



# Terrestrial Habitat



---

School Name

Student Name

Group

---

Site

Date

Time

Recent Weather  
Conditions

# INTRODUCTION

## Background

Because of its great complexity and biodiversity, woodland is a relatively mature terrestrial ecosystem compared with other habitats such as grassland and scrubland. For a woodland, several levels of stratification are observed, starting from the ground level, the undergrowth, the shrub layer and finally the canopy layer. However, woodlands in Hong Kong have been suffering from human disturbance for a long time. Since most of them are secondary forests or plantations, stratification is not obvious with low complexity and biodiversity. Therefore, they are not as ecologically valuable as primary forests.

Many symbiotic relationships can be found in woodland. Trees provide various microhabitats (tree holes, tree barks, litters, etc.) for other animals and plants. At the same time, the species also suffer keen competition for different resources. Please pay special attention to the ecological role of different plants and animals in such a complex environment.

## Aims and Objectives

- To appreciate the wonders of the living world.
- To familiarize different techniques to carry out ecological study in woodland.
- To observe, compare and contrast the ecology among different tree species.

## Equipment

### For plant and animal sampling

<input type="checkbox"/> Insect net	x1
<input type="checkbox"/> Clip board	x1
<input type="checkbox"/> Gloves	x1 Pair
<input type="checkbox"/> Quadrat	x1
<input type="checkbox"/> Plastic bag	x2
<input type="checkbox"/> Plastic basket	x1
<input type="checkbox"/> Plastic box	x1
<input type="checkbox"/> Plastic vial	x6
<input type="checkbox"/> Brush	x2
<input type="checkbox"/> Woodland identification kit	x1
<input type="checkbox"/> Grassland identification kit	x1

### For measurement of physical factors

<input type="checkbox"/> Anemometer	x1
<input type="checkbox"/> Compass	x1
<input type="checkbox"/> Hydrothermometer	x1
<input type="checkbox"/> Light meter	x1
<input type="checkbox"/> Measuring tape [20m]	x1
<input type="checkbox"/> Number cards	x1 Set
<input type="checkbox"/> Soil thermometer	x1
<input type="checkbox"/> Trowel	x1

## Remarks

- No smoking is allowed at the site.
- Put on long-sleeved shirts, jeans and hats with wide brim.
- Never climb up trees.
- Do not reach into holes.
- Dead specimen of vertebrates should not be collected or closely examined.
- Be careful upon handling those spiny plants and the animals which may bite.
- Never ingest any parts of wild plants.
- Never pollute/damage the environment in all sense. Minimize trampling.
- Behave yourselves, and avoid disturbance to the local people.
- Team leader should organize members to work in a serious and efficient way. Members should co-operate with the leader.

Since time is limited, you should work efficiently. If you do have extra time, you are highly recommended to carry out your own investigations, provided that it is safe to do so.

## FIELD WORK

## 1

## Site Profile


Select a 10m x 10m field area, and draw a sketch map (top view) of the field site and surrounding area on [Figure 1](#), indicating:

- Your position in the study site (with a compass)
- Locations of main road, pathways, boulders, trees, walls, buildings etc.
- Microhabitats ([Table 3](#))
- Other particulars of interest

★ In order to proceed the sampling and measurement works at the same time, divide your group into 2 teams. One is responsible for biotic investigation while the other is to take abiotic measurements. However it is more important to understand the whole picture, so try to get involved in the work of your partners.

## 2

## Study of Plants

Select 5 woody plants (  8 woody plants) within the site and mark on the site profile. Hang the number cards on the correspondence plant trunks. For each plant,

- make identification,
- measure its height, the trunk girth and crown width,
- Identify and record other plant groups, such as climbers and lichens.


(Mark the data in [Table 2](#))

★ To protect our wildlife and environment, do not collect unnecessary specimen, put minimal disturbance and keep on your path.

★ Never remove the plants attaching firmly on the barks.

