



Stream Channel

Enquiry Skills Approach, Version 1.0

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

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

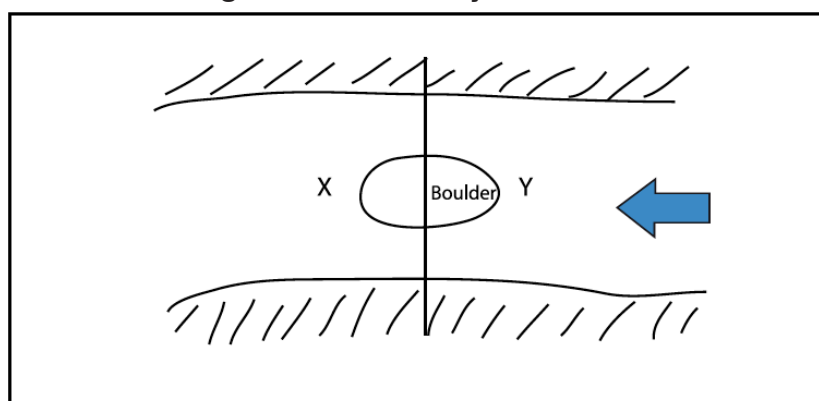
Use the flexible tape to measure the width of the stream in meter.

- 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.

Think About

List the safety risks when conducting stream channel fieldwork.

Figure 6.1 - Bird's Eye View

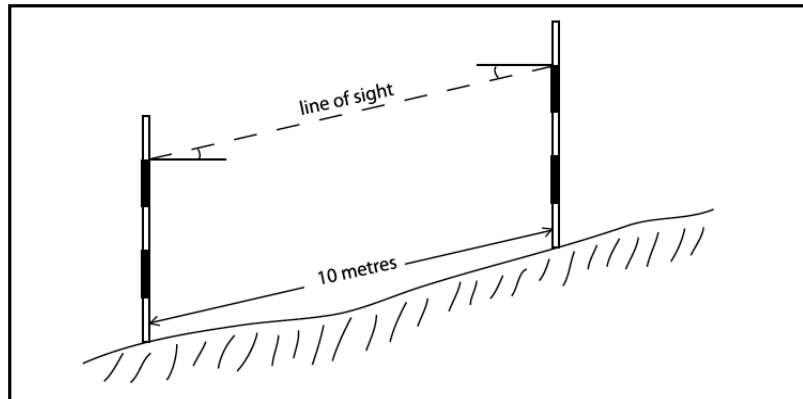


C2 Channel Gradient

Use the abney level to measure the stream gradient.

- 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.
- 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.
- 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 velocity are used to compute the discharge values:

- Measure the velocity of the stream 5 times by using the stream flow meter.
- Record the data in the unit, m/s.
- 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**

- Channel Width
- Channel Depth
- Wetted Perimeter
- Channel Gradient
- Velocity

Data Collection Method

- Subjective Sampling

Equipment List

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

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 field site. Explain your answer.
