明愛陳震夏郊野學園
Caritas Chan Chun Ha
Field Studies Centre

BIOLOGY

Campus Fieldwork Course

Terrestrial Habitat

School Name / Student Name / Group

Site / Date (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 asprimary 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

☐ Insect net	x1
☐ Clip board	x1
☐ Gloves	x1 Pair
☐ Quadrat	x1
☐ Plastic bag	x1
☐ Plastic basket	x1
☐ Plastic vial	x6
☐ Brush	x2
☐ Woodland identification kit	x1
☐ Grassland identification kit	x1

For measurement of physical factors

☐ Anemometer	x1
☐ Compass	x1
☐ Hydrothermometer	x1
☐ Light meter	x1
☐ Measuring tape [20m]	x1
☐ Number cards	x1 Set
☐ Soil thermometer	x1
☐ 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, providedthat it is safe to do so.

FIELD WORK

1 Site Profile

Draw a sketch map (top view) of the field site and surrounding area on Figure 1, 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 2-4 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 specimens, put minimal disturbance and keep on your path.

★ Never remove the plants attaching firmly on the barks.

3 Data Collection & Sampling with Quadrat

Place the 0.5m×0.5m quadrat on a representative area in grassland and woodland respectively, make the location of the quadrat on the site profile. Then,

A. Measure the temperature, relative humidity, wind speed, wind direction and light intensity, then record them in the Table 1.

B. Collect all the leaf litter within the quadrat with a plastic bag.

C. Collect soil sample with a large vial inside the quadrat.

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 3 microhabitats and mark them in your site profile.

B. Measure and collect the related data and record them in Table 3.

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.

Equipment

☐ 100ml Measuring cylinder	x1	☐ Glass rod	x1	☐ Stereomicroscope	x1
☐ Plastic tray	x2	☐ Petri dish	x3	☐ Brush	x2
☐ Evaporating dish	x1	☐ pH paper	x1	☐ Funnel	x1
☐ Balance	x1	☐ Sealing film	x1	☐ Oven	(Share)
☐ Spatula	x1	☐ Ruler	x1	☐ Crucible tong	(Share)
☐ Wash bottle (Deionized water)	x1	☐ Water	x1 bottle	☐ 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 bucket.

5 Soil Analysis

5.1. Soil water content

Weigh about 20g 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 soild 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,

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

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

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

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

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.

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.

★ Beware of aggressive animals hidden in the leaf litter.

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

★ Transfer the animals in the glass chamber specified after identification, and clean up the vials.

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.

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 litter 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

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Site	Date	Time	Recent Weather Conditions
	DD–MM–YYYY		

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

Table 1. Physical factors measurement

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

Table 2. Tree 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											

Table 3. Microhabitat animal sampling

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

Table 4. Soil water content calculation

Mass (g)	Woodland	Grassland
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)		
Soil water content (%)		

Table 5. Soil analysis

	Woodland	Grassland
Soil pH		
Sand (%)		
Silt (%)		
Clay (%)		
Soil texture		

Figure 2. Triangular soil diagram

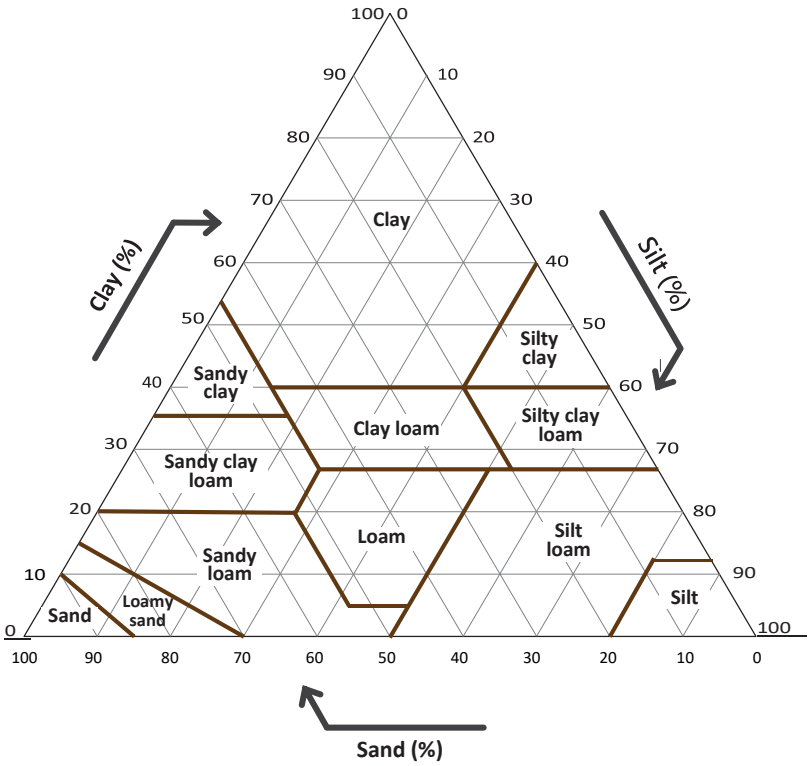

Table 6. Leaf litter analysis

	Woodland	Grassland
Litter mass (g)		
Litter density (kg/m^2)		

Table 7. Animals in the leaf litter

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