## 3

## Data collection and sampling with quadrat

Place the 0.5m x 0.5m quadrat on a representative area in grassland and woodland respectively (  Place the quadrats twice in each habitat), make the location of the quadrat on the site profile. Then,

- Measure the temperature, relative humidity, wind speed and light intensity, then record them in the [Table 1](#).
- Collect all the leaf litter within the quadrat with a plastic bag.
- Collect soil sample with a large vial inside the quadrat.
- Repeat the step **A - C** in grassland and fill in [Table 1](#).

★ Wear cotton gloves to protect your hands.

## 4

## Microhabitat Sampling

- Locate at least 3 microhabitats and mark them in your site profile.
- Measure and collect the related data and record them in [Table 3](#).
- With nets and pooter, catch animals at different microhabitats inside the study area and identify them with the keys provided. Observe any damages on leaves by animals.

★ Pay attention to the microhabitats.  
★ Never disturb any animal nests.

## LABORATORY WORK

## Equipment

<input type="checkbox"/> 100ml Measuring cylinder	x1	<input type="checkbox"/> Glass rod	x1	<input type="checkbox"/> Stereomicroscope	x1
<input type="checkbox"/> Plastic tray	x2	<input type="checkbox"/> Petri dish	x3	<input type="checkbox"/> Brush	x2
<input type="checkbox"/> Evaporating dish	x1	<input type="checkbox"/> pH paper	x1	<input type="checkbox"/> Funnel	x1
<input type="checkbox"/> Balance	x1	<input type="checkbox"/> Sealing film	x1	<input type="checkbox"/> Oven	(Share)
<input type="checkbox"/> Spatula	x1	<input type="checkbox"/> Ruler	x1	<input type="checkbox"/> Crucible tong	(Share)
<input type="checkbox"/> Wash bottle (Deionized water)	x1	<input type="checkbox"/> Water	x1	<input type="checkbox"/> Heat resistant gloves	(Share)

★ Apparatus are pricey, and please use them with care. Please advise technicians if needed.

★ Pour used soil sample in specified water buckets

## 5

## Soil Analysis

## 5.1. Soil water content

Weigh about 30g (🏠 50g) fresh soil sample ( $M_1$ ). Use a spatula to transfer it into an evaporating dish and place it in an oven at 105°C. Take it out after at least half an hour, cool it down and reweigh the soil ( $M_2$ ). Fill in the [Table 4](#) and calculate the soil water content.

$$\text{Soil water content (\%)} = \left[ \frac{(M_1 - M_2)}{M_1} \right] \times 100\%$$

## 5.2. Soil texture analysis

Place 60ml fresh soil into the 100ml measuring cylinder and add water up to more than 100ml. After sealing with the sealing film, mix the content gently and let it settle.

In terms of volume,

$$\% \text{ of sand} = \left[ \frac{\text{Height of sand component (>0.02mm)}}{\text{Total soil height}} \right] \times 100\%$$

$$\% \text{ of silt} = \left[ \frac{\text{Height of silt component (0.002–0.02mm)}}{\text{Total soil height}} \right] \times 100\%$$

$$\% \text{ of clay} = \left[ \frac{\text{Height of clay component (<0.02mm)}}{\text{Total soil height}} \right] \times 100\%$$

Determine the soil texture with the triangular soil diagram ([Figure 2](#)).

## 5.3. pH

Mix the soil sample and deionized water in the ratio of 1:5. Measure the pH of the soil filtrate with a pH paper and record the data in the [Table 5](#).

★ Do not count the water column and the humus layer.

★ Do not count the water column and the humus layer.

## 6

## Biological Investigation

## 6.1. Leaf litter analysis

- A. Place the leaf litter collected in a plastic tray. Measure its mass and record it in the [Table 6](#).
- B. Sort out animals with brushes and sort them into different petri dishes.

6.2. Use the reference books, photographs and the stereomicroscope provided to identify specimens collected from the field site.

## 6.3. Animal observation

- A. Identify and count the animal samples. Include your findings in the [Table 7](#).
- B. Observe any adaptive features of the animals you have collected.

★ Beware of aggressive animals hidden in the leaf litter.

★ Transfer the animals in the petri dishes specified after identification, and clean up the vials.

