Stream Channel

Version 3.0

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.

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	❏	❏

Field Work

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
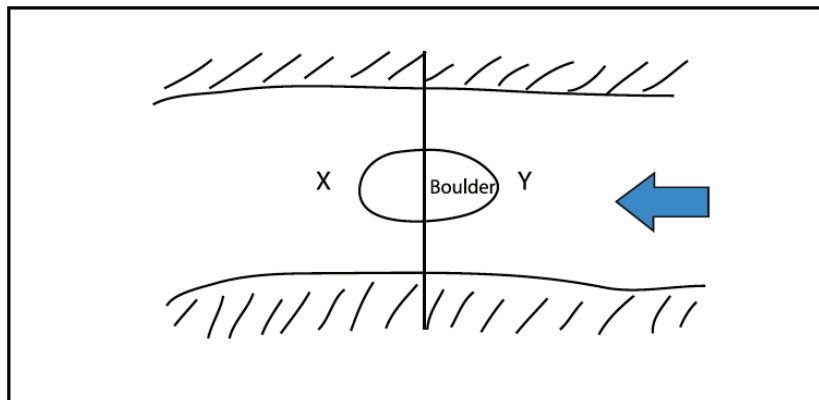
C2   Channel Gradient
Use the abney level to measure the stream gradient.
a)   Assign two people to do the job. They should wade into the stream and stand, for this purpose, 10 metres apart. Each is to hold a ranging pole vertically with the bottom of the pole resting on the stream bed.
b)   The person 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
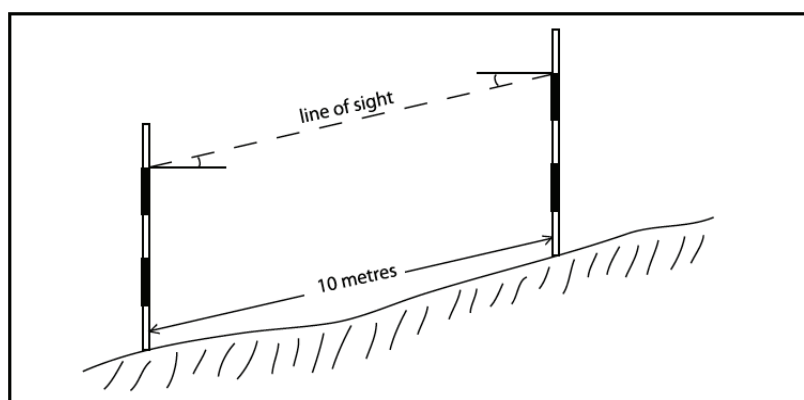
C3   Water Flow
Field measurements of velocty are used to compute the discharge values:
1. Measure the velocity of the stream 5 times by using the stream flow meter.
2. Record the data in the unit, m/s.
3. Enter all data into Table 6.3a and then work out the average velocity and discharge of the stream into Table 6.3b.

Data Sheet

Group:_____   Site:_____

Date: _____   Time:_____

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 veloctiy = _____ m/s

Table 6.3b - Discharge

Discharge = velocity x cross-sectional area

= _____ m^3 / s

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, plot scatter graphs 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

Discussion

1. Describe the surrounding environment in Sites A and B in details.

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

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

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4. With the reference to all findings, analyse the river energy of the studying river.

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