

# Exploring Woodland in Cheung Chau (1 day)



Student Name : \_\_\_\_\_

Group no. : \_\_\_\_\_

Course Date : \_\_\_\_\_

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## Relevance to the DSE geography curriculum :

Disappearing Green Canopy – Who should pay for the massive deforestation in rainforest regions?

- Knowledge:
- To understand the characteristics of abiotic and biotic components of a woodland ecosystem
  - To understand the structure of woodland and the characteristics of woody plants in woodland
- Skills:
- To collect data of vegetation and soil
  - To compare and analyze primary data
- Attitude:
- To cherish the interdependence of human and natural environment
  - To nurture students' concern of the tropical rainforest and awareness of the importance of protection of tropical rainforest on safeguarding national ecological security

## Prior knowledge

Please write down the biotic and abiotic components in the woodland ecosystem.

Biotic components	Abiotic components

### What is the nutrient cycling in woodland systems?

Refer to the module of “Disappearing Green Canopy” in the textbook and study Figure 1. Choose the letters from dotted boxes and put into suitable boxes in Figure 1.

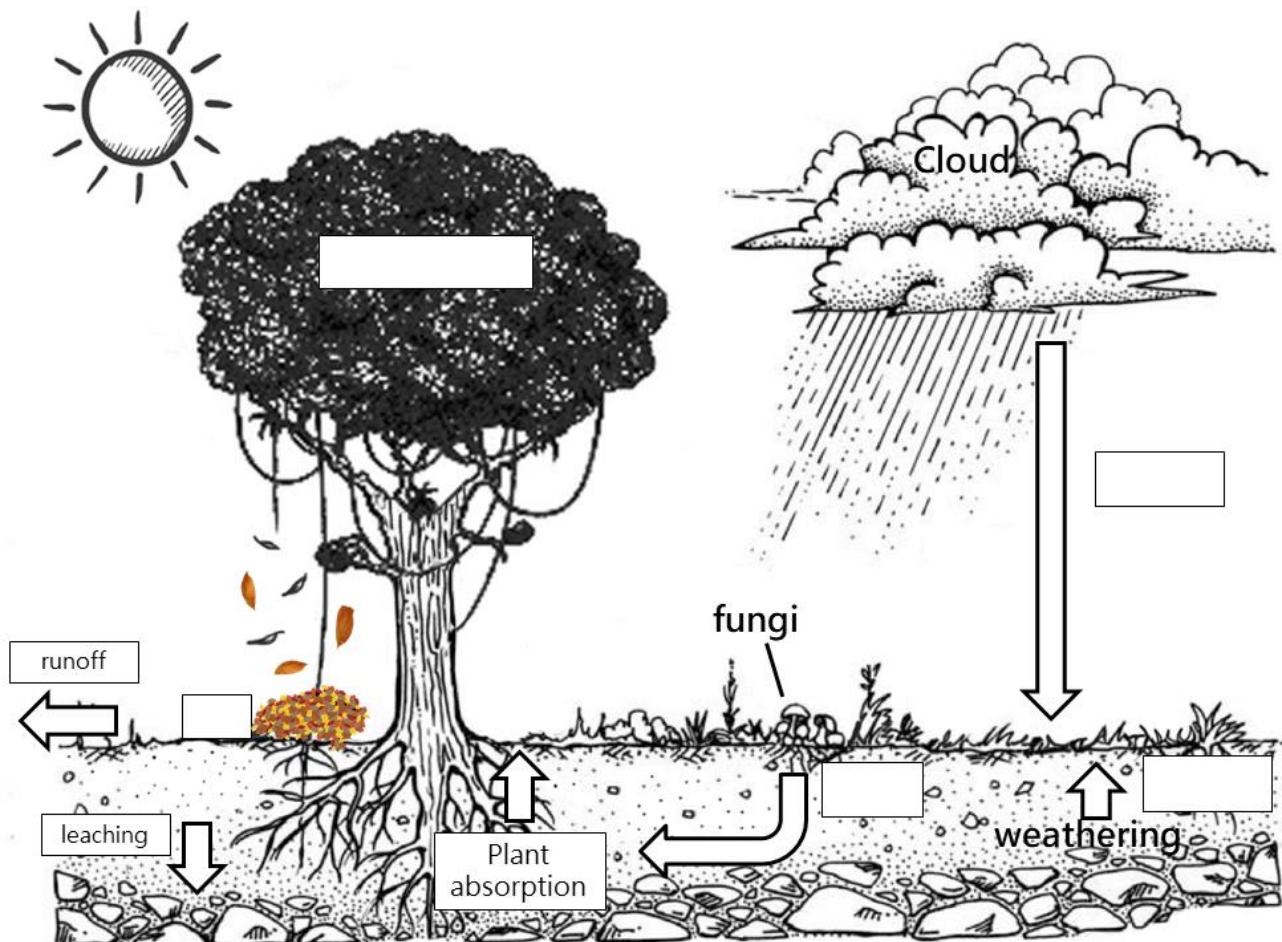


Figure 1 Nutrient cycle in a woodland

**A. Biomass    B. Soil    C. Litter    D. Rainfall    E. Decomposition**

## Stage 1 : Planning and preparation

- **Key point of fieldwork:** Linkages of abiotic and biotic components of woodland ecosystem, the structure of woodland and the characteristics of woody plants in woodland.

