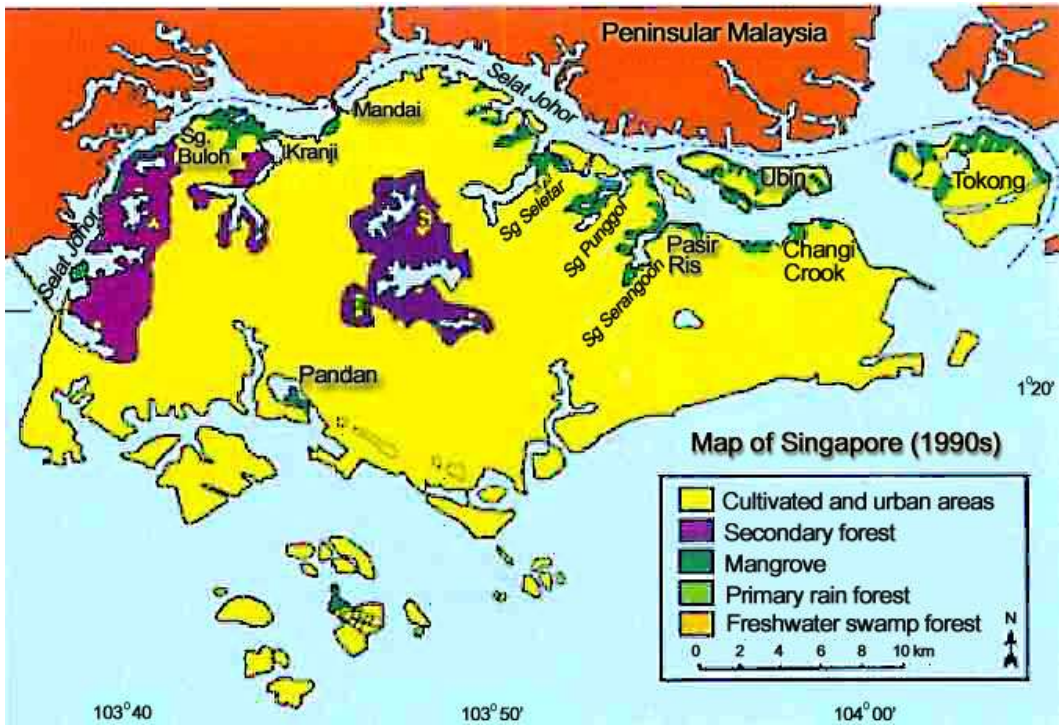
a Singapore case study

Dr Shawn Lum
Ms Sharon Chan
Ms Tan Beng Chiak

Wallace Environmental Learning Laboratory
Established by RGS and NParks

- **Introduction**





Land Use in Singapore 2013

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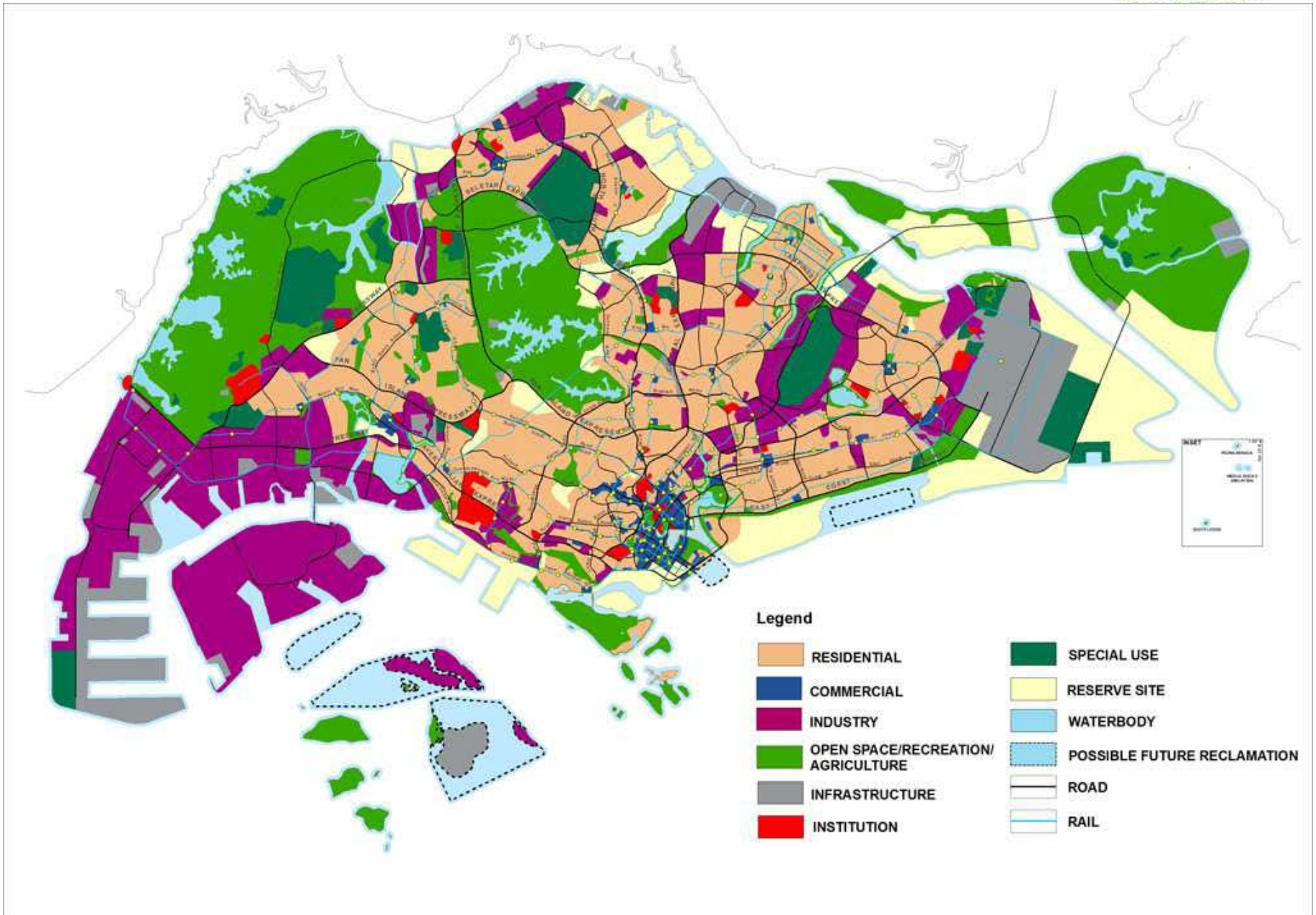

