Basic training and experience sharing on using different field study instruments for conducting fieldwork on coast, city, industry and farming

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Ho Koon Nature Education cum Astronomical Centre
(Sponsored by Sik Sik Yuen)

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Objectives

• Introduction to suggested field study instruments for conducting fieldwork on coast, city, industry and farming
  • Techniques and hands-on practice

• Fieldwork on industry in Kwai Chung
  • Hands-on practice: Using some selected field study instruments for conducting fieldwork on industry
  • Experience sharing on students’ performance on industrial and urban fieldwork and reminders on learning and teaching

• Coastal fieldwork at Lido Beach
  • Hands-on practice: Using some selected field study instruments for conducting fieldwork on coast
  • Experience sharing on students’ performance on coastal fieldwork and reminders on learning and teaching
Conducting Fieldwork on Coast
## Conducting Fieldwork on Coast

### Measuring Profile Gradient
- Measuring Tape (as a transect)
- Ranging Poles
- Abney Level/ Clinometer
- Ruler
- Level Meter

### Measuring Swash / Backwash
- By Observation
- Swingometer

### Measuring Longshore Drift
- By Observation
- Floats (Button, Bottle, etc.)
- Measuring Tape
- Ranging Poles
- Anemometer
- Compass
- Nylon thread
- Timer

### Examining Sediment Sorting
- By Observation

### Measuring Sediment Size
- Trowel
- Sampling Bottle
- Sand Sieves
- Crucible
- Oven
- Spatula

### Measuring Water Quality
- Turbidity Test
- pH Meter
- Thermometer
- Dissolved Oxygen Meter
- Salinity Meter
- E. coli Culture Disc

### Measuring Sediment Roundness
- Vernier Calliper
- Radius Chart
- Cailleux Roundness Index

### Measuring Sediment Shape
- 10X Magnifying Glass
- Power’s Scale of Roundness
Measuring Profile Gradient

Run a Transect
Measuring Profile Gradient

Between Each Key Point
Measuring Profile Gradient
At Certain Distance on a Transect
Measuring Profile Gradient

By Using an Abney Level/ Clinometer
Measuring Profile Gradient

Abney Level

Clinometer
Measuring Profile Gradient

Abney Level

5 degree

Sight

Bubble

Water Level
Measuring Profile Gradient

By Using an Abney Level/ Clinometer

Gradient = \frac{a}{b}

By Using a Rope Tied on Two Ranging Poles

Angle = \tan^{-1}\frac{a}{b}
Measuring Swash and Backwash
By Frequency
Measuring Swash and Backwash

By Strength
Measuring Swash and Backwash

By Swingometer
Measuring Swash and Backwash

By Swingometer
Measuring Longshore Drift

Search in YouTube: How to measure Longshore Drift

https://www.youtube.com/watch?v=-2Sm7kOAsjk
Measuring Longshore Drift

By Observation
Measuring Longshore Drift

By a Float, e.g. Bottle, a Small Bottle, a Button, etc.
Measuring Longshore Drift
Measuring Sediment Deposition and Sorting

By Observation
Measuring Sediment Size

By Using Sieves

<table>
<thead>
<tr>
<th>mm</th>
<th>Phi</th>
<th>Wentworth Classification</th>
</tr>
</thead>
<tbody>
<tr>
<td>4.096~2.00</td>
<td>-12~-1.0</td>
<td>Gravel / Pebble</td>
</tr>
<tr>
<td>2.00~0.0625</td>
<td>-1.0~4.0</td>
<td>Sand</td>
</tr>
<tr>
<td>0.0625~0.0039</td>
<td>4.0~8.0</td>
<td>Silt</td>
</tr>
<tr>
<td>0.0039~0.00006</td>
<td>8.0~14.0</td>
<td>Mud</td>
</tr>
</tbody>
</table>
# Measuring Sediment Size

## By Using Sieves

<table>
<thead>
<tr>
<th>mm</th>
<th>weight (g)</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>&gt;2.0</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2.0 ~ &gt;1.0</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1.0 ~ &gt;0.6</td>
<td></td>
<td></td>
</tr>
<tr>
<td>0.6 ~ &gt;0.3</td>
<td></td>
<td></td>
</tr>
<tr>
<td>0.3 ~ &gt;0.125</td>
<td></td>
<td></td>
</tr>
<tr>
<td>0.125 ~ &gt;0.063</td>
<td></td>
<td></td>
</tr>
<tr>
<td>&lt;=0.063</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Measuring Sediment Size
By Using Sieves

