



Terrestrial Habitat



School Name / Student Name / Group

Site / DD-MM-YYYY / 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	x2
<input type="checkbox"/> Clip board	x1
<input type="checkbox"/> Gloves	x1 Pair
<input type="checkbox"/> Quadrat	x1
<input type="checkbox"/> Plastic bag	x3
<input type="checkbox"/> Plastic basket	x2
<input type="checkbox"/> Plastic box	x1
<input type="checkbox"/> Plastic vial	x6
<input type="checkbox"/> Brush	x2
<input type="checkbox"/> Woodland identification kit	x2
<input type="checkbox"/> Grassland identification kit	x2

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 [30m]	x1
<input type="checkbox"/> Number cards	x1 Set
<input type="checkbox"/> Soil thermometer	x1
<input type="checkbox"/> Trowel	x2

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

(Record on Figure 1)

Select a 10 m field area, and draw a sketch map (top view) of the surrounding area, indicating:

- A. Your position in the study site (with a compass)
- B. Locations of main road, pathways, boulders, trees, walls, buildings etc.
- C. Microhabitats (Table 3)
- D. 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 measurement. 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.

★ 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×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,

- A. Collect soil sample with a large vials inside the quadrat.
- B. Measure the temperature, relative humidity, wind speed and light intensity, then record them in the Table 1.
- C. Collect all the leaf litter within the quadrat with a plastic bag.
- D. Repeat the step A - C in grassland and fill in Table 1.

★ Wear cotton gloves to protect your hands.

4

Microhabitat Sampling

- A. Locate at least 3 microhabitats and mark them in your site profile.
- B. Measure and collect the related data and record them in Table 4.
- C. 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"/> 250ml Measuring cylinder x1	<input type="checkbox"/> pH Paper x1	<input type="checkbox"/> Stereomicroscope x1
<input type="checkbox"/> 100ml beaker x1	<input type="checkbox"/> Sealing film x1	<input type="checkbox"/> Brush x2
<input type="checkbox"/> Plastic tray x1	<input type="checkbox"/> Glass rod x1	<input type="checkbox"/> Oven (Share)
<input type="checkbox"/> Crucible tong x1	<input type="checkbox"/> Spatula x1	<input type="checkbox"/> Balance (Share)
<input type="checkbox"/> Dropper x1	<input type="checkbox"/> Mortar and pestle x1	<input type="checkbox"/> Heat resistant gloves (Share)
<input type="checkbox"/> Evaporating dish x1	<input type="checkbox"/> Wash bottle x1	
<input type="checkbox"/> Test tube x1	<input type="checkbox"/> Petri dishes x5	

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

★ Pour used soil sample in specified water bucket.

5

Soil Analysis

Record data on Table 4.

5.1. pH

Mix the soil sample and distill water in the ratios of 1:5, then transfer it to a tube by dropper. ( Centrifuge the tube and) Measure the pH of the soil filtrate with a pH paper.

5.2. 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 overnight. Take it out, cool it down and reweigh the soil (M_2).

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

5.3. Soil texture analysis

Place 130ml fresh soil into the 250ml measuring cylinder and add water up to about 200ml. After sealing with the sealing film, mix the content gently and let it settle overnight.

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. (Fig. 2)

★ The centrifuge must be operated by the staff. Mishandling can cause serious accident.

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

6

Biological investigation

Record data on Table 5.

Use the reference books, photographs and stereomicroscope provided to identify specimens collected from the woodland.

6.1. Leaf litter analysis

- A. Place the leaf litter collected in a plastic tray and measure its mass.
- B. Sort out animals with brushes and sort them into different Petri dishes.

6.2. Animal observation

Identify, count, and include your findings in the table of animal sampling. Observe any adaptive features of the animals you have collected.

★ Beware of aggressive animals hidden in the leaf litter.

★ Transfer the animals in the glass chamber 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

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DATA SHEET

School Name _____ / Student Name _____ / Group _____

Site _____ / Date DD-MM-YYYY _____ / Time _____ / Recent Weather Conditions _____

