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Stop 1 Yung Shue Wan Main Street

Part 1 Rubbish - what's the solution?

1. What sustainable method is used to deal with waste in Yung Shue Wan?

Separation of waste for recycling.

2. List three benefits of using the method mentioned in Question 1.

i. Reduce environmental damage caused by extracting natural resources, e.g. wood, oil.

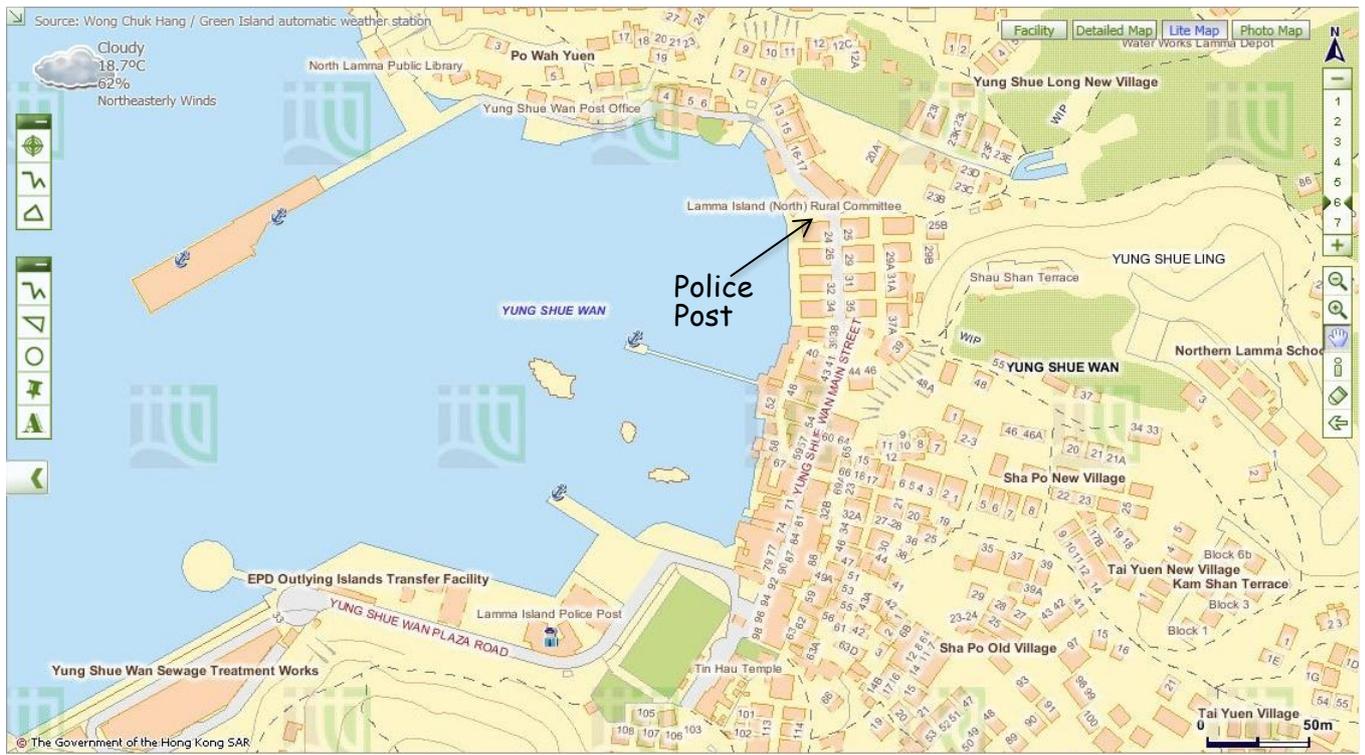
ii. Conserve natural resources.

iii. Reduce waste disposal and the pressure on landfills.

3. Work in groups and walk along the main street. Find out the collection points for recyclable materials. On the map below (Figure 1), mark and label the area where they are for each of the following products with corresponding letters.

- (a) Paper
- (b) Plastics
- (c) Metals
- (d) Glass bottles
- (e) Rechargeable batteries
- (f) Clothes
- (g) Small electrical appliances

Figure 1



Map from Lands Department

4. Discuss with your group members whether the waste separation and recycling scheme is successful. Give evidence to support your answer.

Any reasonable answers.

5. Suggest two ways to improve the scheme so that more people, including visitors use it more often.

- i. Increase the number of recycling collection points.
- ii. Provide more types of recycling bins for recycling rechargeable batteries and small electrical appliances.

or any reasonable answers.

