Designing and organising fieldwork on the physical environment for the development of fieldwork skills

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

- Basic procedure of an enquiry-based fieldwork
- Suggested fieldwork skills on the physical environment and fieldwork examples on developing such skills
- Reminders on organising fieldwork on the physical environment
Basic procedure of an enquiry-based fieldwork
Basic Procedure of Enquiry-Based Fieldwork (5 Stages)

- Planning and Preparation
- Data Collection
- Data Processing, Presentation and Analysis
- Interpretation and Conclusion
- Evaluation
Basic Procedure of Enquiry-Based Fieldwork (5 Stages)

• Planning and Preparation
  • Topic, Title/ Hypothesis, Site, Sampling, Equipment, Safety, etc.

• Data Collection

• Data Processing, Presentation and Analysis

• Interpretation and Conclusion

• Evaluation
Basic Procedure of Enquiry-Based Fieldwork (5 Stages)

• Planning and Preparation

• Data Collection

• Measuring, Recording, Errors, etc.

• Data Processing, Presentation and Analysis

• Interpretation and Conclusion

• Evaluation
Basic Procedure of Enquiry-Based Fieldwork (5 Stages)

• Planning and Preparation

• Data Collection

• Data Processing, Presentation and Analysis
  • Statistical methods, Graphs/ Diagrams/ Maps, etc.

• Interpretation and Conclusion

• Evaluation
Basic Procedure of Enquiry-Based Fieldwork (5 Stages)

- Planning and Preparation
- Data Collection
- Data Processing, Presentation and Analysis
- Interpretation and Conclusion
- Concepts, Knowledge, Application, etc.
- Evaluation
Basic Procedure of Enquiry-Based Fieldwork (5 Stages)

- Planning and Preparation
- Data Collection
- Data Processing, Presentation and Analysis
- Interpretation and Conclusion
- Evaluation
  - Difficulties, Limitations, Improvement, etc.
Suggested fieldwork skills on the physical environment and fieldwork examples on developing such skills
Fieldwork Skills on the Physical Environment

- Managing River and Coastal Environments
- Disappearing Green Canopy
- Global Warming (Climate Change)
- Opportunities and Risks?
- Combating Famine?
Skills of River Fieldwork

- Measuring of
  - Channel Width (measuring tape)
  - Channel Depth (ruler)
  - Wetted Perimeter (measuring tape)
  - Channel Gradient (abney level/clinometer, ranging poles)
  - Stream Velocity (stream flow meter, float, timer)
  - Pebble Roundness (roundness index, radius chart, vernier caliper)
  - Water Quality (dissolved oxygen, ammonia content, pH, etc.)
  - etc.
Skills of Coast Fieldwork

- Measuring of
  - Profile/ Gradient (measuring tape, ranging poles, abney level/ clinometer)
  - Longshore Drift (sediment, bottle, float)
  - Swash and Backwash (observation)
  - Sediment Deposition & Sorting (observation)
  - Sediment Grain Size (sieves)
  - Sediment Shape (roundness index, radius chart, vernier caliper, magnifier)
  - Water Quality (salinity meter/ refractometer, E. coli culture disc, etc.)
  - etc.
Skills of Woodland Fieldwork

• Measuring of
  • Gradient (abney level, clinometer)
  • Stratification (observation)
  • Tree height (abney level, measuring tape)
  • Tree crown width (measuring tape)
  • Tree trunk circumference (measuring tape)
  • Tree species (observation)
  • Microclimate (light meter, thermometer, hygrometer, anemometer, compass)
  • etc.
Skills of Weather Fieldwork

• Measuring of
  • Light Intensity (light meter)
  • Air Temperature/ Temperature (thermometer, black ball thermometer)
  • Relative Humidity (hygrometer)
  • Wind Speed (anemometer)
  • Wind Direction (compass, rope)
  • Air Pressure (barometer)
  • Visibility (map, ruler)
  • Precipitation (rain gauge/ measuring cylinder)
  • etc.
Skills of Coast Fieldwork
Measuring a Beach Profile

Between Each Key Point
Measuring a Beach Profile

At Certain Distance on a Transect
Measuring a Beach Profile

At Certain Distance on a Transect
Measuring the Gradient

By Using an Abney Level/ Clinometer
By Using a Rope Tied on Two Ranging Poles
Measuring the Gradient

By Using an Abney Level/ Clinometer

\[ \text{Gradient} = \frac{a}{b} \]

By Using a Rope Tied on Two Ranging Poles
Measuring of Longshore Drift
Measuring of Longshore Drift

Search in YouTube: How to measure Longshore Drift

https://www.youtube.com/watch?v=-2Sm7kOAsjk
By Observation
Measuring of Longshore Drift
By a Bottle, a Small Bottle, a Float, etc.
Measuring of Swash and Backwash

By Frequency/Strength
Measuring of Sediment Deposition and Sorting
# Measuring of Sediment Grain Size

<table>
<thead>
<tr>
<th>mm</th>
<th>Phi</th>
<th>Wentworth Classification</th>
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<tbody>
<tr>
<td>4.096~2.00</td>
<td>-12~-1.0</td>
<td>Gravel</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>
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Measuring of Sediment Grain Size
By Using Sieves

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<tr>
<th>mm</th>
<th>weight (g)</th>
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<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>
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<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>
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Image of Sieves
Measuring of Sediment Shape

By Roundness Index (Pebble)

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

Power's Scale of Roundness

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<th>Sub-angular</th>
<th>Sub-rounded</th>
<th>Rounded</th>
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<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>
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Measuring of Sediment Shape

By 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
Measuring of Sediment Shape

By Observation (Sand)

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![Image showing samples of sediment with labels and weights]
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.

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

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Measuring of Water Quality

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E. Coli

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EPD, HKSAR
Common Skills of Physical Fieldwork

• Measuring of
  • Gradient (abney level, ranging poles, clinometer)
  • Sediment Roundness (roundness index, radius chart, vernier caliper)
  • Water Quality (E. Coli, pH, etc.)
  • Weather Elements (light intensity, temperature, R.H., etc.)
  • etc.
Skills of River Fieldwork
Measuring of Channel Shape

At Bankfull/ Current Stage
Measuring of Stream Velocity
By Stream Flow Meter
Measuring of Stream Velocity

By Stream Flow Meter
Measuring of Stream Velocity

By Using a Float

Stream Velocity = \frac{Distance}{Time} \times \text{Correction Factor}

\text{Correction Factor}
For rough or rocky river bed: 0.85
For smooth, muddy or sandy river bed: 0.9
Reminders on organising fieldwork on the physical environment
Reminders

• Safety

• Site Selection (Objectives, Accessibility, etc.)

• Time (Tide, Discharge, Daily change, Seasonal change, etc.)

• Equipment (Accuracy, Precision, Calibration, etc.)

• Measurement (Position, Method, etc.)

• etc.
Self-made equipment