### To set the enquiry question

- Relationship between vegetation and soil in a woodland ecosystem.

Hypothesis:

- The higher the canopy density, the higher / lower the soil moisture.
- The higher the canopy density, the higher / lower the soil fertility.
- The higher the light intensity, the higher / lower the undergrowth cover.



- Compare the structure and the characteristics of woodland and the tropical rainforest.

### When to collect data?

Date: \_\_\_\_\_ Time: \_\_\_\_\_ to \_\_\_\_\_

Cloud cover: clear sky / few clouds / scattered clouds / overcast sky

Weather warning and signals within last 2 days:

- Strong Monsoon Signal     Rainstorm Warnings  
 Tropical Cyclone Warning Signals     Thunderstorm warning

Precipitation within last 2 days: heavy rain / drizzle / never rain

What factors do you consider when selecting fieldwork date?

Is today an ideal day for conducting woodland field trip?

Why?

### Where to collect data?

Field site of today: \_\_\_\_\_

Referring to the map on p.15, is it an ideal place to visit?

What factors do you consider when selecting field sites?

Which sampling method is used if students set up data collection locations as follows? (Referring to the sampling method on p.14)

- The position closest to the woodland entrance was taken as the data collection.

A sampling plot was set every 4 m along the transect, and each group collected data in a different sampling plot.

Within the sampling area, select one of the most representative locations as the sampling point.

To learn more...



## What data to collect?

Refer to the information on p.4, match the following research items with the appropriate primary data collection method and the equipment.

Primary data collection methods (details on p.13):

		A. Observation		B. Measurement		C. Counting		D. Category		E. Distribution (mapping)		F. Scoring		G. Field sketching		H. Questionnaire		I. In-depth Interview		
		Research items		Primary data collection methods (You may choose more than one options)		Equipment (refer to p.4)		Operational precautions												
Vegetation	Tree	Tree height																		
		Crown width																		
		Circumference of tree trunk																		
		Canopy density																		
		Other characteristics of woody plants: root/ leaves/ climbers																		
	Shrub	Shrub height																		
	Undergrowth	Undergrowth cover																		
		Vertical stratification																		
Soil	Soil moisture																			
	Soil fertility																			
	Soil texture																			
Environment	Light intensity																			

To learn more...

When choosing an equipment/tool for data collection, you would consider...



## Equipment and materials

Item	Photo	Quantity (each group)	Item	Photo	Quantity (each group)
1. measuring tape (50m)		1 (share)	8. soil moisture meter		1 (share)
2. measuring tape (30m)		1	9. soil NPK meter		1 (share)
3. grid quadrat		1	10. deionized water		1
4. rope (4m)		2	11. trowel		1
5. Abney level		1	12. soil sample bottle		1
6. light meter		1	13. gloves		1
7. densiometer		1	14. clipboard		1

## Stage 2 : Data collection

Group no: \_\_\_\_\_

Transect section (circle where appropriate)

0-4m / 4-8 m / 8-12 m / 12-16 m / 16-20 m / 20-24 m / 24-28 m / 28-32 m / 32-36 m / 36-40 m / 40-44 m / 44-48 m

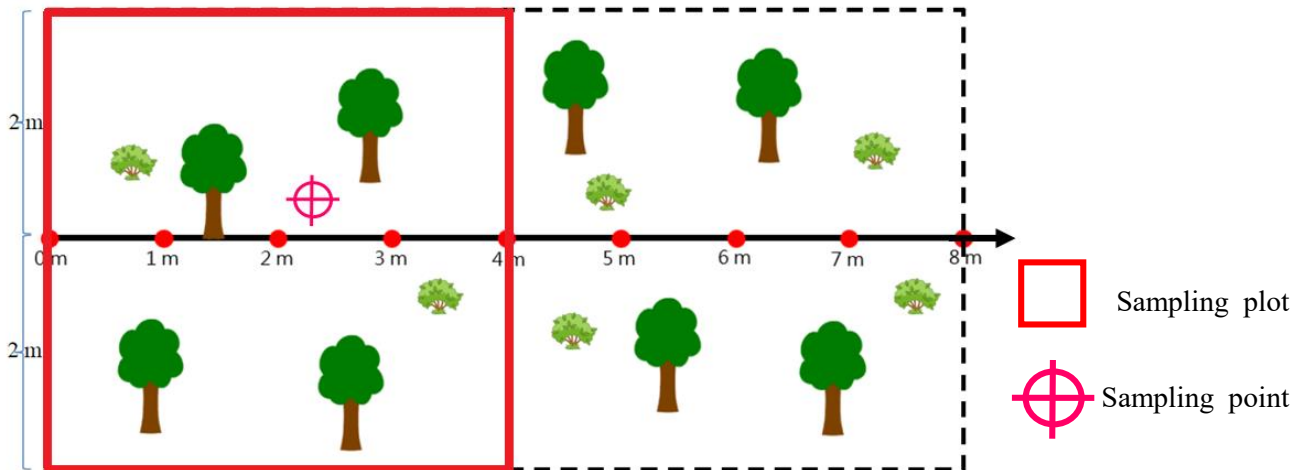


Figure 2 Sampling plot and sampling point

### Part 1 : Work of sampling plot

Within the sample plot, carry out the following work and record it on the data record sheet (p.17):