6. Compare the collection points for recyclable materials in Yung Shue Wan Street with those near your school or living area.

Any reasonable answers.

Part 2 Closed loop recycling - what is it?

Visit 'Lamma Corner'.

1. Through observations and interview, what are the differences between Lamma Corner and other shops in your living area in terms of the products sold? Give evidence to support your answer.

Upcycled, second-hand and recycled products are sold in Lamma Corner, such as T-shirts, jewellery and decorations. These items are not commonly found in other shops.

2. The closed loop recycling is practised on Lamma Island.

Pre-trip Task:

Search for information on closed loop recycling. Draw the logo below and explain the three processes involved.



The closed loop recycling involves three processes, including

- (a) Collecting waste for recycling
- (b) Manufacturing recycled materials into new products
- (c) Purchasing recycled-content products

(a) How can this closed loop recycling help combat climate change?

- Less waste is disposed in landfills and thus less methane is produced.
- Reduce the energy used during extraction of natural resources and manufacturing. As there are less fossil fuels being burned, emission of carbon dioxide is reduced.
- Reduce air pollution during manufacturing.

or any reasonable answers.

(b) Do you think that all recyclable materials collected can enter the loop of recycling?
Why?

No.

- The product is low value-added.
- Difficult and expensive to retrieve materials for processing.
- Lack of technical support.

or any reasonable answers.

(c) Do you think all the recyclable materials are recycled locally in Hong Kong? Why?

No, recycling industry is not profitable in Hong Kong.

3. Do you think recycling is a good way to combat climate change? Why? What else can we do to combat climate change?

• Yes, less waste goes to landfills. /No, reduce, reuse and replace are better than recycling as energy is used in the recycling process.

• To save energy.

• Take public transport.

or any reasonable answers.

Part 3 Eco shopping

Work in groups and walk along the street.

1. Go to one of the green shops and select two types of packaged food that you think they are environmental-friendly. Complete the following table based on the information on their labels.

	Food A	Food B
(a) Name of food		
(b) Is the food homemade? If not, where is it produced?	<input type="checkbox"/> Yes <input type="checkbox"/> No If no, <input type="checkbox"/> Hong Kong <input type="checkbox"/> The Mainland <input type="checkbox"/> Other countries	<input type="checkbox"/> Yes <input type="checkbox"/> No If no, <input type="checkbox"/> Hong Kong <input type="checkbox"/> The Mainland <input type="checkbox"/> Other countries
(c) Is the food made from organic farms?		
(d) Number of ingredients		
(e) Do the ingredients come from plants or animals? Give two examples.	<input type="checkbox"/> Plants <input type="checkbox"/> Animals <input type="checkbox"/> Both Examples: _____ _____	<input type="checkbox"/> Plants <input type="checkbox"/> Animals <input type="checkbox"/> Both Examples: _____ _____
(f) What is/are the	<input type="checkbox"/> plastic bag	<input type="checkbox"/> plastic bag

packaging material(s)?	<input type="checkbox"/> paper <input type="checkbox"/> others _____	<input type="checkbox"/> paper <input type="checkbox"/> others: _____
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2. Which food would you like to buy in order to reduce more carbon emission? Give three reasons to support your answers.

Any reasonable answers.

3. After this activity, will you change your shopping habits? Why?

- Yes. Buy locally produced products/organic products/products with less packaging as this can reduce waste and carbon emission.
- No. Any reasonable answers.

Stop 2 A Local Farm

1. Work in groups. Observe the operation of this farm and interview the farmer. Complete the following table.

Questions	Answers
(a) How to improve soil quality?	<input type="checkbox"/> using chemical fertiliser <input checked="" type="checkbox"/> using compost <input checked="" type="checkbox"/> covering soil with mulches <input checked="" type="checkbox"/> crop rotation <input checked="" type="checkbox"/> fallowing <input checked="" type="checkbox"/> agroforestry: trees are grown with crops <input type="checkbox"/> others _____
(b) How to avoid pest?	<input checked="" type="checkbox"/> using chemical pesticide <input checked="" type="checkbox"/> using CD-ROMs <input type="checkbox"/> using plastic balls <input checked="" type="checkbox"/> growing different types of crops <input checked="" type="checkbox"/> crop rotation <input checked="" type="checkbox"/> growing companion crops <input checked="" type="checkbox"/> using insect trap <input type="checkbox"/> others _____
(c) How to use water resource?	<input checked="" type="checkbox"/> constructing wells <input checked="" type="checkbox"/> building water tanks or ponds <input checked="" type="checkbox"/> covering soil with organic matter <input type="checkbox"/> using drip irrigation <input type="checkbox"/> others _____
(d) What tools are used for farming?	<input checked="" type="checkbox"/> using simple tools, e.g. <u>hoe</u> <input type="checkbox"/> using machines, e.g. _____
(e) What is the useful output?	<input checked="" type="checkbox"/> crops, e.g. <u>tomatoes, lettuce</u>

