明愛陳震夏郊野學園
香港 長洲 芝麻坑路 39號
電話 Tel：2981 1899
傳真 Fax: 2981 3767

Caritas Chan Chun Ha Field Studies Centre
39 Chi Ma Hang Road, Cheung Chau, Hong Kong
網址 Website：http://www.caritasfsc.edu.hk
電郵 E-mail ：info@caritasfsc.edu.hk

Student Name: _____ **Group no.:** _____

Course Date: _____

Course Objectives

Knowledge:
1. To identify the characteristics of river courses and the associated landforms.
2. To relate the exogenetic fluvial processes with the characteristics of river courses and the associated landforms.
3. To analyze how human factors (river management strategies and land use) affect the characteristics of river courses.

Skills:
1. To collect field data by appropriate equipment.
2. To draw the cross section.

Value:
1. To appreciate the natural beauty of rivers.
2. To respect and treasure the intimate relationship between rivers, ecosystem and settlement.

Relevance to DSE Geography Curriculum

✓ Managing river environment: A continuing challenge

Stage 1: Planning and preparation

➢ Key point of fieldwork: Fluvial processes in different stream courses

➢ Hypothesis: propose some hypotheses about the differences between upper course and lower course of a river

Hypothesis relating to fluvial processes:

Gradient: it is _(steeper / gentler)_ in upper course

Average velocity: it is _(faster / slower)_ in upper course

Stream width: it is _(wider / narrower)_ in upper course

Stream depth: it is _(deeper / shallower)_ in upper course

Size of bedload: it is _(larger / smaller)_ in upper course

➢ When to collect data?

Date	
Time	
Season	
Precipitation three days before the fieldwork	Heavy Rain / Drizzle / No Rain
Weather conditions	

What are the merits and demerits of conducting such a field study today?

➢ Where to collect data?

Field site	River Silver A / B / C / D and Wang Tong R / S
Sampling method	Point / Transact / Quadrat

Stage 2: Data Collection

Students are divided into groups. Within the group, some students measure fluvial data in the river. The rest of the students are responsible for recording land uses and stream management measures.

Refer to p.3 and match the appropriate field methods and equipment to the research items.

	Research items	Field method	Required equipment / Tool (if any)	Operational precautions
Related to fluvial process	1. The stream bed			
	2. The velocity			
	3. The size of bedload			
	4. The stream width			
	5. The stream depth			
	6. The stream gradient			
Stream water quality	7. Water turbidity			
	8. Water and air temperature			
	9. The pH value			
	10. The conductivity			
	11. Green algae			
Other	12. Stream river management strategies			
	13. Fluvial landforms			
	14. Surrounding land use			

* A towel is given to dry up the equipment.

Methods for collecting first hand data

A. Observation
C. Counting
E. Scoring
G. Categorizing
B. Distribution
D. Measurement
F. Questionnaire
H. Interviewing

Equipment / Tools

1. Digital thermometer

2. Table tennis ball

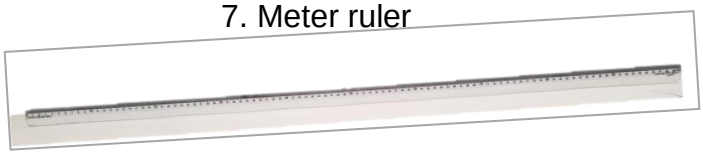
3. Conductivity meter

4. pH meter

5. Stop watch

6. Measuring tape

7. Meter ruler



8. Abney level

9. Bottle (transparent)

A. Record of studied stream

Site _____

1. Stream Bed : rocky / sandy / muddy / weedy

Are there any difficulties in measuring stream velocity?

2. Stream Velocity:

Table tennis ball traveling time for 1 meter (seconds)		Stream Velocity (m/sec) (rounded off to 2 decimal places)	Adjust the result by the "float fudge factor"
e.g.	20 seconds	1m / 20sec = 0.05m/sec	
1			**Average Velocity** =Average X 0.8 =_____m/sec×0.8 = _____m/sec *(rounded off to 2 decimal places)*
2			
3			
4			
5			
	Average =	m / sec	

What should you pay attention when taking samples?

Why does the result need to be adjusted?

