



Studies of Island Weather



Student Name: _____

Group Number: _____

Course Date: _____

OBJECTIVE	ES	
Knowledge:	-	To understand different weather elements
	-	To examine how natural factors and human activities affect weather elements
	-	To understand the effect of urban planning on urban micro-climate
Skill:	-	To use different field equipment to collect data of weather elements and the
		surrounding environment
	-	To draw graphs to show the data of different weather elements and the
		distribution of urban climate sensitivity
Value:	-	To understand the impacts of changing weather elements and our responsibilities
	-	Be aware the challenges to national security imposed by global climate change
		due to urban development

Relevance to DSE geography curriculum

- Compulsory Module 7: Climate Change Long-term fluctuation or irreversible trend?
- Elective Module 2: Weather and Climate

STAGE 1 PLANNING AND PREPARATION

Prior knowledge

1. List the **weather elements** that you have learnt.

2. List the locational factors that would affect the above weather elements.

Enquiry question

Which two field sites would have significant differences in weather elements?

According to the map on p.12 and the photos of field sites, circle the expected result in the table below.

	Weather elements (average)						
Field site	Air temperature	Relative humidity	Wind speed	Light intensity			
(my group)	Higher / Lower	Higher / Lower	Higher / Lower	Higher / Lower			
	Higher / Lower	Higher / Lower	Higher / Lower	Higher / Lower			

Enquiry question 1:

The major locational factors contributing to the differences of weather elements between two field sites would be

Urban planning would affect micro-climate. The higher the urban climate sensitivity (including thermal load and dynamic potential), the greater the chance of urban heat island effect.

Refer to the map on p.13. How would urban climate sensitivity change with increasing distance from city centre?

Enquiry question 2:

The farther from the city centre, the <u>higher / lower</u> the urban climate sensitivity.

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> When to collect data?		
Date:	Season:	What factors would you consider in choosing the
Time: to	_	fieldwork date?
1. Any weather warnings & sig	nals issued by the Hong Kong	
Observatory in the last three d	ays?	
□ Tropical cyclone warning signals	\Box Rainstorm warnings \Box Frost warning	
□ Cold weather warning □ Very I	not weather warning	
2. Is today ideal for fieldwork of	of this topic? Why?	

Where to collect data? \geq

Is Cheung Chau an ideal field site? Why?	What factors are considered
	when choosing the field site?
Enquiry question 1	
Refer to the map on p.12, choose two field sites (Site 1 to Site 8) that you	
expect to have significant differences in weather elements for data	
collection.	
Choice of field site:sampling is applied.	
Enquiry question 2	
Refer to the map on p.13. You are required to walk along one of the study	
routes (A to D or W to Z) and collect data at the corresponding field sites.	
**Each field site has the same distance.	
Choice of field site:sampling is applied.	

A.	Observation	B.	Measurement	C.	Counting	D.	Category
E.	Distribution/ Mapping	F.	Scoring	G.	Field sketching	H.	Questionnaire/ In-depth interview

Table 1 Primary data collection methods (details on p.16)



What data to be collected and how to collect data?

	Items	Primary data collection methods [A-H] (see Table 1) (may choose more than one)	Equipment [1-6] (see Table 2) (if needed)	Operational precautions
Enquiry qu	uestion 1			
	Air temperature			
Weathaw	Relative humidity			
olomonts	Wind direction &			
elements	wind speed			
	Light intensity			
	Surrounding buildings			
Locational	& obstacles			
factors	(distance & height)			
	Land cover material			
Enquiry qu	uestion 2			
	Aspect ratio			
Urban	(Building height : road			
climate sensitivity	width)			
	Dynamic potential			
	Vegetation cover			
Other (if appl	icable):			



Table 2 Equipment for fieldwork (Make sure you know how to use them correctly before fieldwork.)