	<input type="checkbox"/> animal products, e.g. _____
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2. Do you think this way of operation of farm can reduce carbon emissions? Give reasons.

	Can it help reduce carbon emission? Put '✓' or 'x'	If yes, how can this help reduce carbon emission?
(a) Way of improving soil quality	✓	<u>Answer for (a), (c) and (d):</u> <ul style="list-style-type: none"> <u>Less fossil fuels are used to make fertilisers and generate electricity to pump water and drive machines. As there are less fossil fuels being burned, emission of carbon dioxide is reduced.</u>
(b) Way of avoiding pest	x	
(c) Way of using water resource	✓	
(d) Tools used for farming	✓	
(e) Type of output	✓	<u>Vegetables</u> <ul style="list-style-type: none"> <u>No livestock is reared, thus reducing the production of methane.</u>

3. Would you like to buy agricultural produce grown in this type of farm for reducing climate change? Give reasons to support your answers.

Yes.

- It is because the soil is not fertilised by chemicals and therefore it does not pose a health risk.
- Less pollution is created as there is no burning of fossil fuels.

or any reasonable answers.

Stop 3 Viewing at Lamma Power Station

Pre-trip Task:

Write the letters in the space provided to show the components of power station in Figure 2. You may browse the following website to complete this task.

The Power behind Hong Kong--Lamma Power Station:

