Biology - Ecology Field Work

Applied Ecology Elective Part

Air Pollution

Name：_____   Group：_____   Date：_____

Aims：

After the course, students should be able to:

1. know the common air pollutant,
2. study the lichen distribution as an indication of air pollution by sulphur dioxide,
3. understand the source of the air pollution,
4. discuss the effects of air pollution on the environment and the human health,
5. state some strategies for air pollution control,
6. analyze and organize data for presentation,
7. cooperate with others and work together in a scientific investigation,
8. appreciate nature and respect living things.

Schedule：

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09:00 － 10:15	Briefing
10:30 － 12:00	Field work(Tai Mo Shan + Tsuen Wan City)
12:00 － 13:00	Lunch (Tsuen Wan City)
13:00 － 14:15	Field work (Tsuen Wan City)
14:30 － 15:30	Data analysis and prepare presentation
15:30 － 16:30	Presentation & summary

Equipment and tools：

1. Counter	x1	7. Thin nylon thread	x1	13. Hong Kong Lichens	x1
2. Thermohygrometer	x1	8. Mini-quadrat	x1	14. Wildlife Pictorial Guide	x1
3. Magnifying glass	x2	9. Carbon dioxide meter	x1	15. Lichens Field Guide	x1
4. Light meter	x1	10. Dust meter	x1	16. Trees Field Guide	x1
5. Anemometer	x1	11. UV flashlight	x1	17. Bark nature	x1
6. Compass	x5	12. Ruler	x1	18. Map	x1

Clothing：

1. Long-sleeved shirt and trousers for better protection against mosquito and insect bites, as well as preventing sunburn. Shorts are not recommended.
2. A pair of shoes for preventing injuries. Slippers and sandals are not recommended.

Safety：

1. Use the traffic light when you are crossing the road, and should be safety.
2. All participants should work in groups. No participant should work alone.
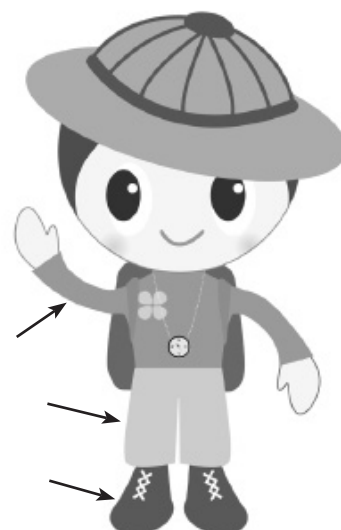
Procedure

A. Field site

The study area is Tai Mo Shan and Tsuen Wan City. Follow the map, and select a suitable place, use the equipments to measure the climate data. Make a few measurements at different points and then take average of the readings. The study area should be safe and contain enough area to stay on.

B. Data record

i. Abiotic factors

Note down recent weather conditions and study time. Describe the environment near the study area.

Recent weather: _____ Study time: _____

1. Tai Mo Shan

Environment description: _____

_____

Time						Mean
Temperature (^{o}C)						
Wind speed(m/s)						
Wind direction						
Carbon dioxide (ppm)						
Suspended particulates (mg/m^3)						

2. Tsuen Wan City Garden   Name:_____

Environment description: _____

_____

Time						Mean
Temperature (^{o}C)						
Wind speed(m/s)						
Wind direction						
Carbon dioxide (ppm)						
Suspended particulates (mg/m^3)						

3. Tsuen Wan City Road   Road Name: _____

Environment description: _____

_____

Time						Mean
Temperature (^{o}C)						
Wind speed(m/s)						
Wind direction						
Carbon dioxide (ppm)						
Suspended particulates (mg/m^3)						

ii. Lichens

There are 3 points to study the lichens distribution, Tai Mo Shan, a garden and a road in Tsuen Wan city (see the map), use the lichen as an air pollution indicator. In each site, you have to choose 2 accessible trees of the same species and a rock to survey, record the surface nature and the location of the lichen.

1. Lichen measure

a. Use a ruler to measure the tree truck at the height about 1m to 1.5m above the ground level.

b. Use a compass, with reference to the part of the trunk between 1m and 1.5m, divide it into 4 equal sectors: East, South, West and North.

c. Place a mini-quadrat on each sector, record the total grid count occupied on each sector. Identify the lichens in the study area, count the number of the grids and calculate the percentage covered by each species.

d. Use a compass to divide a rock into 4 equal sectors (East, South, West and North) and upside, repeat c by using mini-quadrat.

e. Record the lichens outside of the mini-quadrat (included other place of the tree trunk, twigs, road...etc), identify the lichens and record their host.

2. Biotic factors

For each individual tree and rock, record:

a. Name of the tree.

b. Bark nature (hard, soft, thick, thin, smooth, rough, shallow, cracked, deeply cracked, fibrous peeling, scaly peeling, paper like...)

c. Other inhabitants including climbing plants, algae, mosses, fungi and small animals which may affect lichens' growth on the tree or rock.

Lichens distribution

Lichens on the tree truck (Inside the quadrats)

Tree name：_____ Bark nature：_____

	Tree 1								Tree 2							
	E		S		W		N		E		S		W		N	
Lichens	Grid	%	Grid	%	Grid	%	Grid	%	Grid	%	Grid	%	Grid	%	Grid	%
Total		100%		100%		100%		100%		100%		100%		100%		100%

Lichens on the rock (Inside the quadrats)

	E		S		W		N		Upside	
Lichens	Grid	%	Grid	%	Grid	%	Grid	%	Grid	%
Total		100%		100%		100%		100%		100%

Other lichens (Outside the quadrats)

Lichens	Host

Other animals / plants

Name of animals / plants	Microhabitat	Adaptive features

3. Measuring abiotic factors

a. Measure air sulphur dioxide level at the sites.

b. Measure average light intensity directing on the tree trunk and the rock of each sectors by using light meter.

c. Measure humidity and temperature on tree trunk and the rock of each sectors by using the digital thermohygrometer.

d. Approximate distance between the tree / rock and the nearest suspected pollution source.

Tai Mo Shan

Sulphur dioxide level: _____

Abiotic factor on the tree truck

	Tree 1				Tree 2			
	E	S	W	N	E	S	W	N
Temperature (ºC)								
Relative humidity(%)								
Light intensity (Lux)								
Distance of the nearest suspected pollution source (m)								

Abiotic factor of rock surface

	E	S	W	N	Upside
Temperature (ºC)					
Relative humidity(%)					
Light intensity (Lux)					
Distance of the nearest suspected pollution source (m)					

Tsuen Wan city garden

Sulphur dioxide level: _____

Abiotic factor on the tree truck

	Tree 1				Tree 2			
	E	S	W	N	E	S	W	N
Temperature (ºC)								
Relative humidity(%)								
Light intensity (Lux)								
Distance of the nearest suspected pollution source (m)								

Abiotic factor of rock surface

	E	S	W	N	Upside
Temperature (ºC)					
Relative humidity(%)					
Light intensity (Lux)					
Distance of the nearest suspected pollution source (m)					

Tsuen Wan city road

Sulphur dioxide level: _____

Abiotic factor on the tree truck

	Tree 1				Tree 2			
	E	S	W	N	E	S	W	N
Temperature (ºC)								
Relative humidity(%)								
Light intensity (Lux)								
Distance of the nearest suspected pollution source (m)								

Abiotic factor of rock surface

	E	S	W	N	Upside
Temperature (ºC)					
Relative humidity(%)					
Light intensity (Lux)					
Distance of the nearest suspected pollution source (m)					