To Tau Wan

Starfish Bay
Measuring Sediment Shape

By Cailleux Roundness Index (Pebble)

Roundness Index = \( \frac{\text{Radius of the Sharpest Corner} \times 2}{\text{Length of the Longest Axis}} \)

By Power’s Scale of Roundness (Sediments)

<table>
<thead>
<tr>
<th>Roundness Classes</th>
<th>Very Angular</th>
<th>Angular</th>
<th>Sub-angular</th>
<th>Sub-rounded</th>
<th>Rounded</th>
<th>Well Rounded</th>
</tr>
</thead>
<tbody>
<tr>
<td>Roundness Indices</td>
<td>0.12 to 0.17</td>
<td>0.17 to 0.25</td>
<td>0.25 to 0.35</td>
<td>0.35 to 0.49</td>
<td>0.49 to 0.70</td>
<td>0.70 to 1.00</td>
</tr>
</tbody>
</table>
Measuring Sediment Shape
By Cailleux Roundness Index (Pebble)

**Vernier Caliper**

- Corner Radius Chart
  - 0.039688cm
  - 0.07938cm
  - 0.11906cm
  - 0.15875cm
  - 0.19844cm
  - 0.238125cm
  - 0.27781cm
  - 0.3175cm
  - 0.35719cm
  - 0.39688cm
  - 0.39688cm
  - 0.43656cm
  - 0.47625cm
  - 0.55563cm
  - 0.635cm
  - 0.71438cm
  - 0.79375cm
  - 0.87313cm
  - 0.9525cm
  - 1.11125cm
  - 1.27cm
  - 1.42875cm
  - 1.5875cm
  - 1.74625cm
  - 1.905cm
Measuring Sediment Shape

By Cailleux Roundness Index (Pebble)

Roundness Index = \frac{\text{Radius of the Sharpest Corner \times 2}}{\text{Length of the Longest Axis}}

Length of the Longest Axis

Radius of the Sharpest Corner

\includegraphics[width=\textwidth]{image.png}
Measuring Water Quality

Salinity

Salinity is the amount of dissolved salt content of the water. The salinity of seawater is about 35 parts per thousand (ppt).

E. coli

Water Quality Objective (WQO) for bathing beaches has been set under the Water Pollution Control Ordinance (WPCO). The WQO states that the level of *E. coli* should not exceed 180 per 100mL, calculated as the geometric mean for all samples collected from March to October inclusive. Samples have to be taken at least 3 times a month at intervals of between 3 and 14 days.

EPD, HKSAR
Measuring Water Quality

Turbidity

Fill a test tube with sea water and view from above to see how clearly visible the cross drawn on the white paper below is.

Dissolved Oxygen

Dissolved Oxygen is the amount of gaseous oxygen dissolved in the water.

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Objective</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dissolved Oxygen (depth-average)</td>
<td>Not less than 4mg/L in 90% of the samples</td>
</tr>
<tr>
<td>Dissolved Oxygen (bottom)</td>
<td>Not less than 2mg/L in 90% of the samples</td>
</tr>
</tbody>
</table>

EPD, HKSAR
Conducting Fieldwork on Farming
### Conducting Fieldwork on Farming

<table>
<thead>
<tr>
<th>Mapping Land Use</th>
<th>Measuring Soil Moisture &amp; Organic Matters</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Base Map</td>
<td>• Crucible</td>
</tr>
<tr>
<td>• Aerial Photo</td>
<td>• Electronic Balance</td>
</tr>
<tr>
<td>• Satellite Image</td>
<td>• Oven (Soil Moisture) / Furnace (Organic Matters)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Identifying Farming Type</th>
<th>Measuring Soil Chemical Properties</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Observation</td>
<td>• Soil Testing Kit (pH, Nitrogen NO$_3$, Phosphorus P$_2$O$_5$, Potassium K$_2$O)</td>
</tr>
<tr>
<td>• Questionnaires</td>
<td>• Soil pH Meter</td>
</tr>
<tr>
<td>• Interviews</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Identifying Farming System</th>
<th>Measuring Soil Texture</th>
</tr>
</thead>
<tbody>
<tr>
<td>• (Inputs / Processes / Outputs)</td>
<td>• 1-Litre Measuring Cylinder</td>
</tr>
<tr>
<td>• Observation</td>
<td>• Calgon</td>
</tr>
<tr>
<td>• Questionnaires</td>
<td>• Hydrometer</td>
</tr>
<tr>
<td>• Interviews</td>
<td>• Sealing Film</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Measuring Water Quality</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>• Dissolved Oxygen Meter</td>
<td></td>
</tr>
<tr>
<td>• Total Dissolved Solid Meter</td>
<td></td>
</tr>
<tr>
<td>• Ammonia Test</td>
<td></td>
</tr>
<tr>
<td>• Phosphorus Test</td>
<td></td>
</tr>
</tbody>
</table>
Mapping Land Uses