- Select **a representative tree** for the following measurements:
  - a) Tree height
  - b) Crown width of the tree
  - c) Circumference of the tree trunk
- Select **a representative shrub** for height measurement.
- Observe and identify the characteristics of woody plants.

### Part 2 : Work of sampling point

First, select the most representative location of canopy density to set up a sample point.

Then, conduct the following works and record them on the data record sheet (p. 18)

- Measure the light intensity.
- Measure the canopy density.
- Observe and count the undergrowth cover.
- Measure the soil moisture.
- Collect soil samples to measure soil fertility and determine soil texture.

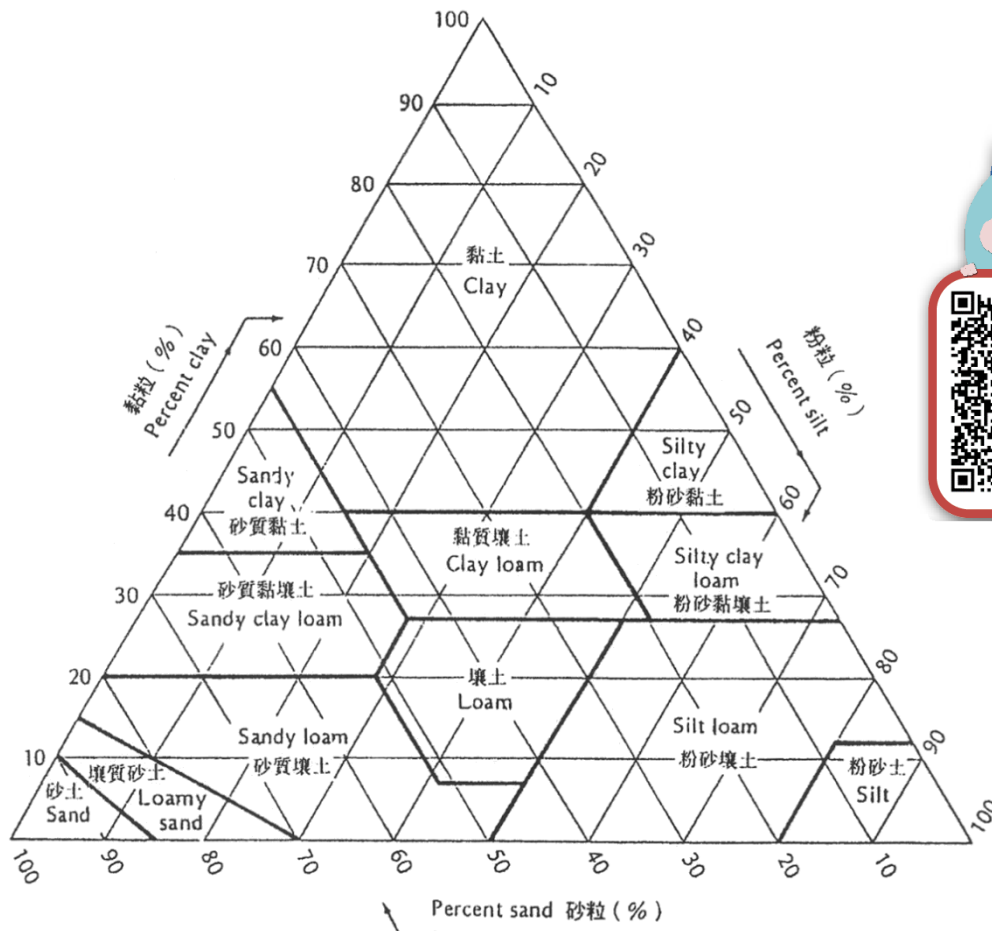
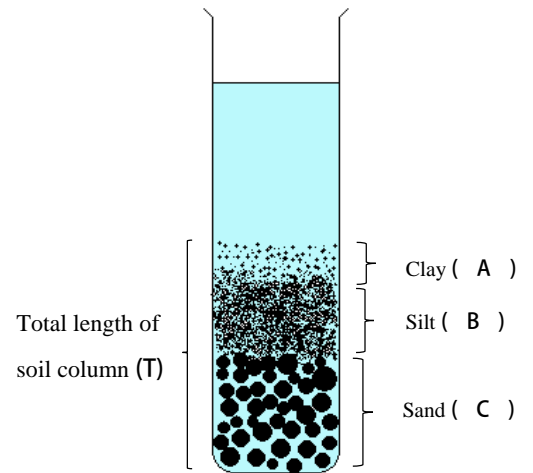


## Experimental part: soil fertility and soil texture

- Use appropriate instruments/tools to find out soil fertility and record the results on the data record sheet (p.18).
- Use the sedimentation method and feel test to find out the soil texture, and record the results on the data record sheet (p. 18).