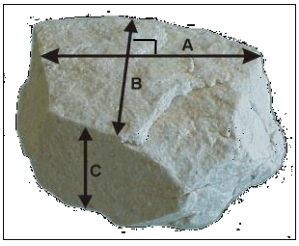
3. Size of bedload: pick up 5 bedload with typical size in your site and measure the length of axis B. (Refer to Figure 1)

Sample	1	2	3	4	5	Average diameter (mm)	Major types of bedload
Diameter(mm) *							

***** Mark as "<1mm" for those grains which have diameter of less than 1mm

Classification of stream bedload

Type of bedload	Boulder	Cobble	Pebble	Granule	Sand
Diameter(mm) *	>256	>64-256	>4-64	>2-4	0.06-2



←Figure 1: How to measure a bedload (appropriate for pebble or bigger)

Axis A is the longest axis.
Axis C is the shortest axis.
Axis B is the axis perpendicular to axis A.

4. Stream Width: _____m

5. Stream Depth: (0.5m per interval)

Interval	Depth (cm)	Interval	Depth (cm)	Interval	Depth (cm)	Interval	Depth (cm)	Interval	Depth (cm)
1 (0.0m)		7 (3.0m)		13 (6.0m)		19 (9.0m)		25 (12.0m)	
2 (0.5m)		8 (3.5m)		14 (6.5m)		20 (9.5m)		26 (12.5m)	
3 (1.0m)		9 (4.0m)		15 (7.0m)		21 (10.0m)		27 (13.0m)	
4 (1.5m)		10 (4.5m)		16 (7.5m)		22 (10.5m)		28 (13.5m)	
5 (2.0m)		11 (5.0m)		17 (8.0m)		23 (11.0m)		29 (14.0m)	
6 (2.5m)		12 (5.5m)		18 (8.5m)		24 (11.5m)		30 (14.5m)	

The Deepest Depth (cm): _____

What sampling method did you use in measuring the stream depth?

Channel Width

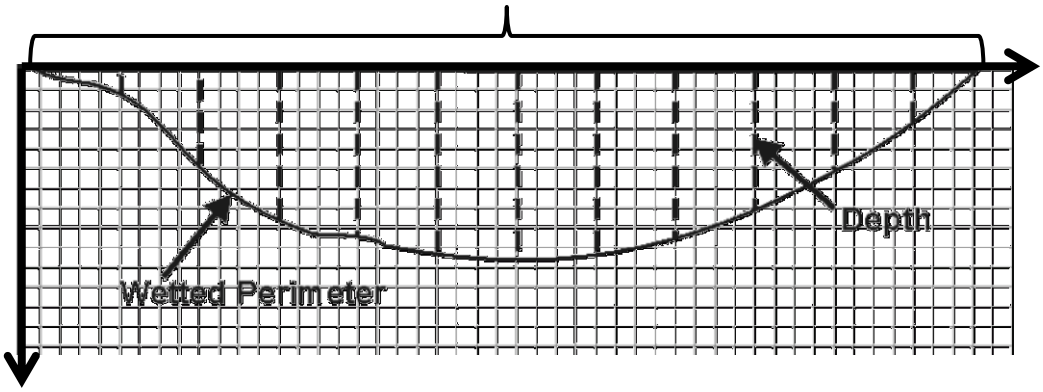
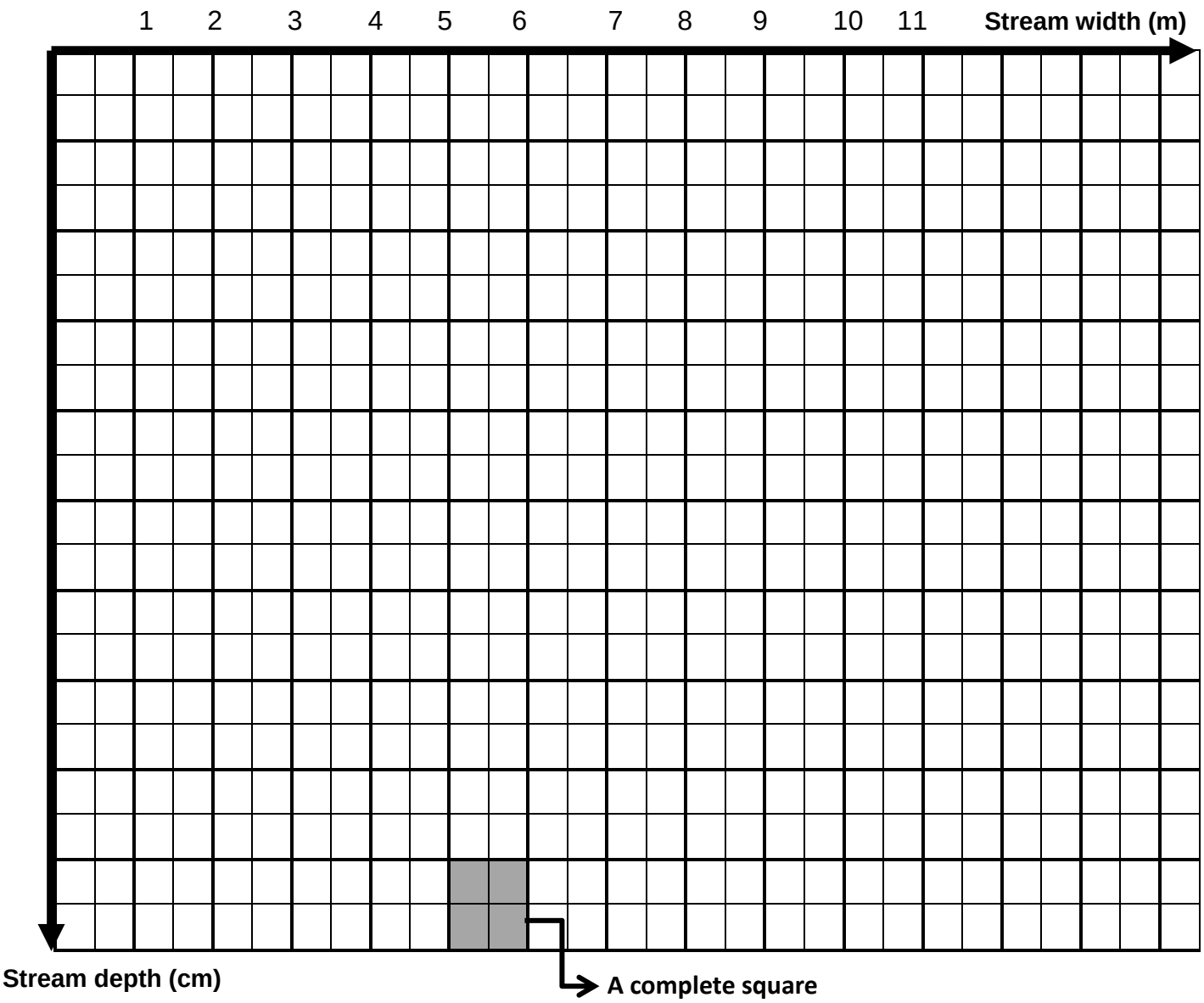