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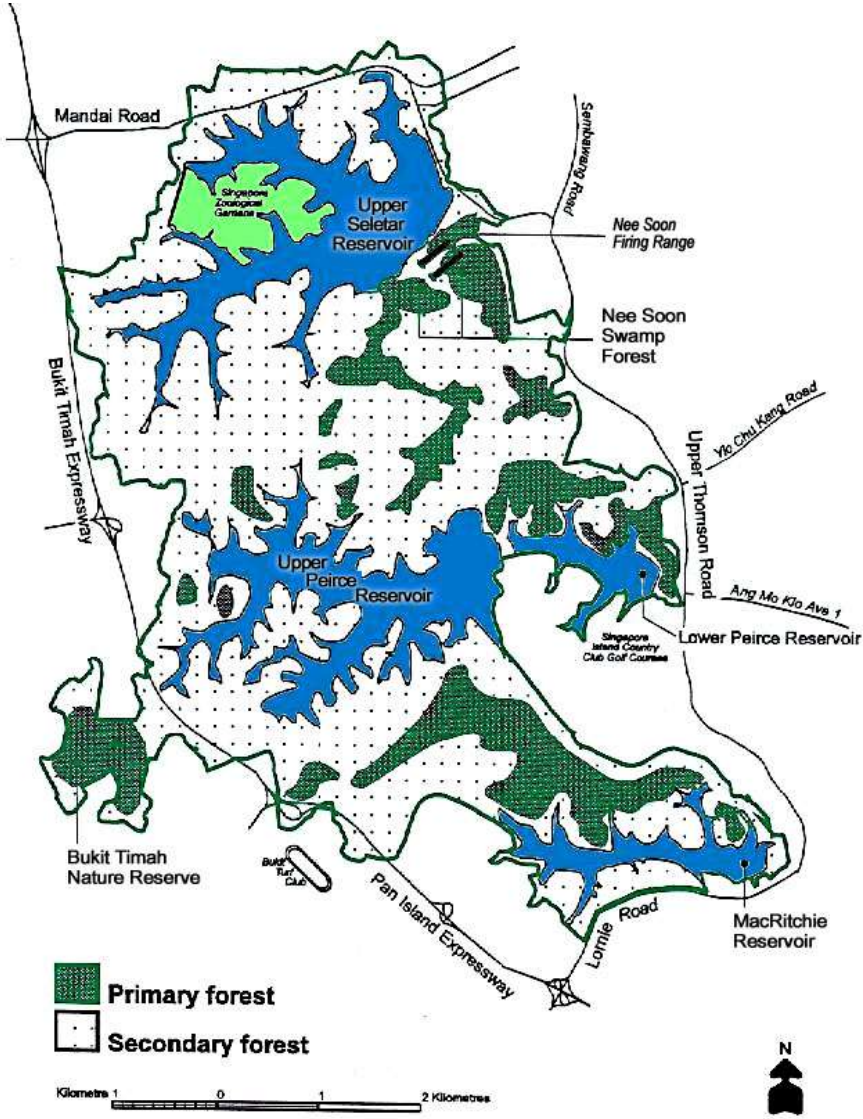