Soil sedimentation method: according to the lab result, draw the picture below and find out the soil texture.

Item	Result
Total length of soil column (cm)	[ T ]
Length of clay column (cm)	[ A ]
Length of silt column (cm)	[ B ]
Length of sand column (cm)	[ C ]
Percentage of clay (%)	$[(A / T) \times 100 \ %]$
Percentage of silt (%)	$[(B / T) \times 100 \ %]$
Percentage of sand (%)	$[(C / T) \times 100 \ %]$
<b>Soil texture (find according to the below graph)</b>	



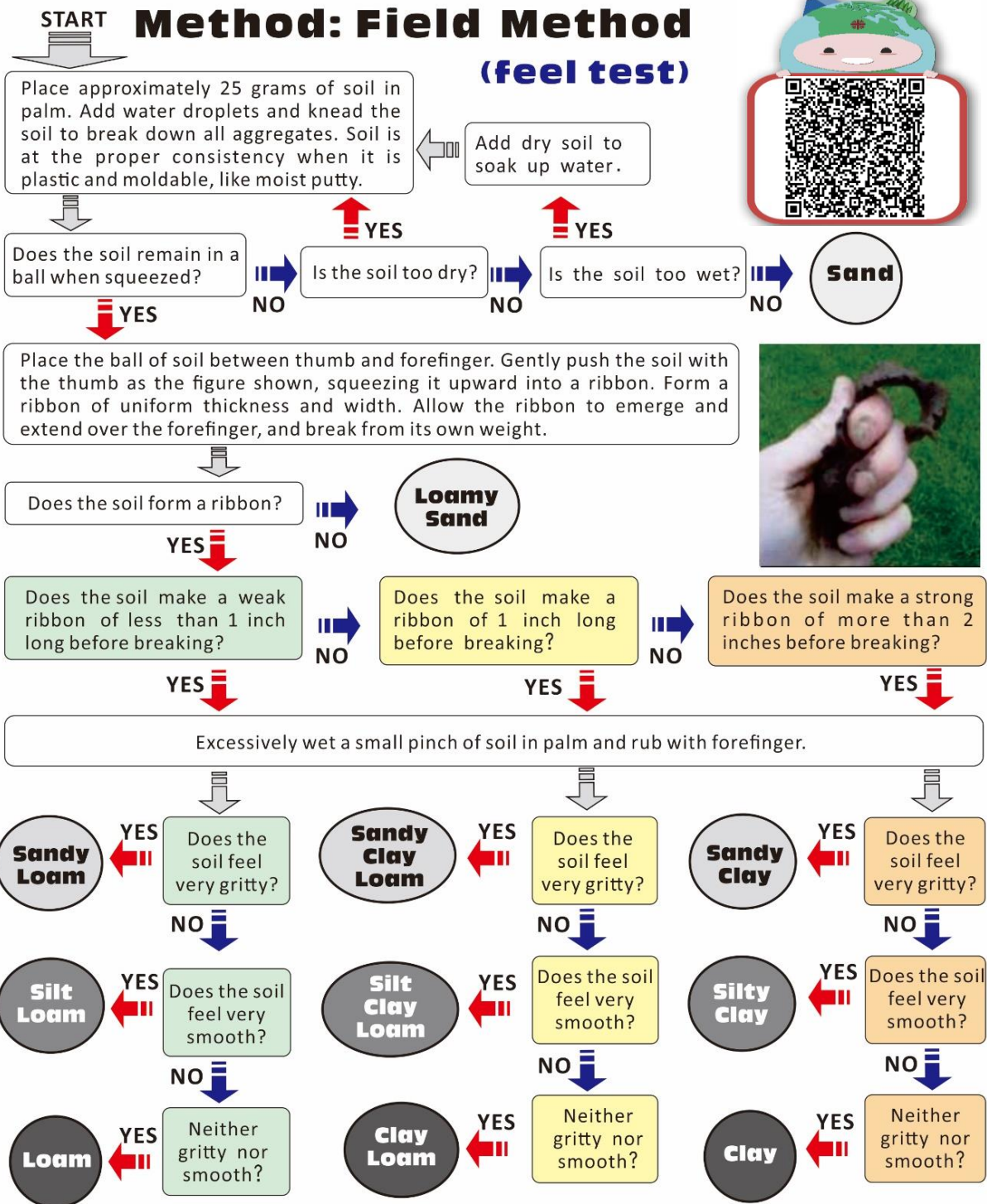
To learn more...



Figure 3 Soil texture triangular graph

Find out the soil texture of the sample according to the steps of feel test in the figure below, and record the results on the data record sheet (p.18).

