



Study of a Freshwater Stream Ecosystem

Name: _____ Group: _____ Date: _____

Aims:

After the course, students should be able to:

1. Classify and identify organisms commonly found in a local freshwater stream 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 freshwater stream 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
10:30 - 11:50	Field work
12:00 - 13:00	Lunch
13:00 - 14:00	Lab. work & Data analysis
14:00 - 15:30	Prepare presentation
15:30 - 16:30	Presentation & summary

Equipment and tools:

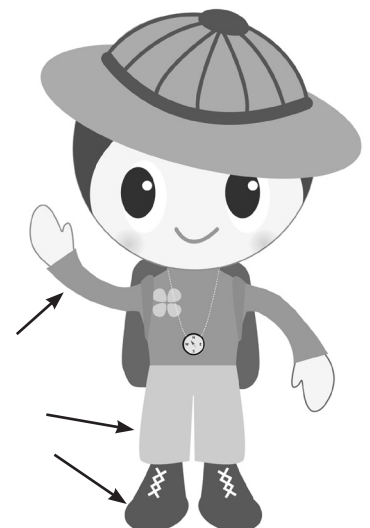
1	Clipboard (x1)	8	Small vials (x3)
2	Light meter (x1)	9	Quadrat 0.5 x 0.5 m (x1)
3	Water flow meter (x1)	10	Rubber gloves (x2 pairs)
4	Digital thermometer (x1)	11	Plastic sorting tray (x1)
5	Brush pen (x2)	12	Water sampling bottle (x1)
6	Metal sieve (x1)	13	"Wildlife Pictorial Guide" (x1)
7	Forceps (x2)	14	"Hill Streams" (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. Avoid stepping on steep and wet rock surfaces. Beware of broken glasses and other sharp objects at the bottom.
2. Never getting into deep water. Avoid direct contact with polluted water.



A. Selecting site

Select a section of a freshwater stream that has varying physical nature — water flow rate, bottom material, shape of water channel, etc.. The area should be safe and contain enough flat area to stay on.

B. Water sampling

Use a water sampling bottle to collect water sample from a representative point in your study area. Bring the water sample to the laboratory for further chemical analysis.

C. Recording biotic factors

1. Animals

- Within the study area, by careful observation, search for animals living on the water surface, in the water or on the rock surfaces. Examples are water skaters, backswimmers, fishes, frogs, Hong Kong Newt, snails, and shrimps. Some animals could be very sensitive to observer's body movement, try not moving too much or too fast during the observation period. Most animals could be directly identified through observation, no collecting is necessary. Note down the animals found and their corresponding microhabitats.
- Find a region with considerable amount of submerged plant roots or stems. Use a metal sieve to collect animals attaching on or hiding amongst the submerged plant roots or stems. Identify the animals found.
- Place a 0.5 m x 0.5 m quadrat at a shallow and stony part of the stream. Carefully look for animals living on the rock surfaces first. Gently pick up small rocks from the bottom, look at the location where the rock is removed to see if there are animals. Then turn the rock upside down and look for animals attached on the lower surface of the rock. Use a soft brush pen to transfer small animals to a sorting tray. Repeat the above process for other small rocks. Identify and count all animals found within the quadrat.
- Place the quadrat at 2 more different positions in the shallow and stony region, and repeat the above process.
- After identification and counting, observe the animals and look for features for adaptation to fast water flow and avoiding predators.
- Try to identify their positions on the food chain i.e. their trophic levels. Notice various relationships between organisms, namely predation, competition, commensalism, mutualism and parasitism. Look for examples in the field.

2. Plants

Observe the plants growing at the study area. Try to identify them and find out the functions they perform in the stream ecosystem.

3. Microorganisms

Collect samples of filamentous algae. They can be found floating on the water surface, in the water, attached on underwater rock surfaces, attached to submerged parts of the plants. Bring the samples to the laboratory for further examination.

D. Measuring abiotic factors

- Note down recent weather conditions such as rainfall, sunshine and temperature.
- Describe the physical environment near the stream habitat, such as nearby habitat types, land use, location of village and possible human impacts. Draw a sketch map to show relevant information.
- Measure the water flow rate at the shallow and stony part of the stream where you did animal survey. Make a few measurements at different points and then take average of the readings.
- Use a light meter to measure average light intensity at the region of your study.
- Use a digital thermometer to measure the air temperature. Place the probe into the water and measure the water temperature.

E. Laboratory work

- Use a dissolved oxygen meter to measure dissolved oxygen of the water sample. Use a pH meter to measure pH of the water sample. Use a total dissolved solids meter to measure total dissolved solids of the water sample. Filter 500ml of the water sample by a completely dried filter paper with known mass. Place it back to oven operating at 105°C. Weigh again when it is dried and calculate the amount of total suspended solids of the water sample in g/l. Repeat the above work for tap water. Compare the results.
- Place the samples of filamentous algae on glass slides and observe under a microscope. Look for other microorganisms as well. Identify and take records.



Animals recorded outside quadrats:

Animal name	Microhabitat	Trophic level

Animals recorded inside quadrats:

Animal name	Number of individuals			Density	Trophic level
	Quadrat 1	Quadrat 2	Quadrat 3		

Adaptation features of animals:

a. Against water flow:

i _____ (e.g. _____)

ii _____ (e.g. _____)

iii _____ (e.g. _____)

b. Preventing predators :

i _____ (e.g. _____)

ii _____ (e.g. _____)

iii _____ (e.g. _____)

Recorded plants:

Plant name	Function(s) in the ecosystem

Recorded microorganisms:

Microorganism name	Microorganism name	Microorganism name

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	Water flow rate (m/s)	Light intensity (Lux)	Air temp. (°C)	Water temp. (°C)
1				
2				
3				
Mean				

Dissolved Oxygen (mg/l)		pH		Total dissolved solids (ppm)		Total suspended solids (mg/l)	
Stream water	Tap water	Stream water	Tap water	Stream water	Tap water	Stream water	Tap water