Farming System in Mui Wo (1 day)

Student Name:_____ Group:_____

Course date:_____

OBJECTIVES

- Knowledge:
  - To understand farming system (conventional farming and hydroponics)
  - To examine how urban development affects farming activities
  - To assess the feasibility of sustainable farming development through application of modern agricultural technology
- Skills:
  - To classify land use in various farming areas
  - To conduct laboratory works of water samples
  - To analyse secondary data
- Value:
  - To develop students' awareness of the development of sustainable farming
  - To understand the impact of farming activities on the ecological environment and our responsibilities
  - Be aware the importance of sustainable farming development to the national food supply security

Relevance to the DSE Geography Curriculum

- ✪ Combating Famine – Is technology a panacea for food shortage?
- ✪ Building a Sustainable City – Are environmental conservation and urban development mutually exclusive?

STAGE 1: PLANNING & PREPARATION

➢ Prior knowledge

1. List the factors that would affect the development of farming activities.

Physical factors	Human factors

2. How to distinguish different farming land uses?

	Commercial farming	**Subsistence farming**	**Leisure farming**	**Fallowed farmland**	**Abandoned farmland**
Scale of production*	large/medium/small	large/medium/small	large/medium/small		
Farming Intensity#	high/medium/low	high/medium/low	high/medium/low		
Crop type	Mainly cash crops Fewer crop variety	Mainly field crops More crop variety	Variable More crop variety		
Others					

** The size production farm varies from 1 to 35 dau chung.*

1 dau chung (674.47m^2) or approximately 1.6 standard basketball court or 8.3 standard badminton court.

 # related to the intensity of land utilization: higher levels of input per unit are of land (e.g. labour, capital, machinery, etc.

3. Refer to the map (p.11), estimate which uses of farmland is likely to appear in different areas and give reasons for your answer.

Use of farmland	Area (A/B/C/D)	Reasons
Commercial farming		
Subsistence farming		
Leisure farming		
Abandoned farmland		

What is/are the major locational factor(s) facilitating the current development of farming activities in the study areas?

_____

_____

➢ When to collect data?

Date:_____ ☐Monday to Friday ☐ Saturday ☐ Sunday & Public holiday

Season:_____ Solar terms:_____ Time:_____ to _____

1. Any weather warnings & signals issued by Hong Kong Observatory in the **last three days**?

☐ Tropical cyclones warning signals ☐ Rainstorm warning signals ☐ Frost warning

☐ Cold weather warning ☐ Very hot weather warning ☐ Other:_____

2. Is today ideal for fieldwork of this topic? Why?

What factors do you consider when selecting fieldwork date?

➢ Where to collect data?

My study areas: ☐ Area A&B ☐ Area C&D

Is Mui Wo an ideal field site of this topic? Why?	What factors would you consider when choosing the field site?
Enquiry Question 1: What are the distribution of different farming systems? What are the main locational factors of the present agricultural activities in the study area? Hypothesis: The farther from city centre, there will be more/ less commercial / subsistence / leisure / abandoned farmland. The farther from city centre, there will be more/ less commercial / subsistence / leisure / abandoned farmland.	
Enquiry Question 2: How far do farming activities affect the stream water quality?	
Enquiry Question 3: How far do farming technology relieve farming constraints?	

➢ What data to be collected and how to collect the data?

Refer to "Primary data collection methods" (Table 1) and "Equipment list" (Table 2), complete the table below.

Items			**Primary data collection methods [A-H]** (may choose more than one)	**Equipment required [1-7](if needed)**	**Operational precautions** (fill in after fieldwork)
Distribution of farming land use					
Input	**Micro climate**	Sunlight			
		Air temperature			
		Relative humidity			
		Wind direction & speed			
	Water	Supply			
		Quality			
	Soil				
	Relief				
	Other (e.g. labour, market, transport network, etc.)				
Process	**e.g. irrigation, pest control, weed removal, etc.**				
Output	**Useful outputs** (e.g. cash crops)				
	Useless outputs (e.g. waste water)				
Constraints					

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

Table 1 Primary data collection methods

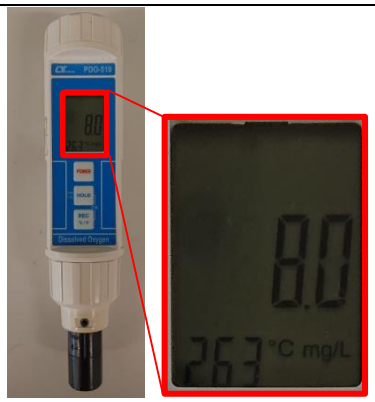
Equipment/ Tools		
1. compass	**2. light meter**	**3. thermo-hygrometer**
		