STAGE 2 DATA COLLECTION (Part 1)

1. Weather elements

- Each group at different field sites (map on p.12) would measure <u>air temperature</u>, <u>relative humidity</u>, <u>wind direction</u>, <u>wind speed</u> and <u>light intensity</u> at the same time.
- Collect data of weather elements in every _____ minutes (______ minutes in total)
 (SIMULTANEOUSLY for all groups)

Field	l site						
Wea	ther condition:	sunny	cloudy Crainy	□ smog	remarks:		
			Weather elements				
	Time	Air temperature	Relative humidity	Wind	Wind speed	Light intensity	
		(°C)	(%)	direction	(m/s)	(Lux)	
1.							
2.							
3.							
4.							
5.							
6.							
	Average value						
Ave	rage value of another field site						
Is yo	our hypothesis valid? (✓ / ≭)						

Why should the data of different field sites be collected at the same time (simultaneously)?

What sampling method is applied when data are collected at every 5 minutes?



建築物高度 垂直距離 視線高度 Figure 1 How to measure the height of = 2. Locational factor Height of building Vertical distance Height of eye level building/ obstacle (To find H1 by laser **Description of field site** distance meter) Field site Building height = H1 + H2rtical Land cover material: H1 -= (D tan α) + H2 仰角 angle of elevation

Distance and height of surrounding building and obstacle (see Figure 1)

- Use the laser distance meter to measure the distance and the height of surrounding building and obstacle.
- ** If there is no building or obstacle in certain direction, record the landscape
 - of that direction, e.g. sea

		Horizontal distance	Height of surround	ding building or obstacle	
Direction	Type of obstacle	between building/ obstacle and field site (m)	<u>Vertical distance</u> between height of eye level and height of building (m) (H1)	Height of eye level of observer (m) (H2)	Total height (m) (H1 + H2)
Ν					
NE					
Е					
SE					
S					
SW					
W					
NW					



H2 -

視線高度 height of eye level

horizontal distance

D

C

STAGE 2 DATA COLLECTION (Part 2)

3. Urban climate sensitivity_

Each group walk through the four field sites (map on p.13) and assess the <u>urban climate sensitivity</u> using observation.

Indicators of assessment

A	Score and description of urban climate sensitivity				
Assessment items	Neutral	Moderate	High	Very high	
Aspect ratio	Less than 1.0	1.0-2.0	2.1-4.0	Larger than 4.0	
(building height : width of road)	(0 mark)	(2 marks)	(4 marks)	(6 marks)	
	High	Moderate	Low	Very low	
Dynamic potential	(0 mark)	(2 marks)	(4 marks)	(6 marks)	
Vacatation action	Many	Moderate	Low	Nil	
vegetation cover	(0 mark)	(1 mark)	(2 marks)	(3 marks)	

Data record sheet

A	Assessment points				
Assessment items					
Aspect ratio (building height : width of road)	mark(s)	mark(s)	mark(s)	mark(s)	
Dynamic potential	mark(s)	mark(s)	mark(s)	mark(s)	
Vegetation cover	mark(s)	mark(s)	mark(s)	mark(s)	
Total score	mark(s)	mark(s)	mark(s)	mark(s)	

Total score	Urban climate sensitivity level	Colour
0-3	Neutral urban climatically sensitive area	Blue
4-7	Moderate urban climatically sensitive area	Green
8-11	Highly urban climatically sensitive area	Orange
12-15	Very highly urban climatically sensitive area	Red

STAGE 3 DATA PROCESSING, PRESENTATION AND ANALYSIS

Enquiry question 1:

1. Weather elements

What kind of graph/ diagram is suitable for comparing data of two field sites over time?

Draw the above graph to show the various weather data of the two field sites.

2. Distance and height of surrounding buildings and obstacles

Refer to the graph on p.9 and mark the distance and height of surrounding buildings and obstacles of **your field site**.

Enquiry question 2:

3. Urban climate sensitivity

What kind of graph/ diagram is suitable to show the distribution of data of your field site?

Use the above diagram to show the urban climate sensitivity of various field sites with the classification scheme of the map on p.13.