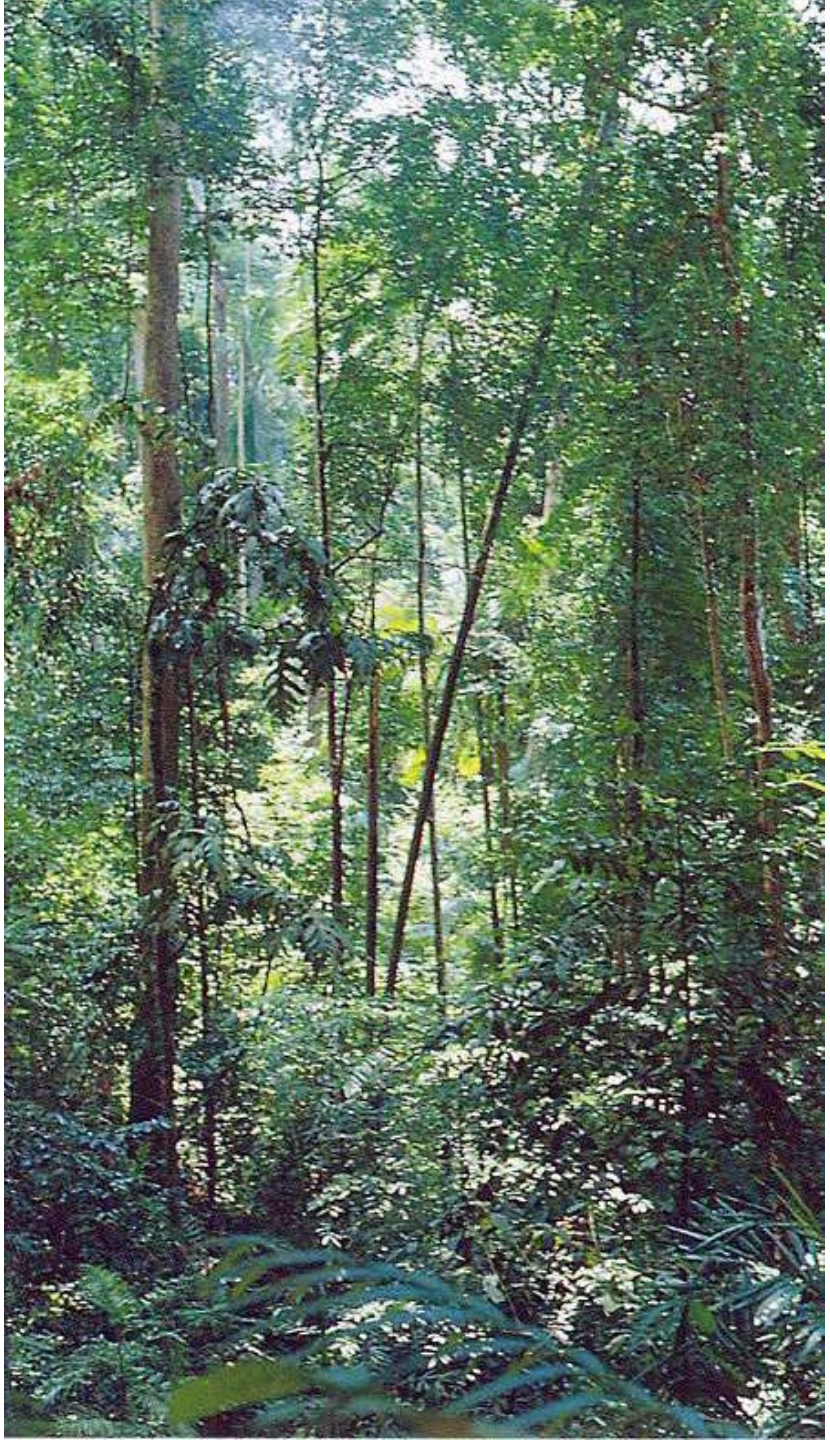
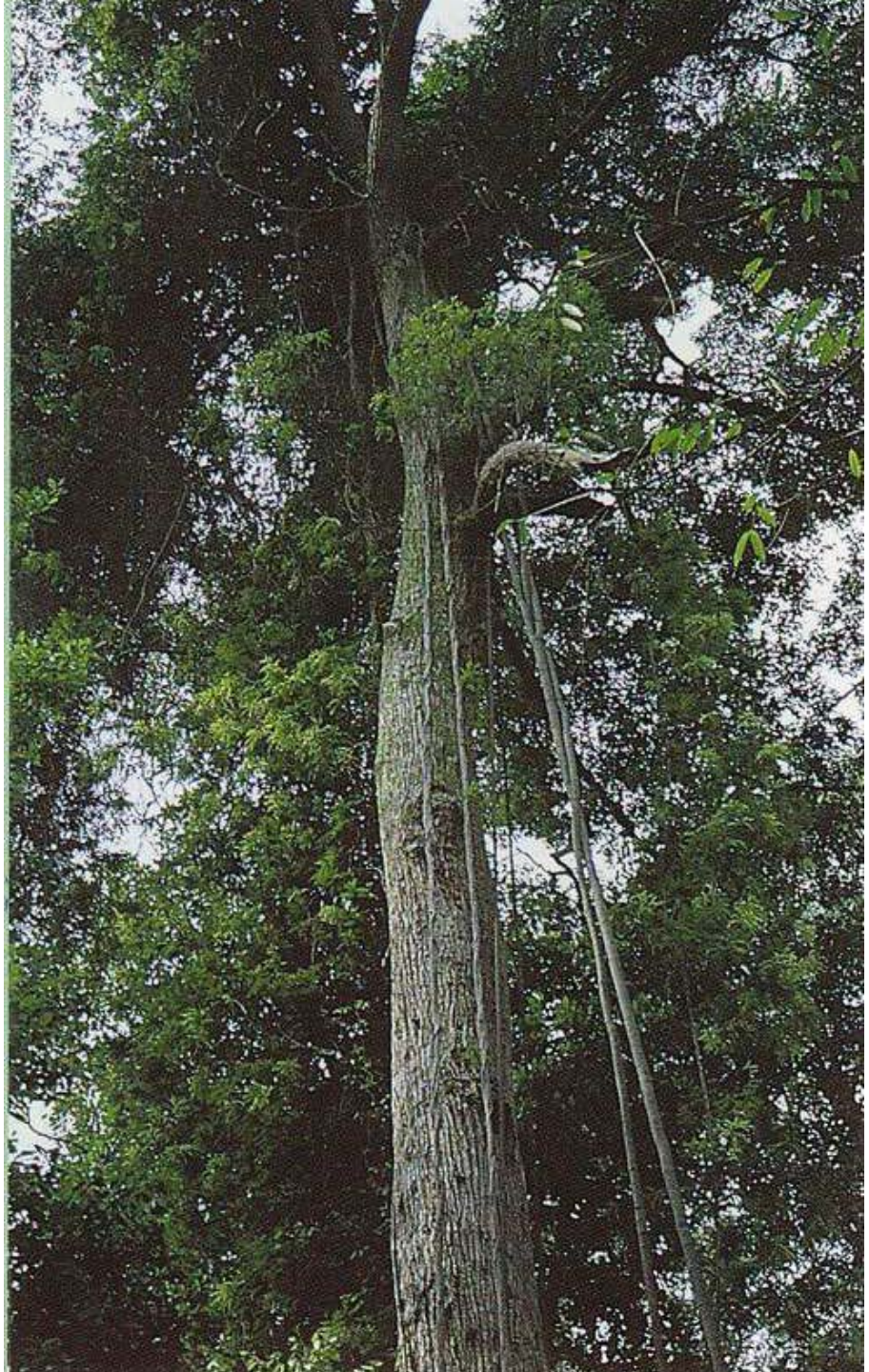