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

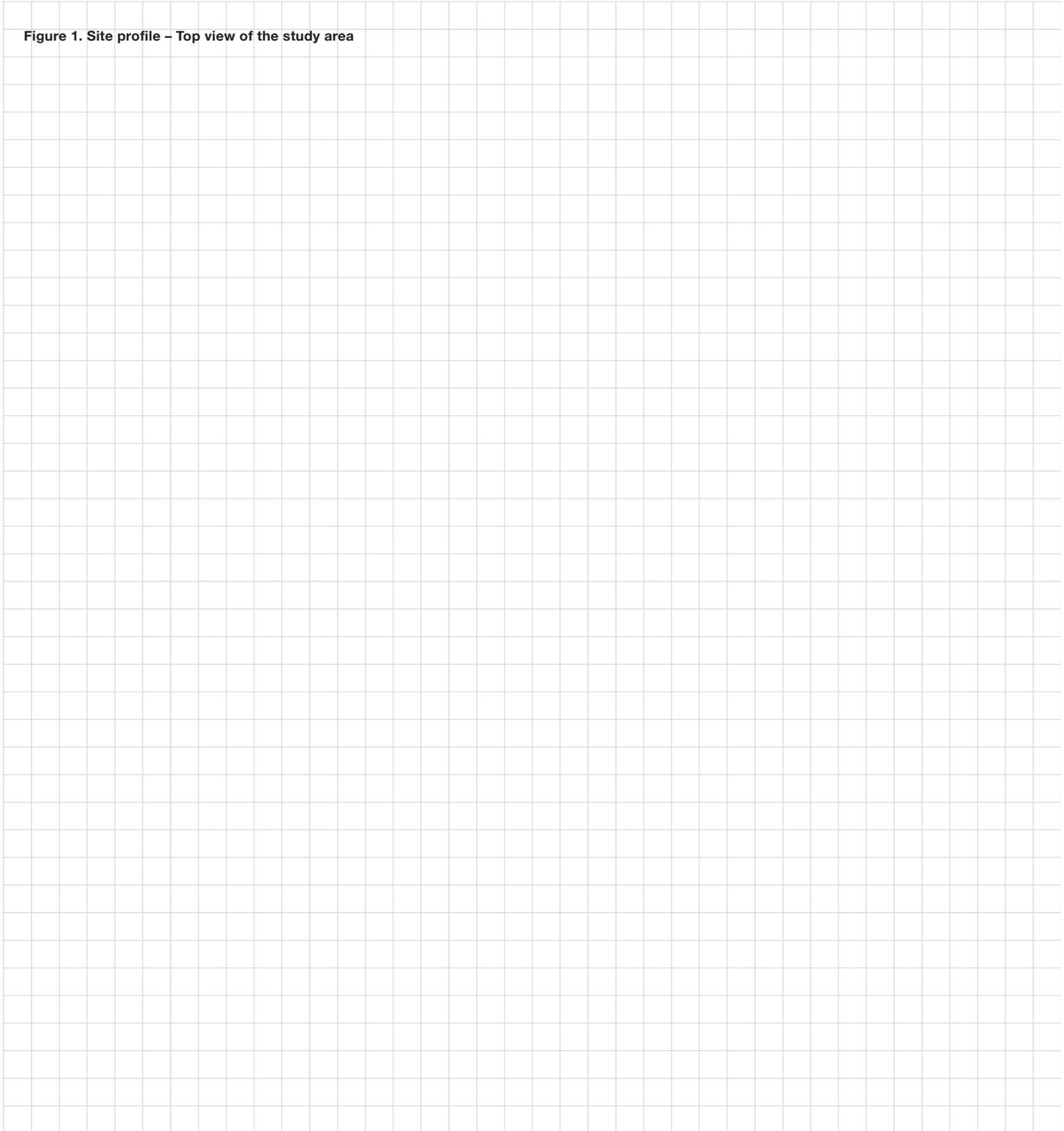


Table 1. Physical factors measurement

	Grassland		Woodland	
	Quadrat 1	Quadrat 2	Quadrat 1	Quadrat 2
Air Temperature (°C)				
Soil Temperature (°C)				
Relative Humidity (%)				
Wind Speed (m/s)				
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

Mirocohabitat	Temperature (°C)	Relative Humidity	Light intensity (lux)	Species Name	Abundance

Table 4. Soil sample analysis

	Grassland	Woodland
Soil pH		
Soil Water Content (%)		
Sand (%)		
Silt (%)		
Clay (%)		
Soil Texture		

Table 5. Leaf litter analysis

	Grassland	Woodland
Litter Mass (g)		
Litter Density (kg/m ²)		
Abundance of Woodlouse		
Abundance of Oriental cockroach		
OTHERS		
OTHERS		
OTHERS		
Abundance of Animal		

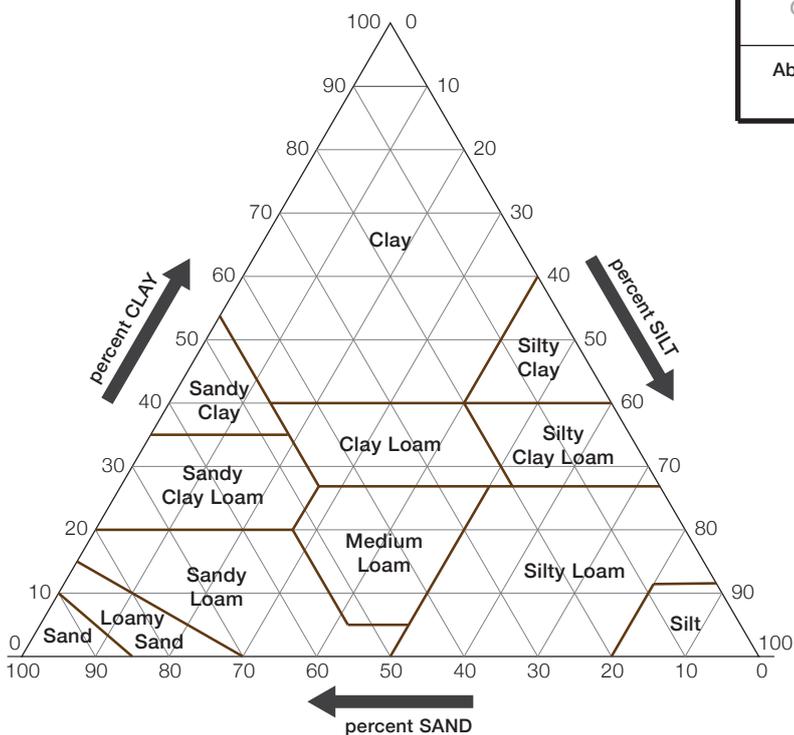


Figure 2. Triangular soil diagram