Stream Pollution

Version 4.0

Objectives

1. To examine the water quality in the study area.
2. To locate and identify the sources of pollution, and discuss the remedial measures of the problems.
3. To examine the environmental quality of rural landscape affected by nearby land uses.

Equipment List(Field Work)

Items	Quantity	Checked	Returned
1. Base map (Individual)	x1	❏	❏
2. Clipboard (Individual)	x1	❏	❏
3. Compass (Individual)	x1	❏	❏
4. Cloth	x2	❏	❏
5. Deionised water (Wash bottle)	x1	❏	❏
6. Forcep	x1	❏	❏
7. pH meter	x1	❏	❏
8. Beaker	x1	❏	❏
9. plastic bottle	x1	❏	❏
10. Rubber gloves	x4	❏	❏
11. Sampling bottle	x4	❏	❏
12. Total dissolved solids (TDS) meter	x1	❏	❏
13. Test tube	x1	❏	❏
14. Thermometer	x1	❏	❏
15. 'X' mark paper	x1	❏	❏
16. Colour Pencils	x1	❏	❏

Equipment List (Laboratory Work)

1. Beakers	6. Measuring cylinder
2. Boiling tubes	7. Solution C
3. Dissolved oxygen meter	8. Spectrophotometer
4. Filter funnel	9. Test tubes
5. Filter paper	

Field Work

1. Refer to Map 1.1.
2. In figure 1.2
   a) mark the land uses in the vicinity of the sites with color pencils,
      i) Green - Agricultural
      ii) Red - Commercial
      iii) Blue - Residential
      iv) Yellow - Industrial
      (Students are advised to go about 100m - 200m upstream to see what the land use is.)
3. At each site,
   a) complete Table 1.1.
   b) conduct water tests (including temperature, pH value and total dissolved solids) in each site and record the data in Table 1.2.
   c) collect a bottle of stream water back to the laboratory for tests (including dissolved oxygen (D. O.) and ammonia content).

Laboratory Work

L1   Dissolved Oxygen Test
1. Pour the water samples into corresponding conical flasks provided.
2. Put the probe of the Dissolved Oxygen meter into the conical flask.
3. Turn on the switch and wait for the reading.
4. Record the reading in Table 1.2.

L2   Ammonia Test
1. Collect a filtered 25 ml water sample into a boiling tube. (Use filter paper, beaker and measuring cylinder.)
2. Add 1 ml of solution C (Nessler's reagent) in it.
3. Agitate the mixture for 30 seconds.
4. A YELLOW colour indicates the presence of ammoniacal nitrogen.
5. Assess the concentration of ammonia by using the spectrophotometer provided.

Group: _____   Date:_____   Time: _____

Site: _____   Observable sewage discharge point(s): Yes/ No

Present weather:

1. Day before the study: Sunny / Rainy / Cloudy / Windy / _____

2. Today: Sunny / Rainy / Cloudy / Windy / _____

General description of the site: _____

_____

Table 1.1 - Characteristics of Stream Appearance

1.	Water level	❏ Full	❏ Normal	❏ Low	
2.	Floating matter Type: _____ [1]	❏ None	❏ Some	❏ Plentiful	❏ Abundant
3.	Suspended sediments	❏ None	❏ Some	❏ Plentiful	❏ Abundant
4.	Green algae[2]	❏ None	❏ Some	❏ Plentiful	❏ Abundant
5.	Sewage fungi[2]	❏ None	❏ Some	❏ Plentiful	❏ Abundant
6.	Colour	❏ Clear	❏ Less clear	❏ Brown	❏ Black
7.	Turbidity[3]	❏ Clear	❏ Fairly low	❏ Moderate	❏ High
8.	Smell	❏ None	❏ Some	❏ Moderate	❏ Strong

Remarks:
1. Oil, foam, faecal matter, plastic bags, etc.
2. Note the location and quantity.
3. Fill a test tube with stream water and view from above to see how clearly visible the cross drawn on the white paper is.