DAI

Taken from A View from the Summit





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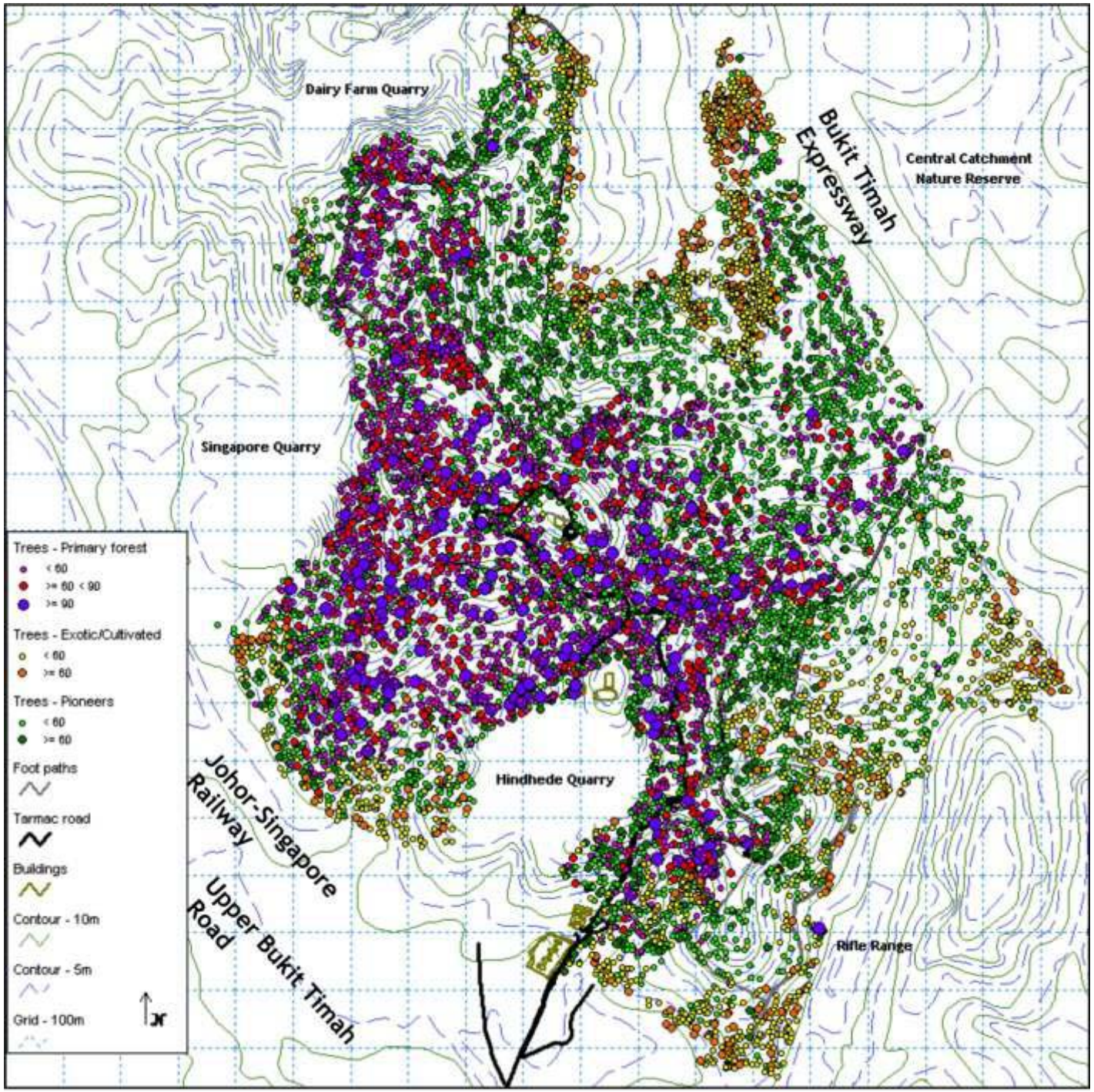
○ Long-term Study at BTNR