4. anemometer	**5. dissolved oxygen meter**	**6. bucket and water sample bottle**
7. coloured pencils		

Table 2 Equipment/ tools for fieldwork

STAGE 2: DATA COLLECTION (DATA RECORD SHEET, P.13-15)

1. Distribution of farming land uses: Walk through your study area. Identify and classify the farming land uses. Colour the farming land uses on the map (p.13).

2. Water quality: Collect water samples and examine the water quality. Record the results on p.14.

3. Operation of farming system: Walk through your study area. Observe the designated farming land use. Record the results on p.15.

STAGE 3: DATA PROCESSING AND PRESENTATION

1. Combining maps

Combine the maps of areas A, B, C and D to show the distribution of farming land uses.

2. Water Pollution Index

Refer to the water quality data (p.14) and the scoring table below, calculate the total assessment score and the pollution level of water samples.

Score	0	1	2	3
Water colour	Clear	Turbid	Brown	Black
Smell	None	Slight	Moderate	Strong
Floating matter	None	Some	Plentiful	Abundant
DO level (mg/L)	Very high [>7.0]	High [5.1-7.0]	Low [3.0-5.0]	Very low [<3.0]
pH value	Neutral (6.75-7.24)	Slightly acidic (4.95 – 6.74) Slightly alkaine (7.25 – 8.04)	Acidic (4.05 - 4.94) Alkaline (8.05 - 9.04)	Strongly acidic (< 4.04) Strongly alkaline (> 9.05)
Ammonia content (mg/L)	0 – 0.50	0.51 – 2.00	2.01 – 4.00	>4.00
Phosphate content (mg/L)	0–0.0.3	0.06–0.4	>0.4–0.8	>0.8

Total score	Pollution level
0–4	**Clean**
5–9	**Slightly polluted**
10–15	**Moderately polluted**
16–21	**Severely polluted**

Item	Area A		Area C	
	Water inlet	**Water outlet**	**Water inlet**	**Water outlet**
Total score				
Pollution level				

STAGE 4: DATA ANALYSIS & INTERPRETATION

1. (a) According to the farming land use map, describe the **current distribution** of farming land uses in Mui Wo and discuss the dominant locational factors.
   Does the distribution meet your hypothesis? (any other locational factors?)
   (b) Refer to the farming land use map and other field data, describe the distribution and characteristics of **leisure farming**.
2. Refer to the aerial photo of Mui Wo (1974) and the field data, discuss the favourable locational factor(s) to the farming activities in the early 1970s.
3. (a) Refer to the data collected (p.15) and the visit of hydroponic system, compare the merits and demerits of conventional farming and controlled environment agriculture (CEA).
   (b) After visiting the modern farming technology, discuss which technology is suitable to improve the food self-sufficiency rate of Hong Kong.
4. Compare the results of the water quality of **Water Inlet** and **Water Outlet**. Discuss how farming activities affect the water quality.

STAGE 5: EVALUATION

Factors affecting the data reliability and validity		Suggestion for improvement
Fieldwork date/ time ◆ Fieldwork date and time representative? ◆ Any impact by today's weather condition?		
Field site/ study area • Field sites match with research topic? • Field study area adequate?		
Location of data collection (Sampling) • Sampling method in choosing field site appropriate? • Location of measurement representative? • Sample size sufficient?		
Data 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?		

Further study

From today's result, what other aspects of "farming of Mui Wo" can be explored? Formulate and elaborate your study plan (e.g. field site/ date/ time/ hypothesis/ data items/ sampling methods, equipment, etc.)

Homework

After the fieldwork, complete the field trip diary (p.11-12) as a means to consolidate this fieldwork experience and reference for revision of field-based question.

