Stream Channel

Enquiry Skills Approach, Version 1.1

A. Planning and Preparation

Objectives
1. To study the downstream variations of channel shape.
2. To study the downstream variations of channel gradient.
3. To study the downstream variations of water flow.

Scope of the Study
1. Tai Mo Shan
2. Chuen Lung
3. Tai Tso Stream

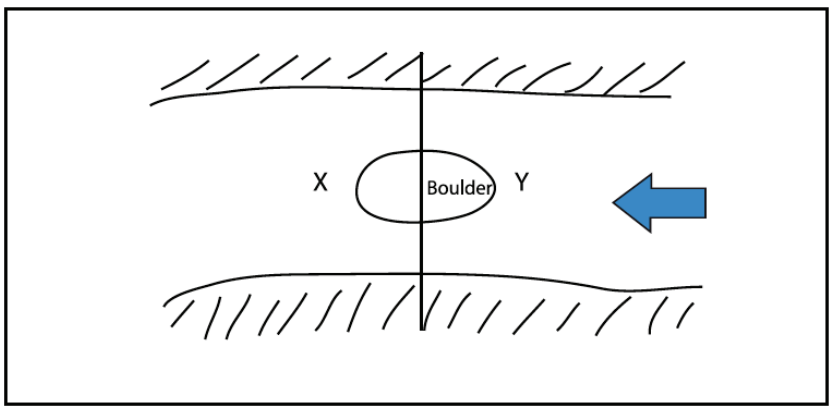
Think About
List the safety risks when conducting stream channel fieldwork.

Field Work Plan
At each site (A & B), choose a straight reach of stream 1 metre long. Avoid, as far as possible, pools or eddies.

C1 Channel Shape
Use the flexible tape to measure the width of the stream in meter.

a) Hold the tape taut across the stream perpendicularly and halfway from each end of the chosen reach.
b) Measure, with the metre ruler, the water depth (in Meter) at 10cm intervals across the width. (starting from the left bank as if you are looking upstream).
c) Take into account the fact that the water may splash up around the ruler.
d) Also ensure that the ruler is upright and on the stream bed, not on a stone or boulder which is not part of the bed.
e) In case any boulder is encountered, measure the depth of water upstream or downstream of the boulder, i.e. at X or Y as in Figure 6.1. Enter all data on Table 6.1a.

Figure 6.1 - Bird's Eye View



C2 Channel Gradient

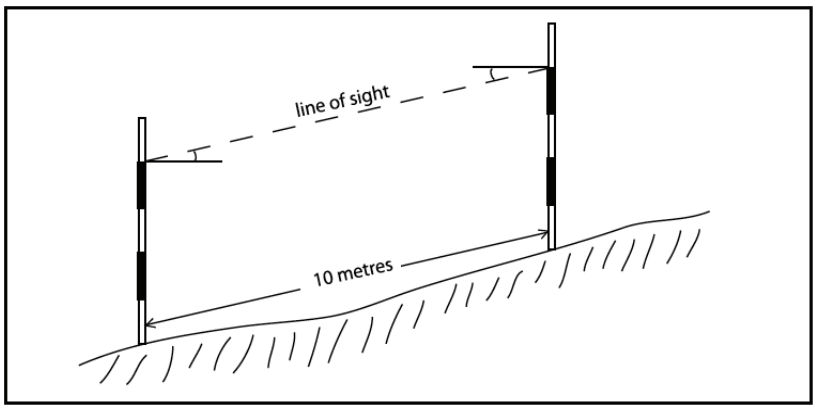
Use the abney level to measure the stream gradient.

a) Assign two people to do the job. They should wade into the stream and stand, for this purpose, 10 metres apart. Each is to hold a ranging pole vertically with the bottom of the pole resting on the stream bed.

b) The person upstream can hold the abney level against the first ranging pole at a certain height, say 1.5 metres, and sight the corresponding point on the second pole. Read the angle of depression.

c) Then take the angle of elevation from the downstream pole towards the first pole (Figure 6.2). Take the readings to the nearest half degree. Enter all data on Table 6.2.