- Impacts of fragmentation?
- Fate of primary forest?
- Impacts of defaunation?



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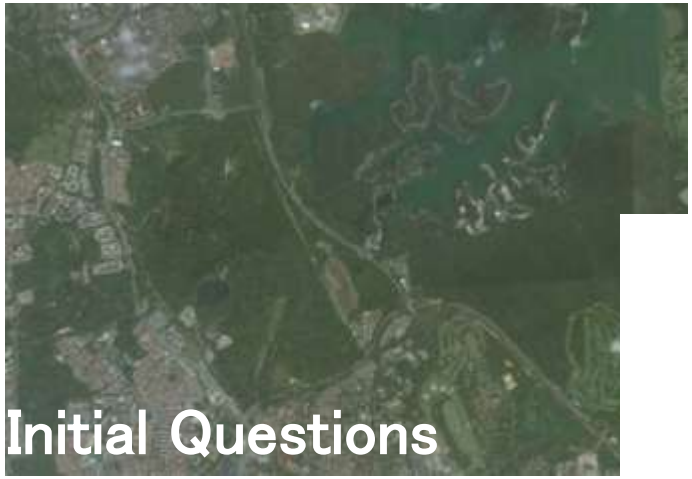
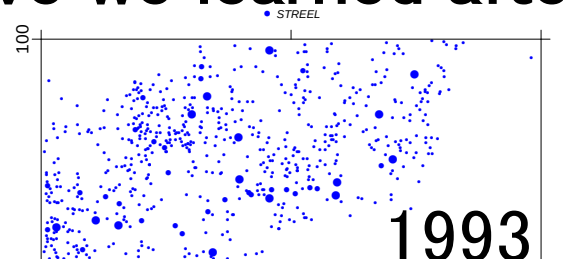
Findings from NIE-CTFS plot

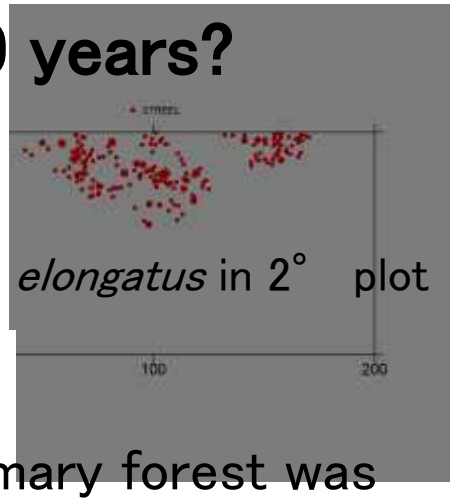
Bukit Timah – What have we learned after 20 years?



Initial Questions

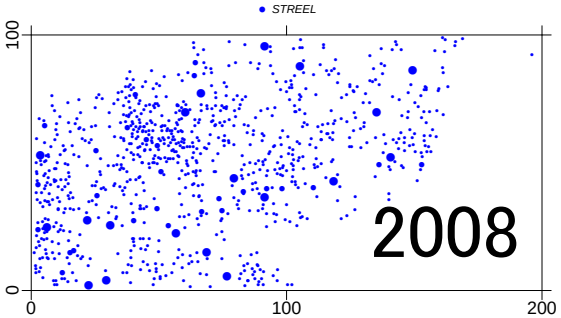
- *Impacts of fragmenta*
- *Fate of primary fores*
- *Impacts of defaunatio*



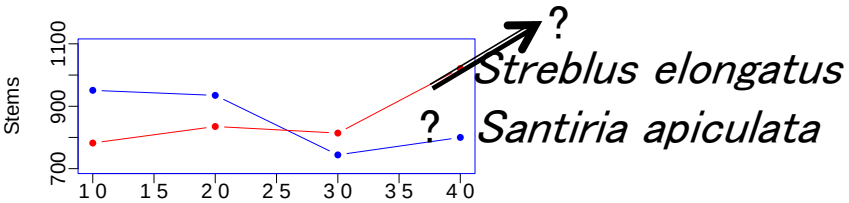


S. elongatus in 2° plot

Streblus elongatus: 782 to 1021 stems



- Primary forest was (surprisingly?) stable
- Some changes in relative abundance



- Secondary forest recovery is slow
- Highest mortality among earlier pioneers but recruitment of primary forest species limited

The work ahead?