Primary data collection methods

Data collection methods	Explanations		Examples
A) Observation	● Using sensory observation to explore the details of research subject (people, things or environment) in a purposive and planned way. Data are recorded using text, photos, sketch, map, etc. (Refer to other data collection methods listed below)		● Identification of the surrounding environment of a field site
B) Measurement	● To estimate or measure the physical quantity of the research subject. It usually requires the use of equipment or tools. Data are usually shown in certain standard, weights or measures.		● Measurement of the width of street and the building height
C) Counting	● To record the number of occurrence of a single item.		● Statistics of pedestrian flow at the pier
D) 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
E) Distribution (mapping)	● To group similar things according to the research topic (similar to "**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 in Cheung Chau
F) Scoring	● To quantify abstract or subjective concepts; ● To merge various data for easy comparison; ● Scoring items should include different aspects.		● Risk index of natural hazards of Cheung Chau ● Air Quality Health Index (AQHI)
G) Field sketching	● To make simplified drawing of the field site to show what the data collectors observed. Annotations related to the research subject are added to provide key feature or additional information.		● Draw the characteristics and formation of weathering landforms
H) Questionnaire	● Forms: face-to-face, telephone, written, etc.; ● Using questionnaire to understand the opinion of research subject; ● Larger sample size than "**in-depth interview"**; ● Mainly closed questions (with options available).	● To collect information by questioning; ● To obtain information which is difficult to be obtained through observations; ● To understand the rationales and opinions of interviewees.	● The main reasons for tourists to visit Cheung Chau ● The level of satisfaction among residents regarding a revitalization project
I) In-depth Interview	● To obtain information through face-to-face/ telephone interview; ● Smaller sample size than "**Questionnaire"**; ● Mainly open questions and forthcoming questions will change upon the answer of respondents.		● Opinions of District Council members on the future development of that district

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).*		
Sampling methods	**Simple random sampling** (簡單隨機抽樣)	**Systematic sampling** (系統抽樣)	**Stratified sampling** (分層抽樣)	**Quota sampling** (配額抽樣/ 定額抽樣)	**Convenience sampling** (便利抽樣/ 方便抽樣)	**Purposive sampling** (立意抽樣)
Explanations	To select sample from the **whole population randomly**. (using computer program, bamboo slip or random number table)	Each member of the whole population is sequentially numbered, then selected according to a **fixed, periodic interval**.	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)

My Field Trip Diary

Farming system in Mui Wo

- Related modules: _____
- Key point of fieldwork/topic: _____

▪ Date:_____ (Weekday/ Public holiday) ▪ Time:_____ ▪ Field site: _____	▪ Weather condition:
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)				

- Secondary data:

Data collected	Use	Obtained from
Apart from the above, what other supplementary information would be necessary to respond to the fieldwork topic?		

- Sampling method (if any):

Sampling method	Applied during data collection of	Merits☺/ Demerits☹

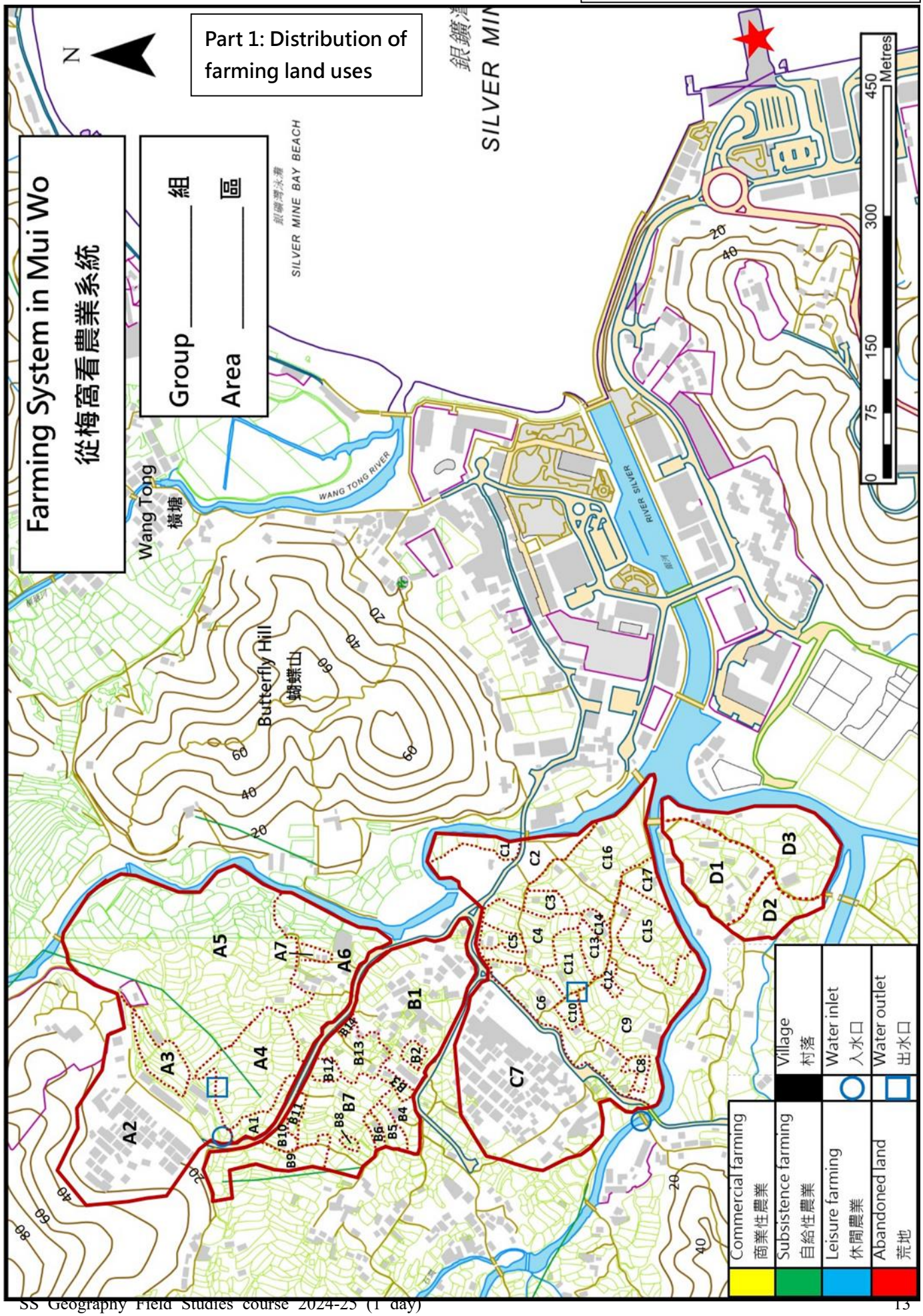
- Data processing and presentation:

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	

Group:____ Study area: AB / CD



Part 2: Water quality

Each group will collect water samples and examine the water quality.

Items		**Area AB / CD** (circle as appropriate)	
		Water inlet	**Water outlet**
Fieldwork	**Water colour** (clear/ turbid / brown / black)		
	Smell (None / Slight / Moderate/ Strong)		
	Floating matter (None/ Some/ Plentiful/ Abundant)		
	Dissolved oxygen level (mg/L)		
Labwork	**pH value**		
	Ammonia content (mg/L)		
	Phosphate content (mg/L)		

Part 3: Operation of farming system

Farming system			Mui Wo		Hydroponics/ Controlled Environment Agriculture	
Study point			_____	_____		
Physical factors	Micro climate	Sunlight (Lux)				Stable/ Unstable
		Temperature (℃)				
		Relative humidity (%)				
		Wind direction & wind speed (m/s)				
	Water	Supply	Rain/River/Reservoir	Rain/River/Reservoir		
		Quality	Water sample test		N/A	
	Soil	Colour			N/A	
		Texture	Sandy / Clayey	Sandy / Clayey	N/A	
	Relief	Relief	Flat / Undulating	Flat / Undulating		
		Area of farmland (estimate)				
Human factors	**Labour intensity** (farmers' no. & age, farm size, farming technology)		Adequate/ Inadequate/ uncertain	Adequate/ Inadequate/ uncertain		
	Transport network (connect to main road)		Yes / No	Yes / No	N/A	
Processes	**Irrigation***		Manual / Mechanized	Manual / Mechanized		
	Soil fertilization*		Organic / Chemical	Organic / Chemical		
	Weed removal*					
	Pest removal*					
	Ploughing & harvesting*		Simple Tools / Machinery	Simple Tools / Machinery	Simple Tools / Machinery	
	Fallowing*		Yes / No	Yes / No	Yes / No	
	Evaluate the level of technology		**Higher / Lower**	**Higher / Lower**	**Higher / Lower**	
Useful outputs	**Variety of produce** Few(1-3)/ Several(4-6)/ Many(>6)					
	Density of cropping		High/Low	High/Low	High/Low	
	Main produce**					
	Value of crops		High/Low	High/Low	High/Low	
	Uses		Own use / For sale	Own use / For sale		
Useless outputs	e.g. waste, waste water, pollutants					

** refer to "Identification Guide of Farming"*

*** leafy vegetables, melons, beans, tubers, fruits, spice, others*

Note