Figure 2: Cross-section of a stream channel.

Shape of Stream Bed

Draw a cross section of the stream for **Site** _____ (refer to Figure 2)：



Use “counting squares” method to find out the stream cross-sectional area.

	Area	Total no. of square(s)
A complete square:	_____ X _____=_____ m^2	
An incomplete square:	Area of a complete square/ 2 = _____ m^2	

■ The stream cross-sectional area is _____m^2

Another method to calculate the stream cross-sectional area:

Stream width(m) X Average stream depth (m)

=_____m X _____m = _____m^2

Which method is more accurate?

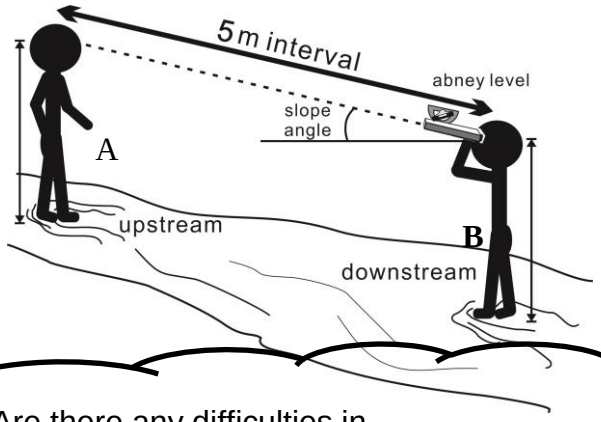
Calculate the stream discharge by using the stream data collected. Show your calculation steps.

■ The stream discharge = velocity (m/s) X cross sectional area (m^2)

= _____ m^3/s

6. Stream Gradient

Use the measuring tape to find out the height of student B's eye (e.g. 1.5m). According to this height, find out the reference point of student A. Then find a five-meter interval by the measuring tape. With the aid of an abney level, student B at downstream find out the slope angle by observing the reference point of the student A standing in upstream.