- Change? What drives it?
- Field experiments needed
- Getting a wider group of researchers involved
- Effects of defaunation?

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Long-term Study at BTNR:

- Forest dynamics
- Impacts of defaunation
- Assessment of exotic species invasiveness
- Population genetics
- DNA Barcoding
- Carbon stocks
- Soil microbes

○ From Reforestation to Field Station

LAU POOK KON

Getting down to serious work in Mandai forest are the staff and students of various schools, together with NIE personnels.

November 14, 1999 : THE SUNDAY TIM

NIE adopts Mandai forest

By **SHARMILPAL KAUR**

THE Mandai forest has new parents. It was adopted yesterday by the National Institute of Education of the Nanyang Technological University.

The NIE will work with

part in caring for nature areas and public parks.

The eight schools are the Singapore American School, Henry Park Primary, Bukit View Secondary, Naval Base Secondary, Raffles Girls Secondary, River Valley High , Corporation Primary, and

At the same time, it is understood that each school will also use the plot for individual projects.

Two months ago, Henry Park Primary, launched its own. More than 80 of its students started seedlings in plastic cups. They will put

let. They say that the toilet is a nice place because it is wet all the time."

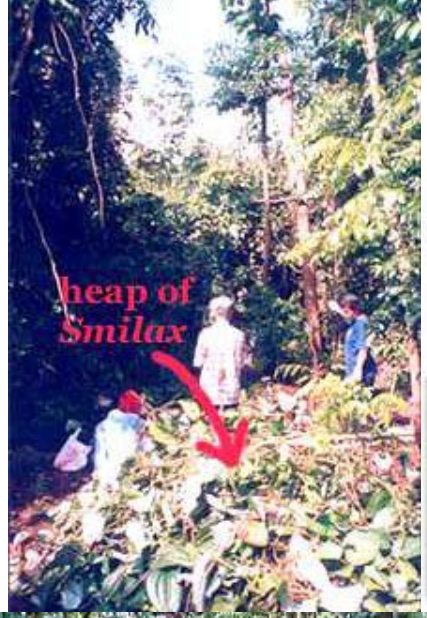
The NIE will use the forest as a living classroom for its ecology and environmental programmes.

Associate Professor Shawn Lum, of the biology

aggressive creeper. It wen out of control and covere the forest. It smothered th smaller trees to death."

The schools will also hav to experiment and find ou which plants will grow bes there