## SUMMARY

## Discussions and Conclusions

- ★ After pooling all information with other groups, can you draw any conclusions on our study?
- ★ Compare and contrast the abiotic factors with the tree measurement among different tree species.  
Comment on the plants and animals associated with them.
- ★ Briefly illustrate the adaptive features of the plants and animals living in the woodland.
- ★ Explain the importance of soil and leaf litters in woodland.
- ★ Compare and contrast the environment inside and outside the woodland.
- ★ Comment on the maturity of the woodland with respect to your stratification observation.
- ★ Based on the organisms collected or observed, try to construct food chains/web to show the trophic levels of these organisms.
- ★ State the limitations and drawbacks of the investigation. Suggest any improvements for further study.
- ★ Comment on the effects of human activities on the ecosystem.
- ★ Observe the litter carefully, let's think...



- What happened to the leaves after they fall?
- What kind of organisms contribute to the process you described? Can you find them?
- Is there any abiotic factors affecting the process?
- Is the soil of the woodland fertile? Why? What's the significance of litter?

## References

1. 侯智恆 (2003) 山坡 (香港野外圖鑑3) · 香港: 香港大學生態學及生物多樣性學系. 萬里機構出版有限公司
2. 許秋思 · 費嘉倫編著 · 何迪綏譯 (1989) 香港動物原色圖鑑 · 香港: 香港政府印務局
3. Hill, D.S. and Cheung W.K., (1988) Hong Kong Insects. Hong Kong: The Urban Council Hong Kong
4. 許秋思編著 · 何迪綏譯 (1992) 香港昆蟲(卷二) · 香港: 香港市政局
5. 梁海菊、朱惠玲(2005) 常見灌木叢植物(香港自然圖鑑系列4) · 香港: 野外動向有限公司
6. Thrower, S.L., (1988) Hong Kong Trees Omnibus Volume. Hong Kong: The Urban Council HK
7. Thrower, S.L., (1984) Hong Kong Shrubs Volume II. Hong Kong: The Urban Council Hong Kong
8. 杜詩雅著 · 何國英譯 (1986) 香港攀援狀植物 · 香港: 香港市政局
9. 饒戈 (2005) 蟲薈-香港昆蟲(1/2) 及 (2/2)(香港自然圖鑑系列(5及6) · 香港: 野外動向有限公司
10. Green, N.P.O., Stout, G.W. and Taylor D.J., (1984) Biological Science. New York: Cambridge University Press



# DATA SHEET

\_\_\_\_\_/\_\_\_\_\_/\_\_\_\_\_  
School Name Student Name Group

\_\_\_\_/\_\_\_\_-\_\_\_\_-\_\_\_\_/\_\_\_\_\_  
Site Date Time Recent Weather Conditions

