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

BIOLOGY

Chi Ma Wan Biodiveristy Survey

School Name	Student Name	Group
	/	/

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

INTRODUCTION

Background

Chi Ma Wan is an estuary environment, and the river brings sediment to the bay, making the local substratum very fertile. Fertile substratum can support many producers and consumers to survive and increase local biodiversity. On the other hand, because the estuary also causes the local abiotic factors to change dramatically in daily and annually, the creatures have developed different adaptive features so that they can be fitter in terms of survival.

Aims and Objectives

- To appreciate the wonders of the living world.
- To familiarize the structure, flora and fauna in a coastal community.
- To familiarize some common ecological sampling techniques in studying coastal habitats.
- To observe, compare and contrast the ecology of coastal habitats.

Equipment

For Biotic factors sampling

☐	Aquarium net	×2
☐	Clip board	×1
☐	Quadrat	×2
☐	Grid quadrat	×1
☐	Plastic basket	×2
☐	Plastic box	×1
☐	Plastic tray	×1
☐	Plastic vial	×9
☐	Chi Ma Wan identification kit	×2
☐	Spoons	×2
☐	Transect line (30m measuring tape)	×1
☐	Trowel	×2

For measurement of abiotic factors

☐	Rope	×1
☐	Anemometer	×1
☐	Compass	×1
☐	Thermohygrometer	×1
☐	Ranging poles	×2
☐	pH meter cum thermometer	×1
☐	Photometer	×1
☐	Metre rule	×1
☐	Plastic bucket with a rope	×1
☐	Sampling bottles (For collection of water samples)	×3
☐	Spirit level	×1
☐	Towel	×1
☐	Dissolved oxygen meter	(Share)

Others

☐	Life buoy with a rope	(Share)

Remarks

- Dress in shorts and canvas shoes with adequate tread. Sandals are not recommended. Be careful of broken glass and abandoned construction material etc.
- Walk slowly and try footing for the stability of substratum. Be careful of loose gravel and slippery rock surface.
- Never step beyond the tide but prepare for getting wet during fieldwork.
- Retreat before high tide.
- Do not remove mollusc rudely.
- Do not pollute/damage the environment in all senses.
- 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.

1 Geographical Environment

Draw a sketch map (top view) of the surrounding area on **Figure 1a & 1b**, indicating

•Bearing of the study site (with a compass).

•Coastline and scale.

•Any rock pools, crevices, outcrops of rocks and other microhabitats.

•Any backshore plant community.

•Other particulars of interest.

Look for a region of shore with apparent zonation patterns and lay a transect line through the shore. Ensure the transect line is straight. Make record on your sketch map.

★Never attempt to step into areas with dense barnacle or oyster.

★Never step into the sea.

★If the wind is strong, put some stones over the transect line to keep it in place.

★To save time, divide your group into two teams. One is responsible for biotic investigation while the other is to take abiotic measurement. However it is also important to get involved in the work of another team.

★Never consume too much time in setting up the transect line.

2 Study of Abiotic Factors

2.1. Water sampling **(Record data on Table 1.)**

A. Sea water sampling

Collect sea water sample by a bucket tied with a rope. Fill up the large vial carefully and close the lid tightly.

★Do it prior to other studies.

B. Dissolved oxygen (DO) and pH

Directly measure DO and pH by putting respectively the probes of DO meter and pH meter into the sample carefully.

★Remember to rinse the probe.

2.2. Topography **(Record data on Figure 2a & 2b.)**

A. Place 2 ranging poles at 1m intervals beside the transect line.

B. Tie a rope to each ranging pole at about 1m above the ground. Raise/lower the string at one pole to ensure the string is horizontal by using spirit level.

★You may have to adjust the measurement interval.

★Place the poles gently on the ground.

C. Record any drop or rise of the rope. Mark the height difference as "+" or "-" when the topography rises or declines respectively.

2.3.Wind speed **(Record data on Table 2a & 2b.)**

Measure the average wind speed and respective direction (onshore / offshore) with an anemometer and a compass.

★As wind speed is always fluctuated, you may use your own way to describe it. Wind speed may be expressed in maximum and minimum values, average value, etc.

2.4. Measure the following abiotic factors at each 1 meter interval:

(Record data on Table 2a & 2b.)

A. Temperature of rock pool with a digital thermometer (or pH meter).

B. Temperature and relative humidity of rock surface with a thermo-hygrometer.

C. Light intensity with a photometer.

★Wait for about 1 minute to take temperature readings.

★Never put the digital thermo-hygrometer into water.

★Prevent blocking sunlight with your body.