It begins with just



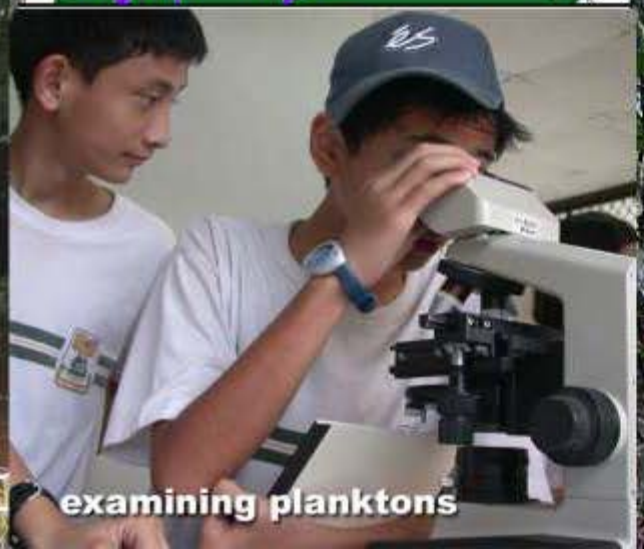
Nature Learning Camp 2001

collecting reservoir water

measuring physical conditions

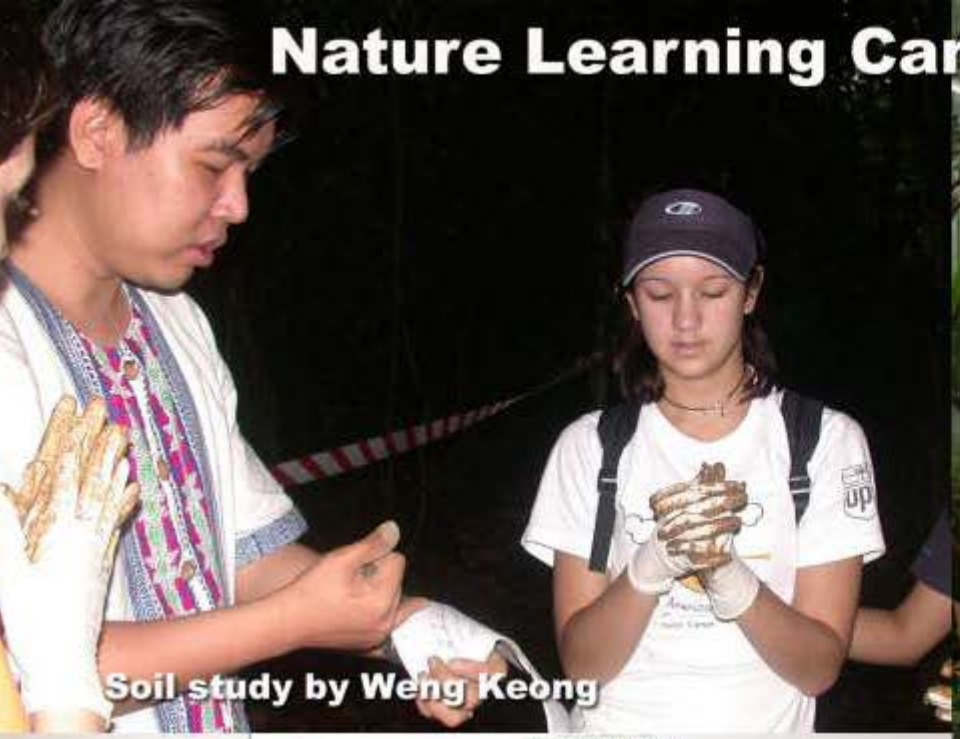
healthy forest

stream study


examining planktons

disturbed forest

Nature Learning Camp 2002



Soil study by Weng Keong

Forest study by Genevie from NParks

Insect study by Benjamin from NParks

Plankton study by PUB

Wallace Environmental Learning Laboratory (WELL)

- *The First Learning Laboratory in the Forest of Singapore*

NATIONAL PARKS

Courtesy of National Archives of Singapore
26 September 1966

Location

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Established by RSS and KPacks

Dairy Farm in the 60s

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Neglected National & Natural Heritage

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Feb 2008

Transformation to WELL

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The Learning Lab

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Learning ABOUT the environment

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- To develop knowledge, understanding, and appreciation for the environment – community & natural surroundings
- raise environmental literacy

Activity with Ecologist, Dr Shawn Lum

Learning IN the environment

Wallace Environmental Learning Laboratory

- outdoor fieldwork – depth in curriculum
- experiential learning – develop skills and solve issues in environment

Learning IN the environment

Wallace Environmental Learning Laboratory
Established by RGS and KPwks

Learning FOR the environment

Wallace Environmental Learning Laboratory
Established by RBS and KPwks

- self-worth, rootedness and connectedness with environment and community
- acquire attitudes of care and concern
- build a understanding of nature and make informed contributions to discussions

