Coast Study

Version 2.1

A. Planning and Preparation

Module

Managing Coastal Environments

Enquiry Question

Enquiry Question 1 : ***Does the coastal gradient keep consistent along the shore?***

Hypothesis 2 : ***The higher the wind speed, the farther the longshore drift displacement.***

Hypothesis 3 : ***The longer the distance from the backshore, the larger the size of load.***

Key Concepts

Tide	Swash	Backwash	Constructive wave	Destructive wave
Load	Longshore drift	Coastal gradient	Coastal landform	Sorting

Scope of the Study

Lido Beach in Sham Tseng

Time of the Study

Date：_____

Rainfall in the past 24-hour：_____ mm

Browse the website of Hong Kong Observatory, and record the tidal information of the selected field site.

a) High tides ： Time：_____ Height：_____m

b) Low tides ： Time：_____ Height：_____m

c) Tide level during field work： Time：_____ Height：_____m

Think About

1. Is this an appropriate time for conducting fieldwork? Explain your answer.

2. List the safety risks when conducting coastal fieldwork.

Field Work Plan

1. In the field site, select a suitable location to set up a 12m transect by using the measuring tape.

Coastal gradient

1. By using abney level, ranging poles, level meters and measuring tape, measure the coastal gradient along the transect at every 1m interval.
2. Record the data in Table 1.1 and draw coastal profile of the field site in Figure 1.

Think About

Suggest other equipment/methods to measure coastal gradient.

Longshore drift

1. Throw the float provided into the sea near the shore.
2. Observe and measure the route and horizontal displacement of the float in 1 minute, and record them in Table 1.2.
3. At the same time, by using compass and anemometer, measure the maximum wind speed and wind direction in 1 minute.

Load size and shape

1. Using the swingometer, count the number and measure the maximum strength of the swash and backwash in 1 minute, and record them in Table 1.3.
2. Each group will be arranged to collect about 50g of surface load with a trowel and place them into a small plastic bottle.
3. Analysis of the load size and shape will be carried out in the laboratory, record them in Table 1.4.

Laboratory work

1. Add 50g of the collected load, and hand it to the assistant teacher for drying in the oven.
2. After drying, pour the dried load onto the column of sieves provided. (Place the sieves in order, with a decreasing openings' diameter from top to bottom.)
3. Put the lid back on the column of sieves and hold them firmly with both hands. Shake the column horizontally and softly for 5 minutes.
4. Measure the net weigh of a crucible by using an electronic balance.
5. Measure the weight of the load from each sieve and pour them onto a piece of paper.
6. Use a 10 times magnifier to observe and compare the shape characteristics of the load at different location.
7. Calculate the percentages of each load size and record the data in Table 1.4.

B. Data Collection

Complete the following table.

Primary Data Items	To Examine Hypothesis/ Enquiry Question			Data Collection Method			Equipment Required (Number on the Equipment Checklist)
	1	2	3	Observation	Counting	Measuring	
1. Coastal gradient							
2. Longshore drift displacement & direction							
3. Wind speed & wind direction							
4. Swash & backwash							
5. Load size & shape							

Equipment Checklist

Items	Quantity	Checked	Returned
1. Base map (Individual)	x 1	❑	❑
2. Clipboard (Individual)	x 1	❑	❑
3. Compass (Individual)	x 1	❑	❑
4. Gloves	x 4	❑	❑
5. Measuring tap - 30m	x 2	❑	❑
6. Level meter	x 2	❑	❑
7. Abney level	x 2	❑	❑
8. Ranging pole	x 2	❑	❑
9. Small sampling plastic bottle	x 1	❑	❑
10. Trowel	x 1	❑	❑
11. Anemometer	x 1	❑	❑
12. Float	x 2	❑	❑
13. Swingometer	x 1	❑	❑
14. Plastic bucket	x 2	❑	❑

Laboratory Work Equipment Checklist

1. Crucible	2. Sieves	3. Electronic balance	4. Oven

Think About

Name the sampling method adopted in fieldwork, and list their advantages.

Data Recording Sheet （Field Site: ：　　）

Table 1.1 - Coastal gradient

0-1m	1-2m	2-3m	3-4m	4-5m	5-6m	6-7m	7-8m	8-9m	9-10m	10-11m	11-12m

Table 1.2 - Longshore drift

	Float ：_____	Float ：_____
Wind direction（°）		
Wind speed (m/s)		
Direction of longshore dirft	From_____to _____	From_____to _____
Horizontal displacement of long-shore drift (cm)		

Table 1.3 - Swash & Backwash

Number of Swash：_____ / minute Strength of Swash：_____ （maximum） Swash：Stronger / Weaker	Number of Backwash：_____ / minute Strength of Backwash：_____ （maximum） Backwash：Stronger / Weaker

Table 1.4 - Load size

Sample from （　） m	Weight of crucible (g) (A)	Weight of crucible & dried load (g) (B)	Net weight of load (g) (B) − (A)	Percentage (%) $\frac{\text{(i) or (ii) or (iii)}}{\text{(C)}}$ x100%
Diameter >2mm			(i)	
Diameter >0.063-2mm			(ii)	
Diameter <=0.063mm			(iii)	
		Total load (C)	(i+ii+iii)	100%

Percentage (%)	**Summary：Load size**							
	（　）m	（　）m	（　）m	（　）m	（　）m	（　）m	（　）m	（　）m
Diameter >2mm	%	%	%	%	%	%	%	%
Diameter >0.063-2mm	%	%	%	%	%	%	%	%
Diameter <=0.063mm	%	%	%	%	%	%	%	%

Data Recording Sheet （Field Site: :)

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Diameter >2mm			(i)	
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Diameter <=0.063mm			(iii)	
		Total load (C)	(i+ii+iii)	100%

Percentage (%)	**Summary：Load size**							
	（ ） m	（ ） m	（ ） m	（ ） m	（ ） m	（ ） m	（ ） m	（ ） m
Diameter >2mm	%	%	%	%	%	%	%	%
Diameter >0.063-2mm	%	%	%	%	%	%	%	%
Diameter <=0.063mm	%	%	%	%	%	%	%	%

Think About

List the possible errors when collecting data.

C. Data Processing, Presentation and Analysis

Draw the most appropriate diagrams with graph paper, to show the data of Enquiry Question 1, Hypothesis 2 and 3.

Diagrams appropriate for showing the data include:

Enquiry Question 1: _____ Hypothesis 2: _____

Hypothesis 3 : _____

Figure 1 - Coastal Profile

Think About

List the merits and demerits of the chosen diagrams.

D. Interpretation and Conclusion

1. Use the collected information to respond Enquiry Question 1: "***Does the coastal gradient keep consistent along the shore?"***

2. Does the fieldwork result support the Hypothesis 2 : ***"The higher the wind speed, the farther the longshore drift displacement."*** Support your conclusion with the collected data and graph.
   (Extended question: What is the relationship between wind direction and longshore drift direction?)

3. Does the fieldwork result support the Hypothesis 3 : "***The longer the distance from the backshore, the larger the size of load."*** Explain your conclusion with the collected data and graph.
   (Extended question: How do swash and backwash affect the deposition of loads along the shore?)

E. Evaluation

1. Base on this fieldwork, suggest how to increase the reliability and validity of the data collection.

2. Suggest a fieldwork in Hong Kong with a theme of coast study, state clearly the hypothesis and data collection arrangement of the fieldwork. .

Further Reading

Water resources in the Greater Bay Area

Overall national strength -
Natural resources and sustainable development
(Chinese version only)