★You can record the maximum reading within 10 seconds.

Let's think...

How do you measure the RH when the interval mark is at a rock pool?

3 Study of Biotic Factors (Belt-transect method)

Record data on Table 3.

3.1. Animal sampling

A. Place a 0.5m × 0.5m frame quadrat along the transect line at 1m intervals. Search, identify, count animals and record down their microhabitats within the quadrat.

B. Observe any special interaction and adaptive behavior such as feeding, defense, gaseous exchange, locomotion, competition, mutualism and parasitism etc.

★To protect our wildlife and environment, do not collect unnecessary specimen and treat your specimens carefully.
★Never collect animal samples tightly adhere on rock surface.
★Put minimal disturbance and keep on your path.
★Do not count the empty shells.
★Place all quadrats on the same side of the transect.
★Place quadrat at the beginning of each successive interval.

Equipment

☐ Dropper	×3	☐ Refractometer	×1	☐ Wash bottle with deionized water	×1
☐ COD testing kit	×1	☐ Cuvette	×2	☐ Spectrophotometer	(Share)
☐ Lens cleaning cloth	×1				

☐ Solution A (Ammonium molybdate / $H_2SO_{4\,(aq)}$) (Share)

☐ Solution B (5% Stannous chloride) (Share)

☐ Solution C (Nessler's reagent) (Share)

4 Water Sample Analysis

Record data on Table 1.

4.1. Salinity

Measure the salinity by placing 2-3 drops of filtered sample onto a refractometer.

4.2. Ammonia content

Pour the filtered water sample into test tube then add 1 drop solution C and shake it gently. A yellow colour indicates the presence of ammonia and the content can be measured by spectrophotometer (425nm).

4.3 Phosphate content

Pour the filtered water sample into test tube then add 1 drop solution A and 1 drop solution B respectively and shake it gently. A blue color indicates the presence of phosphate ions and the content can be measured by spectrophotometer (506nm).

4.4. Chemical oxygen demand, COD (Visual Colorimetric Method)

Remove the colored line at the top of the tube containing Potassium Permanganate to clear the aperture. Press the tube's side wall to expel air. Immerse the aperture of the tube into the sample and release to fill the tube halfway. Shake the tube slowly a few times. Wait for 4~6 minutes with reference to the surrounding temperature. Determine the amount of the organic matter according to the COD analysis card by comparing the color.

★Remember to rinse the glass chamber before taking readings.
★Fully fill the sample on the glass chamber.
★Prevent generating air bubbles in the chamber.
★Calibration can be made with deionized water.

Discussions and Conclusions

★Discuss biodiversities of different shores. Evaluate factor(s) that limit(s) degree of biodiversity of coastal habitats?

★Evaluate zonation patterns observed.

★Examine the external features of the animals, how do they adapt to the environment with respect to their:

- microhabitats (in rock crevices/ in rock pool /on rock surface etc.),
- feeding habits (omnivorous/carnivorous/herbivorous etc.)
- relationships between organism (competition / predation / commensalism / mutualism / parasitism etc.)

★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 studies.

References

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Chi Ma Wan
Biodiveristy Survey

DATA SHEET

School Name / Student Name / Group

Site: Shore X / Shore Y / Shore Z | Date: DD-MM-YYYY | Time: / | Recent Weather Conditions: / | High Tide (Level & Time): m at / | Low Tide (Level & Time): m at

Figure 1a. Site profile – Top view of the study area (Shore ___)

Figure 1b. Site profile – Top view of the study area (Shore ___)

Figure 2a. Topography of shore

Shore ___

Cumulative Change in Height (m)																					
Transect Reading (m)	0																				

Figure 2b. Topography of shore

Shore ___

Cumulative Change in Height (m)																					
Transect Reading (m)	0																				

Table 1. Water Sample Analysis

	Dissolved oxygen (ppm)	pH	Salinity (g/100g)	Ammonium (ppm)	Phosphate (ppm)	COD (ppm)
Shore ___						
Shore ___						

Table 2a. Study of Abiotic Factors
Shore ___

Transect Reading (m)	0																			
Change in height (cm)																				
Cumulative change in height (cm)																				
Temperature (°C)																				
Relative Humidity (%)																				
Light Intensity (lux)																				
Wind Speed (m/s)	1st Reading					2nd Reading					3rd Reading					Average				

Table 2b. Study of Abiotic Factors
Shore ___

Transect Reading (m)	0																			
Change in height (cm)																				
Cumulative change in height (cm)																				
Temperature (°C)																				
Relative Humidity (%)																				
Light Intensity (lux)																				
Wind Speed (m/s)	1st Reading					2nd Reading					3rd Reading					Average				