Reforestation activity by Corporation Primary

- Student Research can be “Real” Research

STUDY OF FOREST STRUCTURE ALONG WALLACE TRAIL IN 2010 DURING LEARNING JOURNEY

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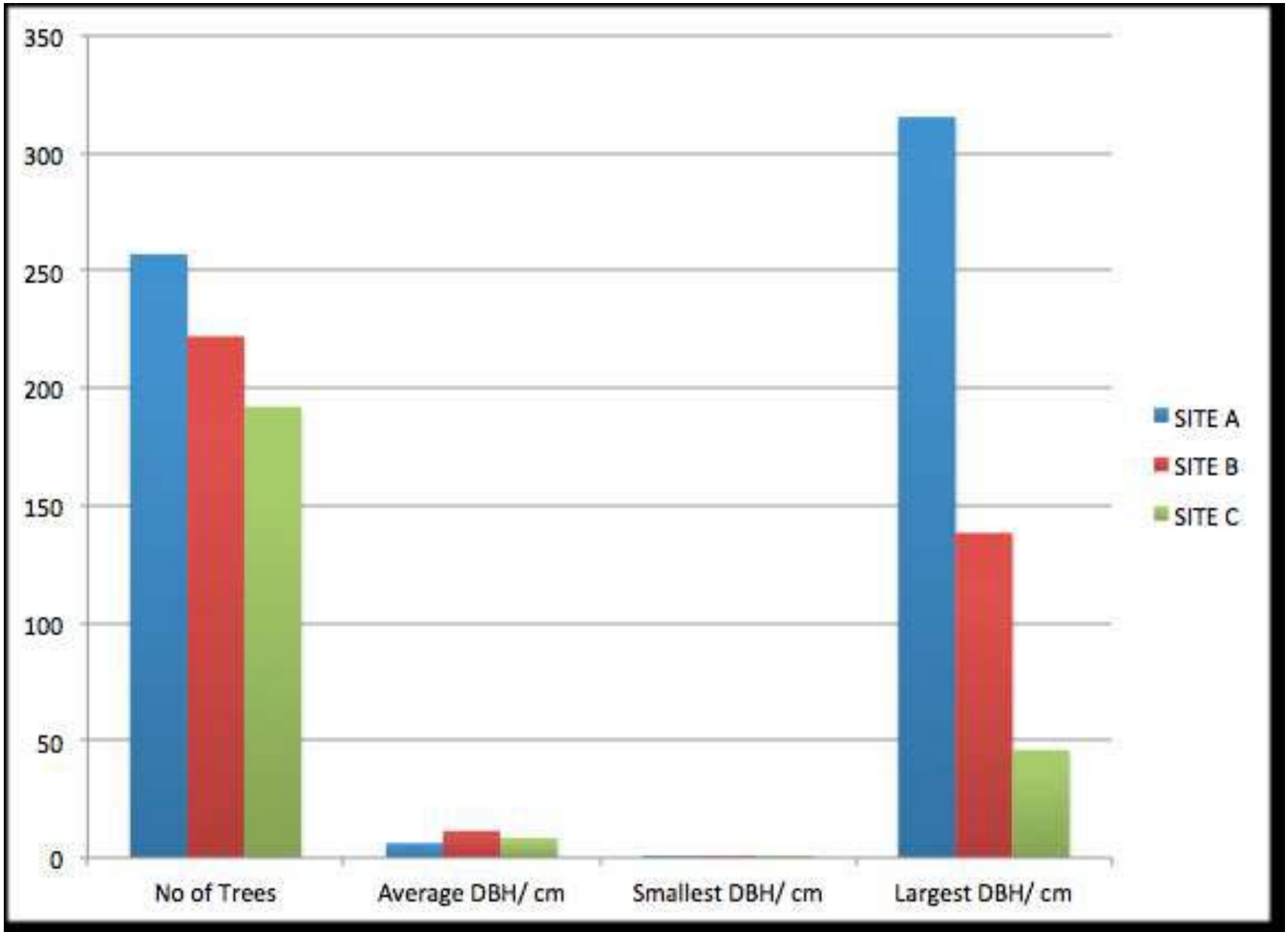
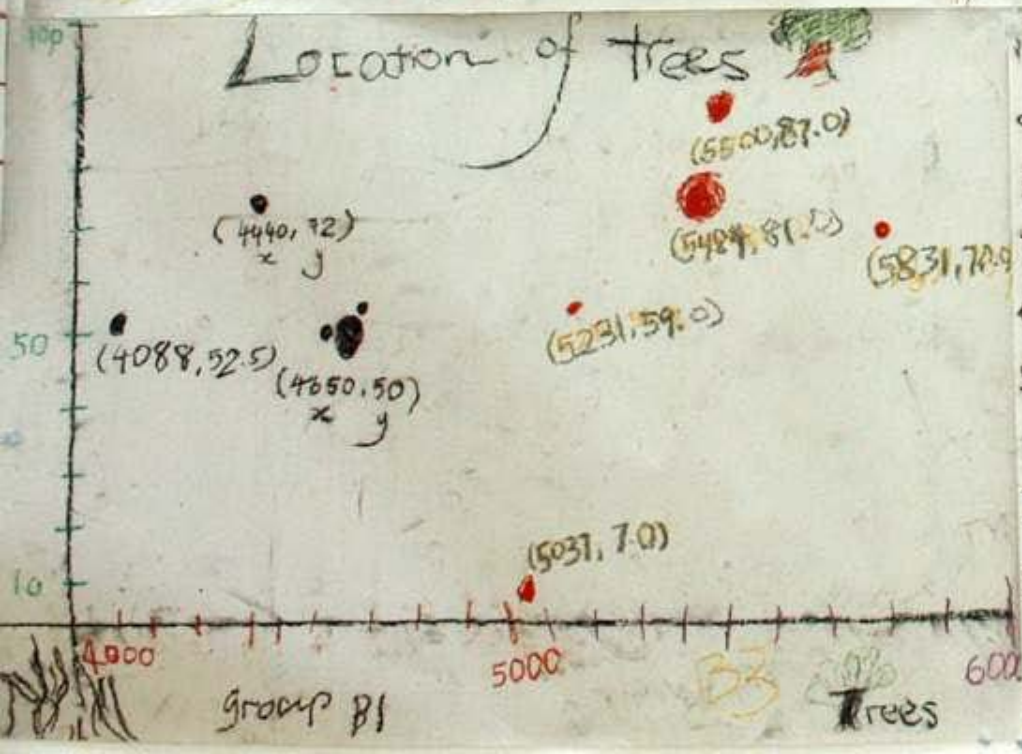


Group B3


Location of trees
(5500,87.0)
(4440,72)
x y
(5484,81.0)
(5831,70.9
(5231,59.0)
(4088,52.5)
(4650,50)
x y
(5037,7.0)
100
50
10
4000
5000
6000
Group B1
Trees

Group B2
100
90
80
70
60
50
40
30
20
10
6000
6100
6200
6300
6400
6500
6600
6700
6800

Research has shown that taking the children outside the classroom and by focusing on hands-on activities, the children's academic performance increases in every discipline.

Report from the "Closing the Achievement Gap" educational research project – Using the Environment as an Integrating Context for Learning (1998)