# LABWORK SOIL TEXTURE



United States Department of Agriculture Natural Resource Conservation Service Program Aid Number 1619 "Estimating Soil Moisture by Feel and Appearance." April 1998, reprinted June 2005

Figure 4 Steps of feel test



### Stage 3 : Data processing and presentation

Collect and integrate the data of each group and fill in the table below.

Group no.		1	2	3	4	5	6	7	8
Location of sampling point (m)		_____m	_____m	_____m	_____m	_____m	_____m	_____m	_____m
Canopy density (%)									
Light intensity (Lux)									
Undergrowth cover (%)									
Soil moisture (%)									
Soil fertility	Available N (ppm)								
	Available P (ppm)								
	Available K (ppm)								
	Total (ppm)								

What diagram can show the following situations? Write the name of diagram in the space provided.

Situations	Name of diagram
Example 1: Change of soil moisture along the transect.	
Example 2: Compare the light intensity in different sampling point.	
The relationship between two variables (e.g. canopy density and soil fertility)	

Integrate the collected vegetation data (p.18-19), and compare the structure and woody plant characteristics of the studied woodland and tropical rainforest.

		Studied woodland (Hong Kong)	Tropical rainforest
Tree (incl. emergent, canopy & understorey)	Tree height		Emergent layer: 50m or above Canopy layer : 20-35 m Understorey layer: 10-20 m
	Crown width		13-22 m
	Circumference of tree trunk		140 cm
Shrub layer	Shrub height		Less than 5 m
Undergrowth	Undergrowth cover		Sparse vegetation; low

## Stage 4 : Interpretation and conclusion

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Is your hypothesis valid or not? Explain the reasons with reference to the data collected. Explain any other factors which might support your conclusion.

Hypothesis 1 :  valid       Invalid

The higher the canopy density, the **higher** / **lower** the soil moisture.

Explanations :

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Hypothesis 2 :  valid       Invalid

The higher the canopy density, the **higher** / **lower** the soil fertility.

Explanations :

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Hypothesis 3 :  valid       Invalid

The higher the light intensity, the **higher** / **lower** the undergrowth cover.

Explanations :

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## Stage 5: Evaluation

Factors affecting the data reliability and validity		Suggestion for improvement
<b>Fieldwork date/ time</b> <ul style="list-style-type: none"> <li>◆ Fieldwork date and time representative?</li> <li>◆ Any impact by today's weather condition?</li> </ul>		
<b>Field site/ study area</b> <ul style="list-style-type: none"> <li>◆ Field sites match with research topic?</li> <li>◆ Field study area adequate?</li> </ul>		
<b>Location of data collection (Sampling)</b> <ul style="list-style-type: none"> <li>◆ Sampling method in choosing field site appropriate?</li> <li>◆ Location of measurement representative?</li> <li>◆ Sample size sufficient?</li> </ul>		
<b>Data collection items/ methods</b> <ul style="list-style-type: none"> <li>◆ Data collection items adequate to respond the enquiry questions?</li> <li>◆ Are the data obtained from the data collection method(s) objective and without bias?</li> <li>◆ Any inadequacy about the equipment/ instruments?</li> <li>◆ Measurer using the equipment/ instruments correctly?</li> </ul>		

## My Field Trip Diary

- Related modules: Disappearing Green Canopy
- Key point of fieldwork/topic: To study the relationships between vegetation and soil in a woodland ecosystem/ To investigate the structure and the characteristics of plants of a woodland.

▪ Date: _____ ( Weekday/ Public holiday ) ▪ Time: _____	▪ Weather condition: ▪ Field site: _____
Is the above planning appropriate for the fieldwork?  <div style="border: 1px solid black; height: 40px; width: 100%;"></div>	

- Primary data:

Data collection method	Data collected	Equipment/ Material (if any)	Merit☺/ Limitation☹ of the data collection method (give examples)	Suggestion for improvement (give explanations)

➤ Secondary data:

Data collected	Use	Data obtained from
Apart from the above, what other secondary data could be used for further investigation?		

➤ Sampling method (if any):

Sampling method	Applied in the following	Merits☺/ Demerits☹

➤ Data processing and presentation:

Type of graph/ chart	Content shown and function of graph/chart	Merits☺/ Demerits☹

➤ For deeper learning or further study, I suggest modify the following aspects.

		Suggestion (give examples)
<input type="checkbox"/>	Key point of fieldwork/ topic	
<input type="checkbox"/>	Data to be collected and method of data collection	
<input type="checkbox"/>	Date and time of fieldwork	
<input type="checkbox"/>	Field site	