Along a Route

Within an Area

(Images are missed due to copyright issue.)
Identifying Farming Type

Traditional Farming  Organic Farming  Leisure Farming
Identifying Farming System

Inputs

Processes

Outputs
Measuring Soil Moisture & Organic Matters

Soil Moisture

Organic Matters
Measuring Soil Chemical Properties

Soil Testing Kit

pH Meter
Measuring Soil Texture

By Hydrometer
Conducting Fieldwork on City
Conducting Fieldwork on City

Measuring Air Quality
• Carbon Dioxide Meter
• Dust Particulate Meter
• Presence of Lichens

Mapping Land Use
• Observation
• Base Map
• Aerial Photos
• Satellite Images

Measuring Sound Level
• Sound Level Meter

Counting Vehicles or Pedestrian Flow
• Counter

Measuring Water Quality
• Dissolved Oxygen Meter
• Total Dissolved Solid Meter
• Ammonia Test
• Phosphorus Test

Examining Land Pollution
• Observation
Measuring Air Quality

Carbon Dioxide Meter
Unit: ppm (Parts Per Million)

(Images are missed due to copyright issue.)
Measuring Air Quality

Dust Particulate Meter (PM2.5)

Unit: $\mu$g/m$^3$

(Images are missed due to copyright issue.)
Measuring Air Quality

Presence of Lichens

<table>
<thead>
<tr>
<th>Lichen</th>
<th>Characteristics</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Squamaria sp.</strong></td>
<td>Stone, crustose, black fruit bodies immersed in the thallus.</td>
</tr>
<tr>
<td><strong>Caloplaca sp.</strong></td>
<td>Stone, crustose, thallus deep orange.</td>
</tr>
<tr>
<td><strong>Aspicilia sp.</strong></td>
<td>Stone, crustose, fruiting bodies dark brown with pale grey margin, seated on the thallus.</td>
</tr>
<tr>
<td><strong>Buellia sp.</strong></td>
<td>Stone, crustose, fruiting bodies black without obvious margin, seated on the thallus.</td>
</tr>
<tr>
<td><strong>Diploschistes actinostomus</strong></td>
<td>Stone, crustose, black spots.</td>
</tr>
<tr>
<td><strong>Pertusaria sp.</strong></td>
<td>Stone, crustose, bright white soredia.</td>
</tr>
</tbody>
</table>
Measuring Sound Level

Sound Level Meter

Unit: Decibel (dB)

(Images are missed due to copyright issue.)
Measuring Sound Level

dB Calculator

(Images are missed due to copyright issue.)
Conducting Fieldwork on Industry
Conducting Fieldwork on Industry

Measuring Air Quality
- Carbon Dioxide Meter
- Dust Particulate Meter
- Ringelmann Chart (Smoke Density)
- Presence of Lichens

Identifying Types of Industry
- Directory of Industry Buildings
- Presence of Chimneys

Measuring Sound Level
- Sound Level Meter

Counting Vehicles Flow & Parking
- Counter

Measuring Water Quality
- Dissolved Oxygen Meter
- Total Dissolved Solid Meter
- Ammonia Test
- Phosphorus Test

Examining Land Pollution
- Observation
Measuring Air Quality

Smoke Density Chart (Ringelmann Chart)

1. Stand at least 30 meters but not more than 400 meters from the tested chimney.
2. Hold the chart at arm’s length.
3. Look through the hole at the smoke as it emerges from the top of the chimney.
4. Compare the grey segments on the chart with the view through the hole.
Measuring Air Quality

Virtual Ringelmann App (Android Only)

(Images are missed due to copyright issue.)

http://virtualringelmann.com/en
Measuring Water Quality

Total Dissolved Solid Meter

Total dissolved solids (TDS) comprise inorganic salts (principally calcium, magnesium, potassium, sodium, bicarbonates, chlorides, and sulfates) and some small amounts of organic matter that are dissolved in water.

Counting Vehicles Flow & Parking

By Counting
Identifying Types of Industry

Directory of Industrial Buildings

Presence of Chimneys