Stream gradient: _____°

Are there any difficulties in measuring stream gradient?

7. **Water turbidity** : clear / a little / turbid / very turbid

8. **Water Temperature** : _____℃ **Air Temperature** : _____℃

9. **pH Value** : _____

10. **Conductivity** : _____ppm (parts per million)

11. **Green Algae** : none (0%) / some (1-20%) / plentiful (21-50%) / abundant (>50%)

B. Record of River management strategies and land uses

1. River management measures (for a-f put a '✓' where appropriate) 2. List the landforms in g that are found	River Silver				Wang Tong	
	A	**B**	**C**	**D**	**R***	**S**
a) Channeli-zation 						
b) Weir 						
c) Concrete Frame with Soil Sacks 						
d) Gabion 						
e) Monitoring and Warning Signs 						
f) Others (if any, please specify)						
g) Fluvial landforms						

*** Can be adjusted according to time available**

C. Land Use along the field route (✓ the appropriate land use)

	River Silver				Wang Tong	
Land use	**Around Site A**	**Site B to Site A**	**Site C to Site B**	**Site D to Site C**	**Site R to Site S***	**Around Site S**
Commercial						
Residential						
Industrial						
GCI[#]						
Recreational						
Agricultural						
Abandoned						
Vacant						
Work in progress						

*** Can be adjusted according to time available**

[#]GCI stands for government, community and institution

Stage 3: Data Processing and Presentation

1. Calculate the average stream velocity (p.4)
2. Calculate the average size of bedload (p.4)
3. Draw the stream cross section (p.6) and calculate the cross-sectional area(p.6) and the discharge(p.7)
4. Fill in the data summary table (p. 10)

Summary of Data

Group							Compare with typical river (✓=similar ×=different)
Site							
Stream Bed							
Stream Velocity (m/s)							
Average Diameter of Bedload (mm)							
Stream Width (m)							
Stream Deepest Depth (cm)							
Cross Sectional Area (m^2)							
Discharge (m^3/s)							
Stream Gradient							
Water Turbidity							
Water Temperature (℃)							
Air Temperature (℃)							
pH Value							
Conductivity (ppm)							
Green Algae							

Stage 4: Data Interpretation & Conclusion

Discussion Questions

1. With reference to the summary of data (p.10), explain whether the hypotheses in p.1 are correct:
   a) gradient
   b) average velocity
   c) stream width
   d) stream depth
   e) size of bedload

2. Describe the differences of stream management strategies in the following field sites. Explain.
   a) Site A and B vs Site C and D
   b) Site C and D vs Site R and S