Table 1.2 - Other Properties of Stream Water

1. pH: _____   2. Temperature: _____ $^{\circ}$C

3. Total Dissolved Solids (TDS): _____ ppm   4. Dissolved Oxygen: _____mg/L

5. Ammonia Content: _____ ppm

1. According to Table 1.3, convert the findings on characteristics of stream (Table 1.1) into 4-point-scale marks.
2. According to Table 1.4, convert the properties of stream water (Table 1.2) into 5-point-scale marks.
3. By referring to Table 1.5, mark the findings of all sample points in Table 1.6, and then assess the degree of stream pollution at each sampling point.
4. Using an appropriate method, show the degree of pollution along the stream on base map.

Table 1.3 - 4 -Point Scale (on characteristics of stream)

Items	0	1	2	3
Floating matter	None	Some	Plentiful	Abundant
Suspended sediments	None	Some	Plentiful	Abundant
Green algae	None	Some	Plentiful	Abundant
Sewage fungi	None	Some	Plentiful	Abundant
Colour	Clear	Less clear	Brown	Black
Turbidity	Clear	Fairly low	Moderate	High
Smell	None	Some	Moderate	Strong

Table 1.4 - 5-Point Scale (on other properties)

Assessment Unit	0	1	2	3	4
Ammonia Content (ppm)	<1 (very low)	1 - <10 (low)	10 - <20 (moderate)	20 - <30 (high)	>=30 (very high)
Dissolved Oxygen (mg/L)	>7.5 (very high)	7.5 - >5.0 (high)	5.0 - >3.5 (moderate)	3.5 - >2.0 (low)	<=2.0 (very low)
Total dissolved solids (ppm)	<50 (very low)	50 - <100 (low)	100 - <200 (moderate)	200 - <400 (high)	>=400 (very high)

Table 1.5 - Degree of Pollution

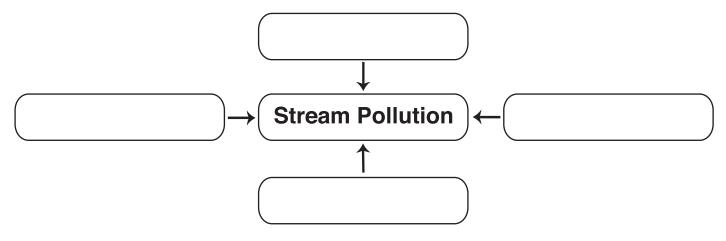| Assessment Unit	Pollution level
less than 5	clean
5 -10	slightly polluted
11-15	moderate polluted
over 15	severely polluted

Table 1.6 - Summary of Scores of Sampling Points

	Site 1	Site 2	Site 3	Site 4
Floating matter				
Suspended sediments				
Green algae				
Sewage fungi				
Colour				
Turbidity				
Smell				
Ammonia content				
Dissolved Oxygen				
Total dissolved solids				
Total score				
Pollution level				

Table 1.7 - Summary of Total Scores of Sampling Points

Group	Site 1	Site 2	Site 3	Site 4
1				
2				
3				
4				
5				
6				
7				
8				

Discussion

1. List out the possible sources of stream pollution in the study area.

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│              │ ───► │  Stream Pollution │ ◄─── │              │
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2. From the aspects of channel characteristics and landuse, explain the causes of stream water quality in site 1.

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_____

_____

3. From the aspects of channel characteristics and landuse, explain the causes of stream water quality in site 2.

_____

_____

_____

4. From the aspects of channel characteristics and landuse, explain the causes of stream water quality in site 3.

_____

_____

_____

5. From the aspects of channel characteristics and landuse, explain the causes of stream water quality in site 4.

_____

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6. What are the other factors affecting the stream water quality in the study area?

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7. Suggest policies to improve the stream water quality of the study area.

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8. As a rural representative in Chuen Lung, how would you suggest to improve the local environment to achieve sustainable development?

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