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Mark the surrounding building(s) and obstacle(s) on the dotted line with the scheme below:

Ratio of <u>distance</u> to field site:	1 cm = 2 metres				
Height of building and obstacle:	0-3m	>3-9m	>9-12m	>12m	
<u>Type</u> of building and obstacle:	Picture or self-determined sign (e.g. tree, building, sea)				



STAGE 4 INTERPRETATION AND CONCLUSION

Enquiry question 1

- 1. Compare the similarities and differences of the data of various weather elements of your two field sites, discuss whether the hypothesis (p.2) is valid or not. [Are there any other locational factors?]
- 2. "Heat island effect is a common phenomenon in a populated city, of which the temperature in urban areas is significantly higher than that in rural areas....."

Compare the air temperature data from the Hong Kong Observatory, Automatic Weather Station of Caritas Chan Chun Ha Field Studies Centre and the data collected during fieldwork in Cheung Chau, discuss whether the statement is valid or not.

- Air temperature data from the Hong Kong Observatory (HKO) http://www.hko.gov.hk/tc/wxinfo/ts/display_element_tt.htm
- Air temperature data from the Automatic Weather Station of Caritas Chan Chun Ha Field Studies Centre https://cowin.hku.hk/chinese/series.html

Enquiry question 2

- 3. With reference to the data displayed on p.13, discuss whether the hypothesis (p.2) is valid or not.
- 4. In recent years, the number of hot nights and very hot days remain high. Refer to the field evidence, suggest urban planning measures to improve the micro-climatic environment of Cheung Chau and tackle the heat island effect.

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STAGE 5 EVALUATION

- 1. What sampling method is used in <u>a) choosing field site</u> and <u>b) measurement of weather elements</u> respectively? Account for the <u>merits</u> and <u>demerits</u> of these sampling methods.
- Observation is used for assessing urban climate sensitivity. State the <u>advantages</u> and <u>limitations</u> of this method.
- 3. Relate enquiry question 1 or 2, what may cause bias in the data collected? What can be done to improve the reliability and validity of data of this fieldwork?

Enquiry question 1 / D Enquiry question 2

	Factors affecting the data rel	iability and validity	Suggestion for improvement
Fiel ◆	dwork date/ time Fieldwork date and time representative? Any impact by today's weather condition?		
Fiel •	d site/ study area Field sites match with research topic? Field study area adequate?		
Loc:	ation of data collection (Sampling) Sampling method in choosing field site appropriate? Location of measurement representative? Sample size sufficient?		
Data	a collection items/ methods Data collection items adequate to respond the enquiry questions? Are the data obtained from the data		
•	collection method(s) objective and without bias? Any inadequacy about the equipment/ instruments? Measurer using the equipment/ instruments correctly?		

4. Further study:

Devise a study plan on the topic related to <u>the differences of weather elements between urban and</u> <u>rural areas</u> (Items may include: field site/ date/ time/ hypothesis/ data to be collected/ sampling methods/ equipment list, etc.)

<u>Homework</u>

After the fieldwork, complete the field trip diary (p.14-15) as a means to consolidate this fieldwork experience and reference for revision of field-based question.



Field Studies Courses for SS Geography 2022-23



Field Studies Courses for SS Geography 2022-23

My Field Trip Diary

Studies of Island Weather

Related modules: ______

Key point of fieldwork/topic: ______

Date: ______ (Weekday/ Public holiday)
Time: ______ • Field site: ______
Is the above planning appropriate for this fieldwork?

Primary data:

Strategies of data collection	Data collected	Equipment/ Instrument (if any)	Merits [©] / Demerits [®] of the data collection strategy (give examples)	Suggestion for improvement (give explanations)
Measurement				
Observation				
Counting				
Questionnaire/				
Interview				
Other (if any)				



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- Secondary data:

Data collected	Use	Obtained from		
Anart from the above what other	supplementary information would	he necessary to respond to the		
fieldwork tonic?				