Figure 6.2 - Long Profile View



C3 Water Flow

Field measurements of velocty are used to compute the discharge values:

1. Measure the velocity of the stream 5 times by using the stream flow meter.
2. Record the data in the unit, m/s.
3. Enter all data into Table 6.3a and then work out the average velocity and discharge of the stream into Table 6.3b.

B. Data Collection

Data Items

1. Channel Width
2. Channel Depth
3. Wetted Perimeter
4. Channel Gradient
5. Velocity

Data Collection Method

1. Systematic Sampling

Equipment List

Items	Quantity	Checked	Returned
1. Abney level	x2	❑	❑
2. Base map (Individual)	x1	❑	❑
3. Clipboard (Individual)	x1	❑	❑
4. Compass (Individual)	x1	❑	❑
5. Cotton gloves	x4	❑	❑
6. Measuring tap - 3.5m	x2	❑	❑
7. Measuring tap - 30m	x2	❑	❑
8. Ranging pole	x1	❑	❑
9. Stream flow meter	x1	❑	❑
10. Level meter	x2	❑	❑
11. Timer	x1	❑	❑
12. Bubble ball	x1	❑	❑

Think About

List possible errors when collecting data.

Data Recording sheet

Table 6.1a - Channel Shape

Width of stream = _____ m

Depth of stream (in cm)

1._____	2._____	3._____	4._____	5._____	6._____
7._____	8._____	9._____	10._____	11._____	12._____
13._____	14._____	15._____	16._____	17._____	18._____
19._____	20._____	21._____	22._____	23._____	24._____
25._____	26._____	27._____	28._____	29._____	30._____
31._____	32._____	33._____	34._____	35._____	36._____
37._____	38._____	39._____	40._____	41._____	42._____

Average depth = _____ m

Table 6.1b - Channel Shape

Cross-sectional area	=	_____ m^2
Wetted perimeter	=	_____ m
Hydraulic radius	=	cross-sectional area / wetted perimeter
	=	_____

Table 6.2 - Channel Gradient

Stream gradient	angle of depression	=	_____ degrees
	angel of elevation	=	_____ degrees
	average	=	_____ degrees

Table 6.3a - Velocity

1	2	3	4	5
Average velocity = _____ m/s				

Table 6.3b - Discharge

Discharge = velocity x cross-sectional area

= _____ m^3 / s

C. Data Processing, Presentation and Analysis

1. For each site draw a cross-section to scale on paper.
2. Complete Table 6.1, 6.2 & 6.3.
3. With reference to the data from all the other groups, draw graphs and diagrams to show the relationship of the following items:

   a) the downstream variation of discharge (i.e. the whole course)

   b) the relationship between discharge and width

   c) the relationship between discharge and depth

   d) the relationship between discharge and velocity

   e) the relationship between gradient and velocity

4. With reference to the data from all the other groups, summarize and compare the following items and circle the correct answer.

	Site A	Site B
Width	Wider / Narrower	Wider / Narrower
Average depth	Deeper / Shallower	Deeper / Shallower
Cross-sectional area	Bigger / Smaller	Bigger / Smaller
Wetted perimeter	Longer / shorter	Longer / shorter
Hydraulic radius	Higher / Lower	Higher / Lower
Stream gradient	Steeper / Gentler	Steeper / Gentler
Average velocity	Faster / Slower	Faster / Slower
Discharge	More / Less	More / Less

Think About

List the merits and demerits of the chosen graphs or diagrams.

D. Interpretation and conclusion

1. Summarize the main findings and the graphs, describe the downstream variation of the channel characteristics.

2. Summarize the main findings and the graphs, describe and explain the downstream variation of the river discharge.

E. Evaluation

1. Other than the data collected in this course, suggest other data and information you might need to further investigate the channel characteristics in the filed site. Explain your answer.