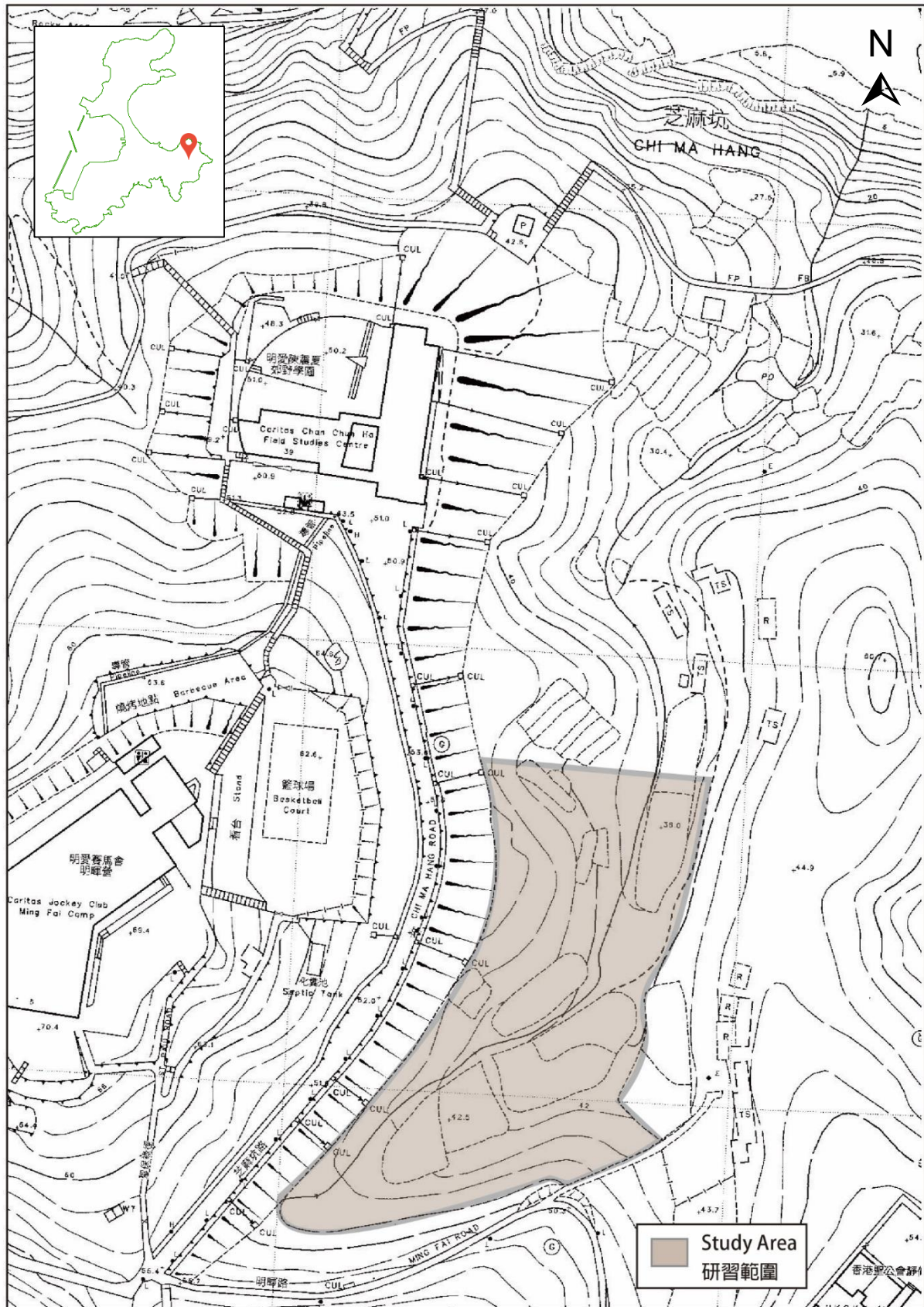
## Primary data collection methods

Data collection methods	Explanations		Examples
<b>A) Observation</b>	<ul style="list-style-type: none"> <li>Using sensory observation to explore the details of research subject (people, things or environment) in a purposive and planned way. Data are recorded using text, photos, sketch, map, etc. (Refer to other data collection methods listed below)</li> </ul>		<ul style="list-style-type: none"> <li>Identification of the surrounding environment of a field site</li> </ul>
<b>B) Measurement</b>	<ul style="list-style-type: none"> <li>To estimate or measure the physical quantity of the research subject. It usually requires the use of equipment or tools. Data are usually shown in certain standard, weights or measures.</li> </ul>		<ul style="list-style-type: none"> <li>Measurement of the width of street and the building height</li> </ul>
<b>C) Counting</b>	<ul style="list-style-type: none"> <li>To record the number of occurrence of a single item.</li> </ul>		<ul style="list-style-type: none"> <li>Statistics of pedestrian flow at the pier</li> </ul>
<b>D) Category</b>	<ul style="list-style-type: none"> <li>To classify based on the nature, characteristics and uses:               <ul style="list-style-type: none"> <li>to group the same or similar things;</li> <li>to separate different things.</li> </ul> </li> </ul>		<ul style="list-style-type: none"> <li>Types of goods sold in supermarket</li> <li>Customers (serving local residents and tourists) of different shops</li> </ul>
<b>E) Distribution (mapping)</b>	<ul style="list-style-type: none"> <li>To group similar things according to the research topic (similar to “D. Category”);</li> <li>Only suitable for spatial representation (different from category);</li> <li>Useful in showing the mode of occurrence of research subject in a complex environment.</li> </ul>		<ul style="list-style-type: none"> <li>Distribution of shops selling big fish balls in Cheung Chau</li> </ul>
<b>F) Scoring</b>	<ul style="list-style-type: none"> <li>To quantify abstract or subjective concepts;</li> <li>To merge various data for easy comparison;</li> <li>Scoring items should include different aspects.</li> </ul>		<ul style="list-style-type: none"> <li>Risk index of natural hazards of Cheung Chau</li> <li>Air Quality Health Index (AQHI)</li> </ul>
<b>G) Field sketching</b>	<ul style="list-style-type: none"> <li>To make simplified drawing of the field site to show what the data collectors observed. Annotations related to the research subject are added to provide key feature or additional information.</li> </ul>		<ul style="list-style-type: none"> <li>Draw the characteristics and formation of weathering landforms</li> </ul>
<b>H) Questionnaire</b>	<ul style="list-style-type: none"> <li>Forms: face-to-face, telephone, written, etc.;</li> <li>Using questionnaire to understand the opinion of research subject;</li> <li>Larger sample size than “I. in-depth interview”;</li> <li>Mainly closed questions (with options available).</li> </ul>	<ul style="list-style-type: none"> <li>To collect information by questioning;</li> <li>To obtain information which is difficult to be obtained through observations;</li> <li>To understand the rationales and opinions of interviewees.</li> </ul>	<ul style="list-style-type: none"> <li>The main reasons for tourists to visit Cheung Chau</li> <li>The level of satisfaction among residents regarding a revitalization project</li> </ul>