**Figure 1. Site profile – Top view of the study**

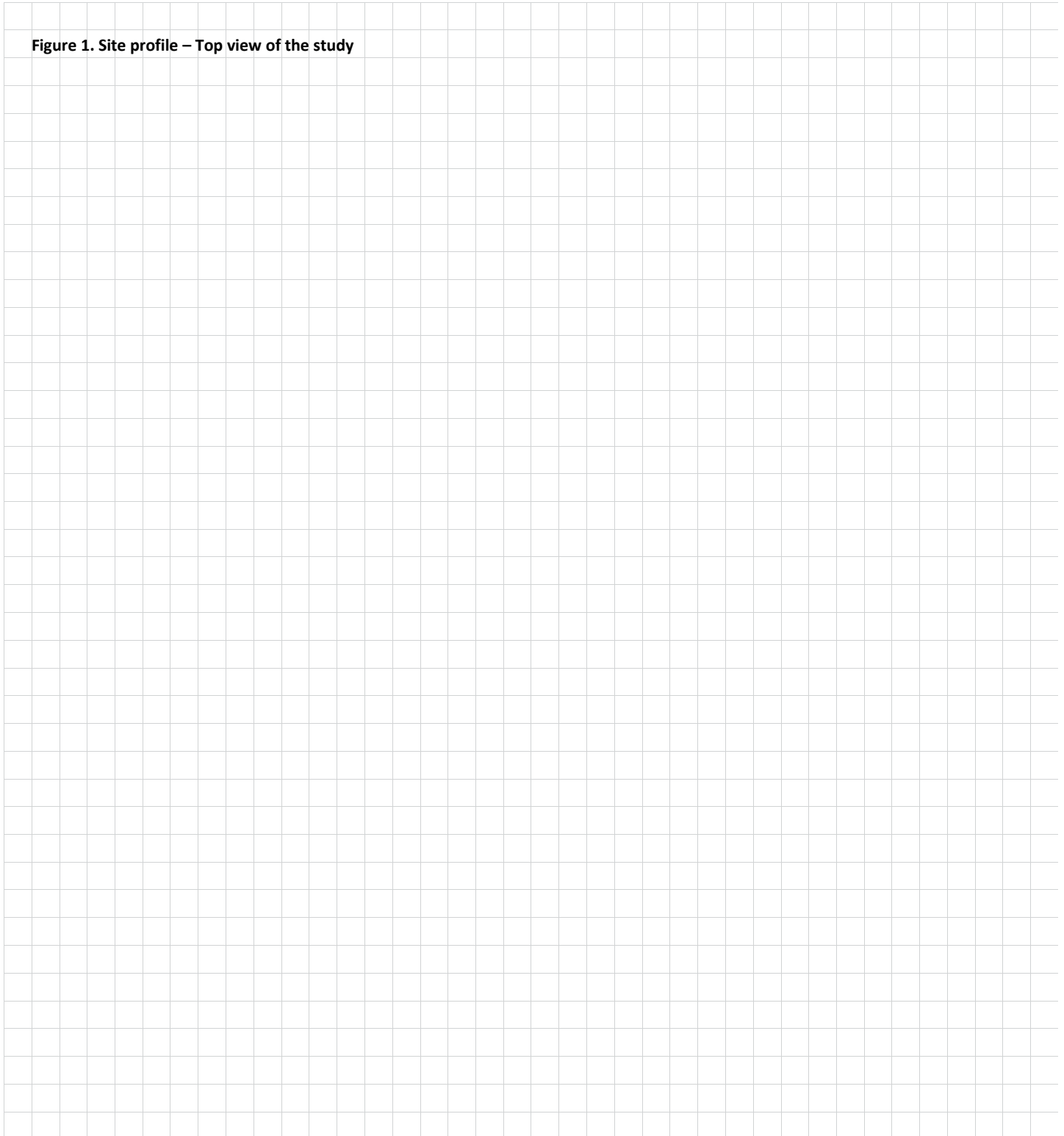


Table 1. Data of abiotic factors



	Grassland		Woodland	
	Quadrat 1	 Quadrat 2	Quadrat 1	 Quadrat 2
Air temperature (°C)				
Soil surface temperature (°C)				
Soil temperature (°C)				
Relative humidity (%)				
Wind speed (m/s)				
Wind direction				
Light intensity (lux)				

Table 2. Plant data

	Species Name	Tree Height Measurement			Trunk Girth (m)	Crown Width			Associated plant observation (✓)		
		Observer Height (m)	Ratio to Observer	Tree Height (m)		Step Interval (m)	No. of Steps	Canopy Width (m)	Climbing Plants	Lichen	Fungi
1											
2											
3											
4											
5											
6											
7											
8											



Table 3. Microhabitat animal sampling

Microhabitat	Temperature (°C)	Relative Humidity (%)	Light Intensity (lux)	Species Name	Abundance

Table 4. Soil water content calculation

Mass (g)	Grassland	Woodland
Evaporating dish		
Evaporating dish + Soil sample		
Soil sample ( $M_1$ )		
Evaporating dish + Soil sample after baking		
Soil sample after baking ( $M_2$ )		
Soil sample difference ( $M_1 - M_2$ )		
<b>Soil water content (%)</b>		