Sampling method (if any):

Sampling method	Applied during data collection of	Merits©/ Demerits®

> Data processing and presentation:

Type of graph/ chart	Content and function of graph/chart	Merits©/ Demerits

> For deeper learning or further study, I suggest modify the following aspects:

	Suggestion	(give examples)
Key point of fieldwork/ topic		
Data to be collected and method of data collection		
Date and time of fieldwork		
Field site		

Methods	Explanations	Examples
1. Observation	• To explore the details of research subject (people, things or environment) in a purposive and planned way.	 Taking photos, drawing sketches (places near the school)
2. Measurement	• To estimate or measure the physical quantity of the research subject (data usually shown in certain standard or weights and measures).	 Travel time of ordinary and fast ferry (time) Measurement of the width of street (length)
3. Counting	• To record the number of occurrence of a single item.	• Pedestrian flow at the pier
4. Category	 To classify based on the nature, characteristics and uses: to group the same or similar things; to separate different things. 	 Types of goods sold in supermarket Customers (serving local residents and tourists) of different shops
5. Distribution	 To group similar things according to the research topic (similar to "4. Category"); Only suitable for spatial representation (different from category); Useful in showing the mode of occurrence of research subject in a complex environment. 	 Distribution of shops selling big fish balls
6. Scoring (Index)	 To quantify abstract or subjective concepts; To merge various data for easy comparison; Scoring items should include different aspects. 	 Michellin 's restaurant rating (3-star rating) Air Quality Health Index (AQHI)
7. Questionnaire	 Forms: face-to-face, telephone, written, etc.; Using questionnaire to understand the opinion of research subject; Larger sample size than "8. in-depth interview"; Mainly closed questions (with options available). To collect information by questioning; To obtain information which is 	 Reasons for tourists to visit Cheung Chau
8. In-depth Interview (unstructured, semi-structured, structured)	 To obtain information through face-to-face/ telephone interview; Smaller sample size than "7.Questionnaire"; Mainly open questions and forthcoming questions will change upon the answer of respondents. difficult to be obtained through observations; To understand the rationales and opinions of interviewees. 	 Opinions of District Council members on the future development of that district

Data collection methods

Sampling Methods

	 Probabilistic sampling methods Need to know the size of population; Few differences among individuals; Individual has equal chance of being selected; Representativeness of data depends on sampling percentage. 			 Non-probabilistic sampling methods Size of population might not be relevant to the research objective; Chance of individual being selected is unknown; Representativeness of the results depends on the judgment of researcher in sample selection (Such as the correlation between samples and research targets). 		
Methods	Simple random Sampling	Systematic sampling	Stratified Sampling	Quota Sampling	Convenience Sampling	Purposive sampling
	(簡單隨機抽樣)	(系統抽樣)	(分層抽樣)	(配額抽樣/定額抽樣)	(便利抽樣/方便抽樣)	(立意抽樣)
Explanations	To select sample from the <u>whole population</u> <u>randomly</u> . (using computer program, bamboo slip or random number table)	Each member of the whole population is sequentially numbered, then selected according to a <u>fixed, periodic</u> <u>interval</u> .	The whole population are classified according to the variable and divided into separate stratum. Then samples are selected randomly by proportion from each stratum.	The whole population are classified according to the variable and divided into separate stratum. Then desired number (quota) of samples are selected from each stratum.	Research subjects are selected due to convenience of recruitment.	Samples are selected according to research objectives and special requirements.
Examples	To choose a certain number of students to conduct questionnaires/ surveys according to the class number.	To measure the noise level of a street in a regular interval.	To group buildings according to their ages (e.g. above or below 50), and select a certain number of buildings in each group randomly.	To select a certain number of male and female customers, then record the amount spent in a shop.	To interview a certain number of relatives who work in mainland China To interview a certain number of passersby on the street	To conduct an in-depth interview with a district councilor about the social problems of that district.
Remarks	Suitable for small population and few variations among samples (for relevant research objectives).	Suitable for large population (hidden cyclic ordering which may affect the representativeness of data).	Effectively show the relationship / effect between variables.	Effectively show the relationship / effect of variables, but the characteristics and size of samples are judged subjectively.	Should not generalize the data to larger population	Suitable for qualitative research (data is easily influenced by the subjective judgment of researcher)