Stage 5: Evaluation

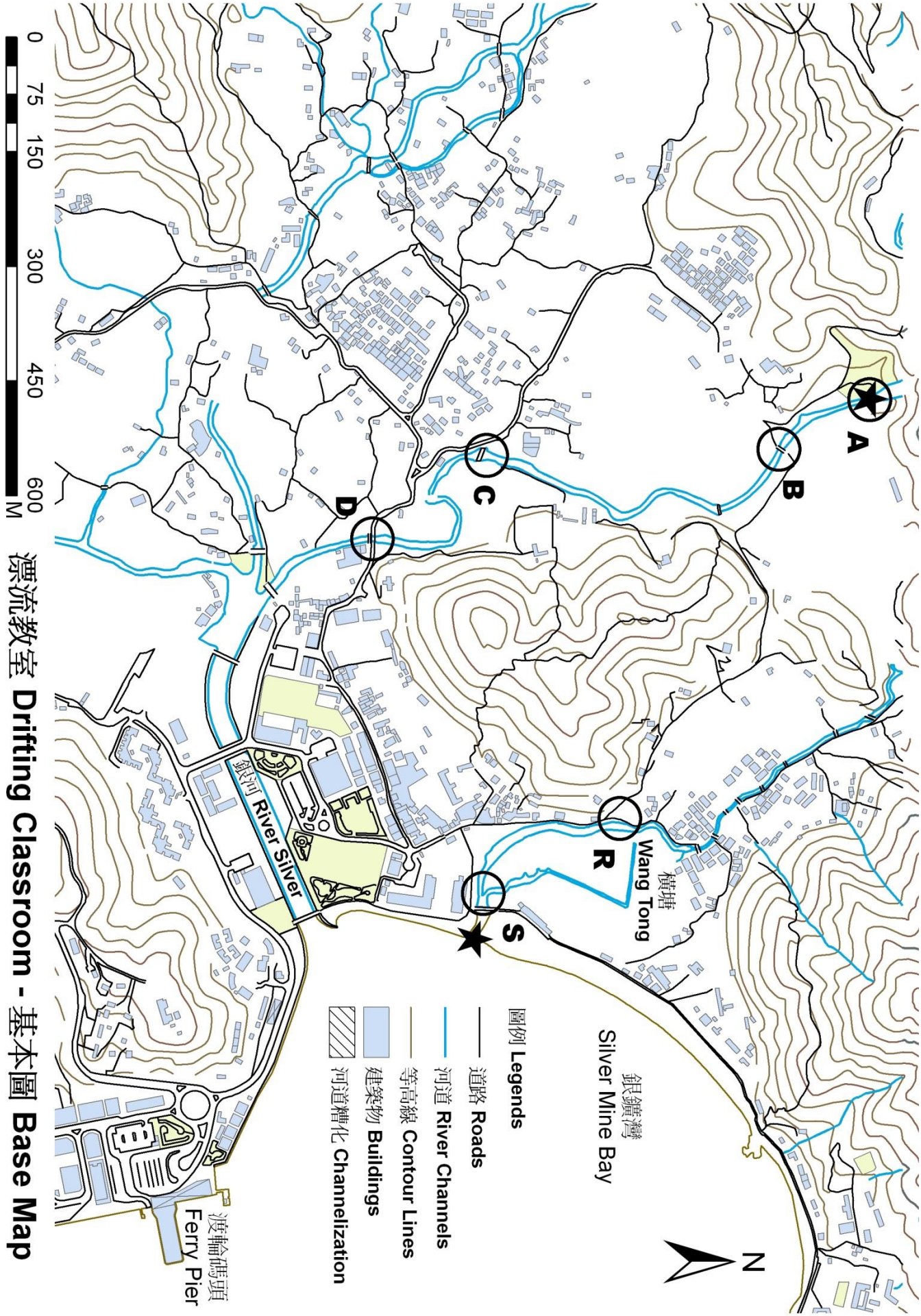
1. According to today weather and season, point out one advantage and one limitation of the fieldwork about “fluvial processes” today. How can you overcome this limitation?

2. Describe and explain how the data quality is influenced when collecting the following data. Suggest how you can increase the validity and reliability in data collection.
   a) stream velocity
   b) diameter of bedload
   c) stream depth
   d) stream gradient
   e) water quality

3. Today, the data collected is focusing on “the fluvial process”. We need to have further study for a better understanding about the stream environment. Choose one of the following topics and elaborate your study plan (e.g. field site / date / time / data collected / field methods / sampling methods):
   a) stream management strategies
   b) water quality

<u>Homework:</u>

After the fieldwork, please organize this fieldwork experience in field trip diary on p.13-14, as a reference for the revision of field-based question.


0 75 150 300 450 600 M
漂流教室 Drifting Classroom - 基本圖 Base Map
A
B
C
D
R
S
N
銀鑛灣
Silver Mine Bay
橫塘
Wang Tong
銀河 River Silver
渡輪碼頭
Ferry Pier
圖例 Legends
道路 Roads
河道 River Channels
等高線 Contour Lines
建築物 Buildings
河道糟化 Channelization

My Field Trip Diary

- Related modules: **Managing River and Coastal Environment : A continuing challenge**
- Key point of fieldwork/topic: _____

▪ Date:_____ (Weekday/ Public holiday) ▪ Time:_____ ▪ Field site: _____	▪ Weather condition:
Is the above planning appropriate for the fieldwork?	

- Primary data:

Data collection method	Data collected	Equipment/ Material (if any)	Merits/ Demerits of the data collection method (give examples)	Suggestion for improvement (give explanations)
❑ Measurement				
❑ Observation				
❑ Counting				
❑ Questionnaire/ Interview				
❑ Other (if any)				

- Secondary data (for supplementary information only):

Data collected	Use	Data obtained from
Apart from the above, what other secondary data could be used for further investigation?		

- Sampling method (if any):

Sampling method	Data to be collected	Merits/ Demerits

- Data processing and presentation:

Type of graph/ chart	Content shown and function of graph/chart

- For deeper learning or further study, I suggest modify the following aspects.

		Suggestion (give examples)
❑	Key point of fieldwork/ topic	
❑	Data to be collected and method of data collection	
❑	Date and time of fieldwork	
❑	Field site	