



## Study of a Mangrove Ecosystem

Name: \_\_\_\_\_ Group: \_\_\_\_\_ Date: \_\_\_\_\_

### Aims:

After the course, students should be able to:

1. Classify and identify organisms commonly found in a local mangrove habitat ,
2. Observe how organisms adapt to the physical environment,
3. Distinguish interrelationships between living organisms in an ecosystem,
4. Record and measure physical factors in a mangrove ecosystem,
5. Use simple sampling tools,
6. Do simple chemical analysis of water sample in the laboratory,
7. Analyze and organize data for presentation,
8. Cooperate with others and work together in a scientific investigation
9. Appreciate nature and respect living things.

### Schedule:

9:00 - 10:15	Briefing
10:50 - 12:20	Field work
13:00 - 14:00	Lunch
14:00 - 14:50	Lab. work & Data analysis
14:50 - 15:30	Prepare presentation
15:30 - 16:30	Presentation & summary

### Equipment and tools:

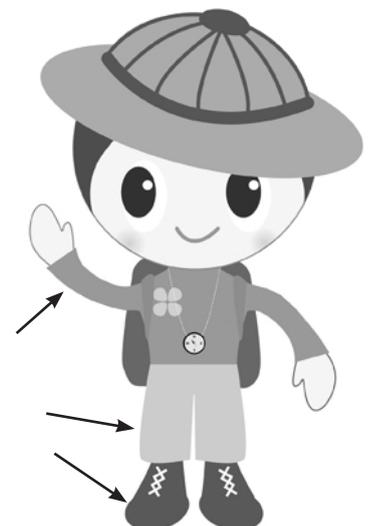
1	Clipboard (x1)	10	Plastic sorting tray (x1)
2	Light meter (x1)	11	Water sampling bottle (x1)
3	Digital thermohygrometer (x1)	12	Plastic bag (x1)
4	Soil thermometer (x1)	13	Nylon thread (x1)
5	Digital anemometer (x1)	14	Cotton gloves (x2 pairs)
6	Trowel (x2)	15	Wildlife Pictorial Guide (x1)
7	Forceps (x2)	16	Estuarine Organisms (x1)
8	Magnifying glass (x2)	17	Hong Kong Coastal Plants (x1)
9	Quadrat 0.5 x 0.5 m (x2)		

### 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. Avoid stepping onto too muddy areas. Beware of oyster shells which could cause serious wound.
2. Leave the area once the knees were submerged by the incoming tide.



## A. Selecting site

Select a safe area that has mangrove plants and open space. As far as possible, the area should resemble the rest of the mangrove habitat.

## B. Recording biotic factors

### 1. Animals

- Place a 0.5 m X 0.5 m quadrat on the soil surface near sea water. Pick up the animals found on the soil surface within the quadrat, identify and count. If there are stones present in the area, lift the stones to look for animals hiding beneath. Use a trowel, carefully dig out animals in the soil within the quadrat, identify and count.
- Place the quadrat inside the mangrove stand and just in front of the mangrove stand respectively. Repeat the above process.
- Do qualitative survey of animals at different microhabitats in the habitat, such as under boulders, in crevices of mangrove root system, on the leaves and barks of mangrove trees, etc.
- Note any special behaviour and morphological features related to their feeding, defence against predators, prevention of overheating and desiccation, etc.
- Notice various relationships between organisms, namely predation, competition, commensalism, mutualism and parasitism. Look for examples in the field.

### 2. Plants

- Identify 3 species of true mangrove plants (usually growing closer to the sea) and 2 species of associated mangrove plants (usually growing at the back shore far away from the sea).
- Carefully observe and compare the roots of true mangrove plants and associated mangrove plants. Pay attention to features which are related to enhancing better anchorage, as well as features related to enhancing better gaseous exchange.
- Carefully observe and compare the leaves of true mangrove plants and associated mangrove plants. Pay attention to features which are related to regulation of water potential and salt content in plant tissues.
- Look for modification(s) of the reproductive system, which minimize impact of regular tides on seed dispersal and germination.
- Collect a few leaves from different mangrove species (true and associated) for further examination in the laboratory.

## C. Measuring abiotic factors

- Note down recent weather conditions such as rainfall, sunshine and temperature.
- Describe the physical environment near the mangrove habitat, such as location(s) of stream outlet, habitat types, land use, location of village and possible human impacts. Draw a sketch map to show relevant information.
- Measure the following physical factors in the open space and under the mangrove canopy respectively. Take five measurements in different positions for each area and take the mean value.
  - Digital thermohygrometer for measuring air temperature and relative humidity.
  - Light meter for measuring light intensity.
  - Anemometer for measuring wind speed and the compass with a nylon filament for measuring wind direction.
  - Soil thermometer for measuring soil temperature.

## D. Water sampling

Use a water sampling bottle to collect water sample at the location closer to your study area. Bring the water sample to the laboratory for further chemical analysis.

## E. Observing soil

Select an area with soft substratum. Dig vertically into the soil by a trowel and notice the nature and colour of the soil layers from top to bottom.

## F. Laboratory work

- Use a refractometer to measure salinity of the water sample.
- Do cross sections of the mangrove leaves and examine under the microscope, compare the leaves of true mangrove and those of associated mangrove.



# Data sheet

## Animals found inside quadrats:

Animal names	Number of individuals		
	Quadrat 1 (near sea water)	Quadrat 2 (in front of mangrove stand)	Quadrat 3 (Inside mangrove stand)

## Animals found outside quadrats:

Animal names	Microhabitat	Animal names	Microhabitat

## Adaptation features of animals:

a. Preventing desiccation and/or overheat:

- i \_\_\_\_\_ (e.g. \_\_\_\_\_ )
- ii \_\_\_\_\_ (e.g. \_\_\_\_\_ )
- iii \_\_\_\_\_ (e.g. \_\_\_\_\_ )

b. Preventing predators :

- i \_\_\_\_\_ (e.g. \_\_\_\_\_ )
- ii \_\_\_\_\_ (e.g. \_\_\_\_\_ )
- iii \_\_\_\_\_ (e.g. \_\_\_\_\_ )

**Observed plants:**

True mangrove plant 1	True mangrove plant 2	True mangrove plant 3
Associated mangrove plant 1	Associated mangrove plant 2	

**Root features enhancing better anchorage on unstable substratum:**

**Root features enhancing better gaseous exchange in water-logged soil:**

**Leaf features related to regulation of water potential and salt content in plant tissue:**

**Modification of reproductive system to minimize impact of tide on seed dispersal:**

**Relationships between living organisms:**

- i \_\_\_\_\_ (e.g. \_\_\_\_\_ )
- ii \_\_\_\_\_ (e.g. \_\_\_\_\_ )
- iii \_\_\_\_\_ (e.g. \_\_\_\_\_ )
- iv \_\_\_\_\_ (e.g. \_\_\_\_\_ )

**Recent weather conditions:** \_\_\_\_\_

**Physical environment near field site:** \_\_\_\_\_



**Sketch map:**

**Physical factors:**

Measure	Air temperature °C		Relative humidity %		Light intensity Lux		Wind speed ms <sup>-1</sup> & direction		Soil temperature °C	
	Open space	Under mangrove canopy	Open space	Under mangrove canopy	Open space	Under mangrove canopy	Open space	Under mangrove canopy	Open space	Under mangrove canopy
1										
2										
3										
4										
5										
Mean										

Sea water salinity: \_\_\_\_\_

Soil nature and colour: \_\_\_\_\_