<b>I) In-depth Interview</b>	<ul style="list-style-type: none"> <li>To obtain information through face-to-face/ telephone interview;</li> <li>Smaller sample size than “H. Questionnaire”;</li> <li>Mainly open questions and forthcoming questions will change upon the answer of respondents.</li> </ul>		<ul style="list-style-type: none"> <li>Opinions of District Council members on the future development of that district</li> </ul>

## Sampling Methods

<b>Probabilistic sampling methods</b> ➤ Need to know the size of population; ➤ Few differences among individuals; ➤ Individual has equal chance of being selected; ➤ Representativeness of data depends on sampling percentage.				<b>Non-probabilistic sampling methods</b> ➤ Size of population might not be relevant to the research objective; ➤ Chance of individual being selected is unknown; ➤ Representativeness of the results depends on the judgment of researcher in sample selection (Such as the correlation between samples and research targets).		
Sampling methods	<b>Simple random sampling</b> (簡單隨機抽樣)	<b>Systematic sampling</b> (系統抽樣)	<b>Stratified sampling</b> (分層抽樣)	<b>Quota sampling</b> (配額抽樣/ 定額抽樣)	<b>Convenience sampling</b> (便利抽樣/ 方便抽樣)	<b>Purposive sampling</b> (立意抽樣)
<b>Explanations</b>	To select sample from the <b>whole population randomly</b> . (using computer program, bamboo slip or random number table)	Each member of the whole population is sequentially numbered, then selected according to a <b>fixed, periodic interval</b> .	The whole population are classified according to the variable and divided into separate stratum. Then samples are selected randomly by proportion from each stratum.	The whole population are classified according to the variable and divided into separate stratum. Then desired number (quota) of samples are selected from each stratum.	Research subjects are selected due to convenience of recruitment.	Samples are selected according to research objectives and special requirements.
<b>Examples</b>	To choose a certain number of students to conduct questionnaires/ surveys according to the class number.	To measure the noise level of a street in a regular interval.	To group buildings according to their ages (e.g. above or below 50), and select a certain number of buildings in each group randomly.	To select a certain number of male and female customers, then record the amount spent in a shop.	To interview a certain number of relatives who work in mainland China To interview a certain number of passersby on the street	To conduct an in-depth interview with a district councilor about the social problems of that district.
<b>Remarks</b>	Suitable for small population and few variations among samples (for relevant research objectives).	Suitable for large population (hidden cyclic ordering which may affect the representativeness of data).	Effectively show the relationship / effect between variables.	Effectively show the relationship / effect of variables, but the characteristics and size of samples are judged subjectively.	Should not generalize the data to larger population	Suitable for qualitative research (data is easily influenced by the subjective judgment of researcher)