Table 5. Soil analysis

	Grassland	Woodland
<b>Soil pH</b>		
Sand (%)		
Silt (%)		
Clay (%)		
<b>Soil texture</b>		

Figure 2. Triangular soil texture diagram

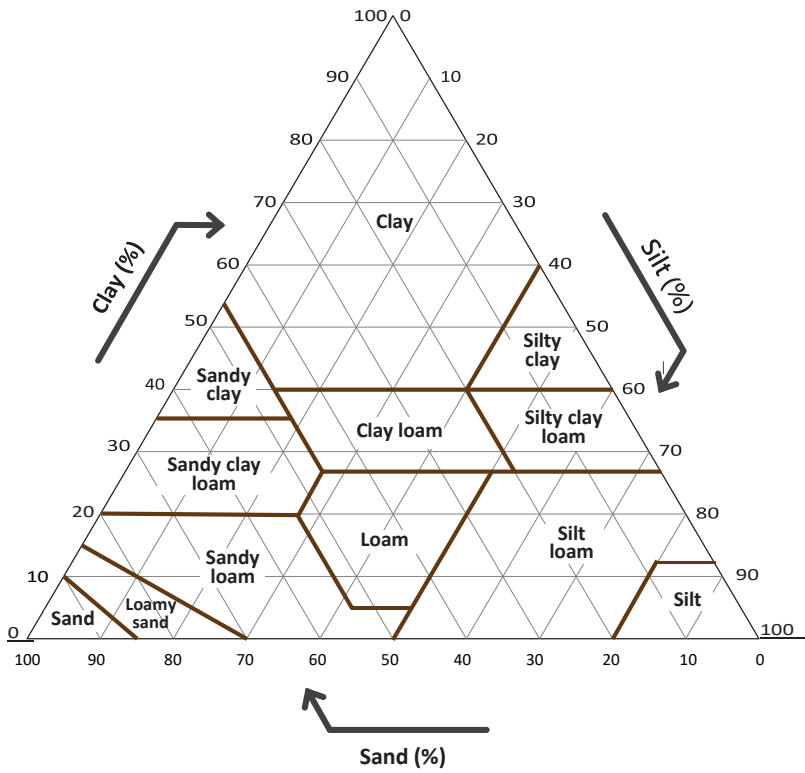


Figure 3. Reference diagram of soil water availability for plant use

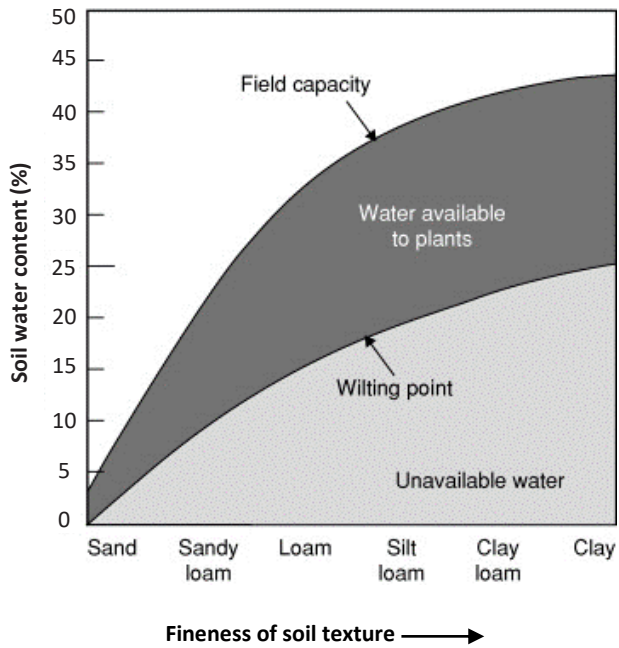


Table 6. Leaf litter analysis

	Woodland	Grassland
Litter mass (g)		
Litter density (kg/m <sup>2</sup> )		

Table 7. Animal data

Species Name	Abundance in Woodland	Abundance in Grassland	Adaptive features
Woodlouse			
Oriental Cockroach			
Others			
<b>Total abundance of animals</b>			/
<b>Species number of animals</b>			/