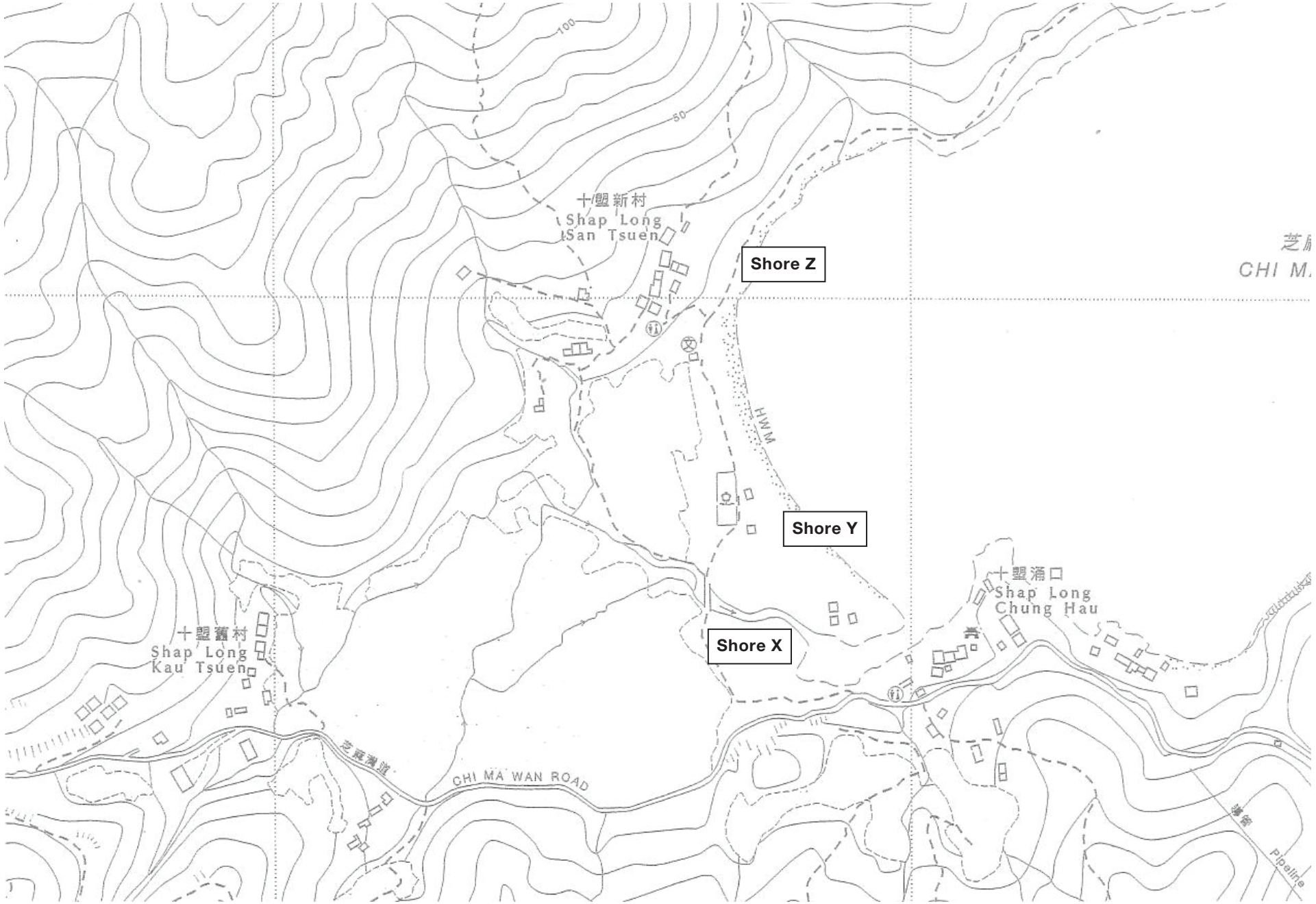
Table 3a. Study of Biotic Factors

Shore ____		Organisms abundance																			
Transect Reading (m)		0																			
Animal																					
Others																					

Table 3b. Study of Biotic Factors

Shore ____		Organisms abundance																			
Transect Reading (m)		0																			
Animal																					
Others																					

*by % coverage


100
50
十塱新村
Shap Long
San Tsuen
Shore Z
CHI M
HWM
Shore Y
十塱涌口
Shap Long
Chung Hau
Shore X
十塱舊村
Shap Long
Kau Tsuen
芝馬灣道
CHI MA WAN ROAD
Pipeline