# Fieldsite of woodland in Cheung Chau





# Exploring Woodland in Cheung Chau

Group no. \_\_\_\_\_

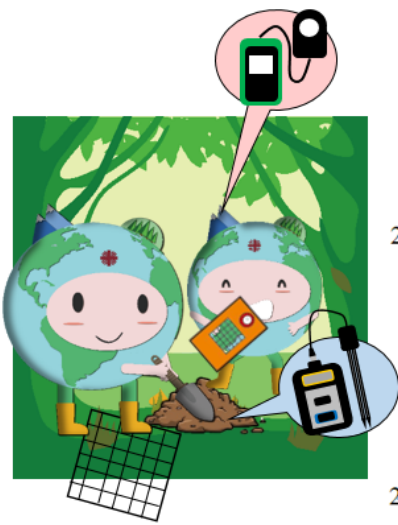
## Data record sheet

Date: \_\_\_\_\_ Time: \_\_\_\_\_ Weather: sunny/ cloudy / rainy / windy

Transect section: \_\_\_\_\_ m to \_\_\_\_\_ m

Environmental features : \_\_\_\_\_

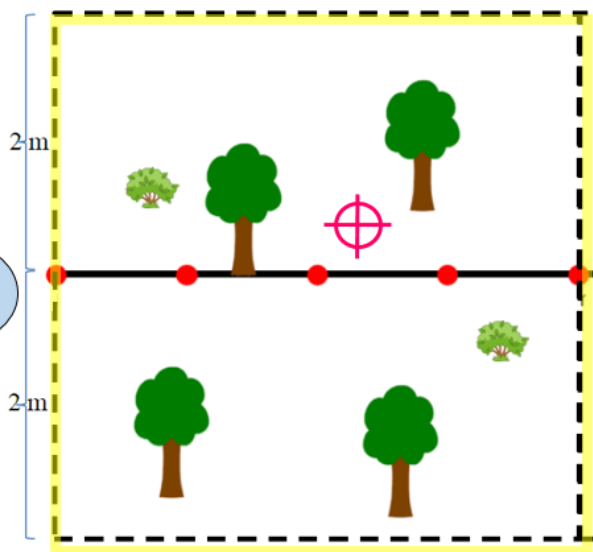
### Work allocation



#### Part 2: Sampling point

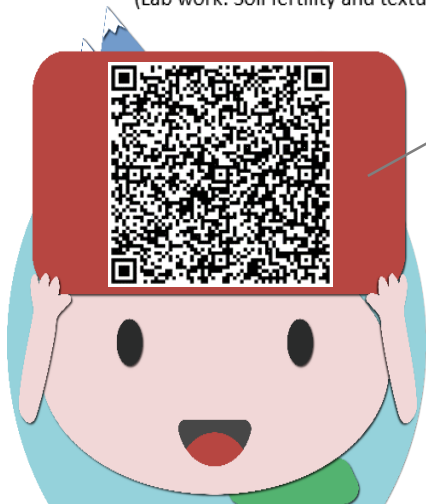
- 1)  Light intensity
- 2)  Canopy density
- 3)  Undergrowth cover
- 4)  Soil moisture
- 5)  Collect soil sample

(Lab work: Soil fertility and texture test)



#### Part 1: Sampling plot

- 1)  Tree height
- 2)  Crown width
- 3)  Circumference of tree trunk
- 4)  Shrub height
- 5)  Characteristics of woody plants



How to use Abney level?

How to use densiometer?



## Part 1: Sampling plot

Group no. \_\_\_\_\_

Tree (Select ONE representative tree)

Tree height	Horizontal distance between observer and the tree [ D ]	m	
	Elevation angle of the Abney level [ $\alpha$ ]	°	
	$D \tan \alpha$ [ H1 ]	m	
	Height from eye level of observer to ground [ H2 ]	m	
	<b>Tree height</b> [ H1+H2 ]	m	
Crown width	m		
Circumference of tree trunk	cm		

Shrub (Select ONE representative Shrub)

Shrub height	cm	
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### Other characteristic of woody plants

Within sampling plot, observe and record the following woody plant characteristics.

	Characteristics of plants	Rough amount (tick where appropriate)		
Tree crown	Umbrella-shaped crowns	<input type="checkbox"/> None	<input type="checkbox"/> Few	<input type="checkbox"/> Many
	Oval-shaped crowns	<input type="checkbox"/> None	<input type="checkbox"/> Few	<input type="checkbox"/> Many
Leaves	Drip-tips	<input type="checkbox"/> None	<input type="checkbox"/> Few	<input type="checkbox"/> Many
	Broad leaves	<input type="checkbox"/> None	<input type="checkbox"/> Few	<input type="checkbox"/> Many
	Waxy leaf surface	<input type="checkbox"/> None	<input type="checkbox"/> Few	<input type="checkbox"/> Many
Trunk	Straight trunks	<input type="checkbox"/> None	<input type="checkbox"/> Few	<input type="checkbox"/> Many
Roots	Buttress roots	<input type="checkbox"/> None	<input type="checkbox"/> Few	<input type="checkbox"/> Many
Stem and bark	Stem flowers/ cauliflory	<input type="checkbox"/> None	<input type="checkbox"/> Few	<input type="checkbox"/> Many
	Thin and smooth bark	<input type="checkbox"/> None	<input type="checkbox"/> Few	<input type="checkbox"/> Many
Other	Climbers	<input type="checkbox"/> None	<input type="checkbox"/> Few	<input type="checkbox"/> Many
	Stranglers	<input type="checkbox"/> None	<input type="checkbox"/> Few	<input type="checkbox"/> Many
	Fern/ shade-tolerant plants	<input type="checkbox"/> None	<input type="checkbox"/> Few	<input type="checkbox"/> Many
	Mosses and lichen	<input type="checkbox"/> None	<input type="checkbox"/> Few	<input type="checkbox"/> Many