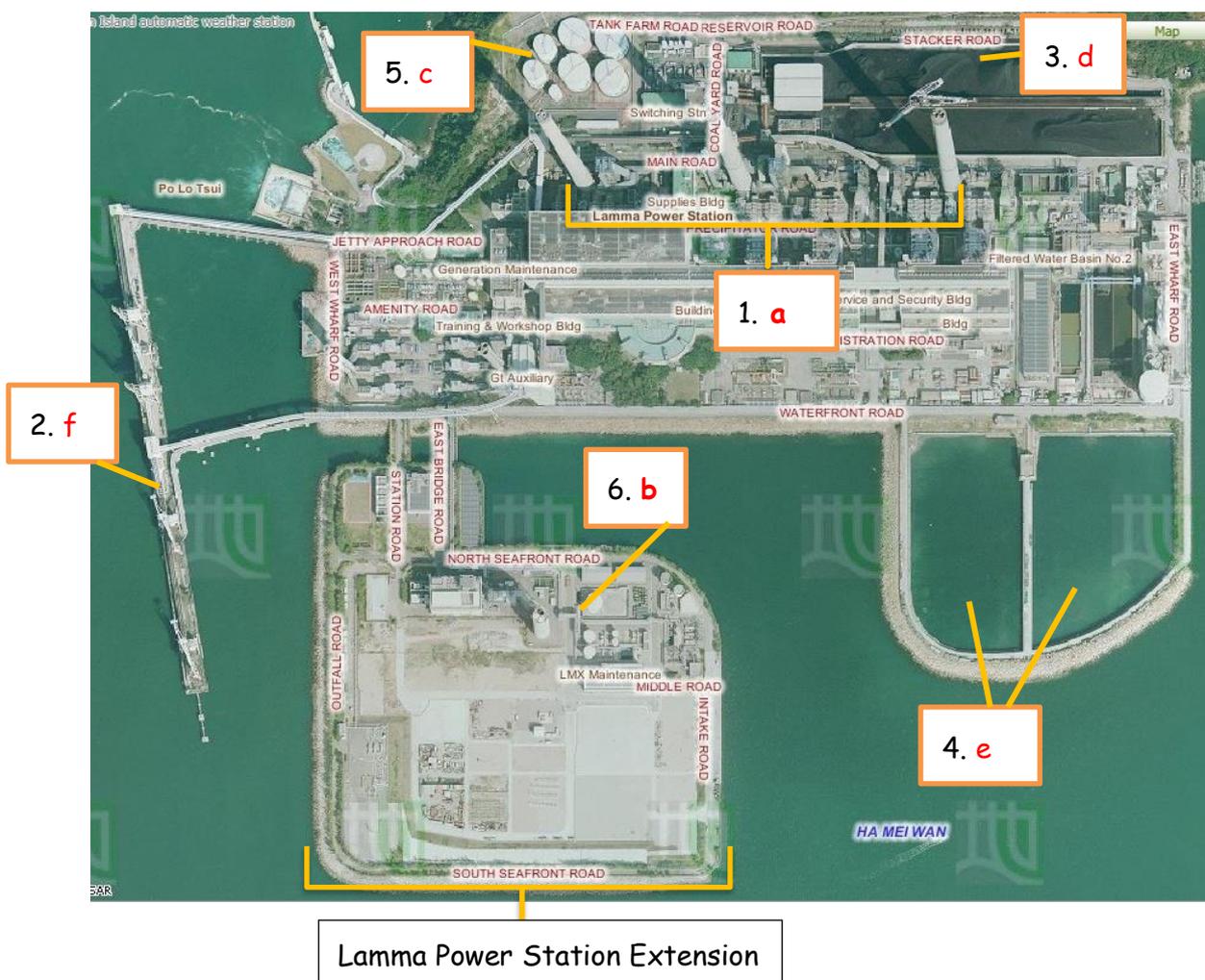
Source: HK Electric

https://www.hkelectric.com/en/MediaResources/Documents/LPS_2014.pdf

(a) Coal-fired Generating Units	(b) Gas-fired Combined-cycle Generating Units	(c) Oil-fired Generating Units
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(d) Coal Yard	(e) Ash Lagoon	(f) Transport jetty
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Figure 2 Components of Power Station



Lamma Power Station Extension

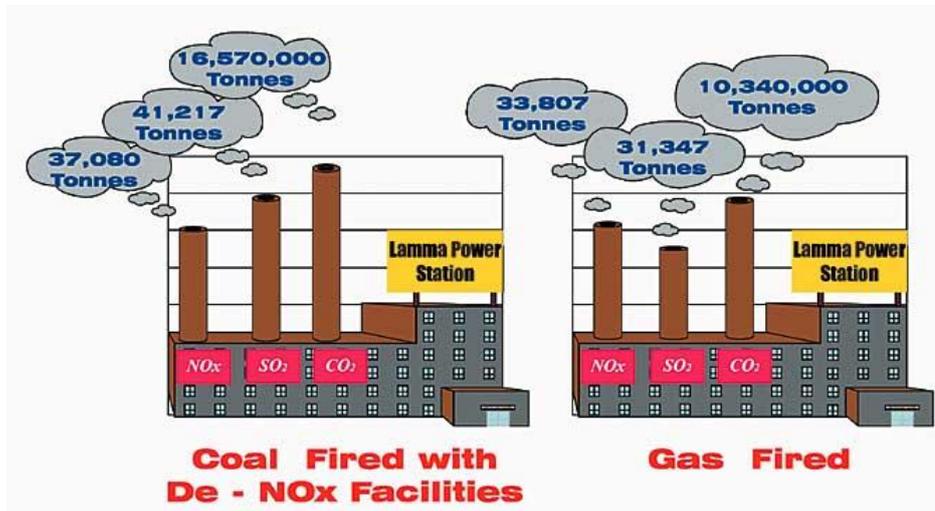
Aerial Photos from Lands Department

1. Observe the power station. Describe and explain the locational advantages of the power station.

Locational characteristics	Reasons
<u>Located near the coast</u>	<ul style="list-style-type: none"> • <u>Easier import of fuel by cheap sea transport.</u> • <u>Need water for cooling.</u>
<u>Sheltered by hills</u>	<ul style="list-style-type: none"> • <u>The impact caused by adverse weather condition is reduced.</u>
<u>Far away from the</u>	<ul style="list-style-type: none"> • <u>High risk of fire explosion.</u> • <u>Air pollution is serious.</u>

2. Figure 3 shows the amount of air pollutants emitted from coal-fired and gas-fired generating units respectively when the total electricity generation in the year 2012 would increase by 2.57 times compared with that in 1990.

Figure 3 Amount of Air Pollutants Emitted from the Coal-fired and Gas-fired Units



Source: Environmental Protection Department, HKSAR Government

http://www.epd.gov.hk/eia/operation/english/chapter05_4.html

- (a) How does the power station affect our environment?

The burning of fossil fuels for generating electricity will emit large amount of greenhouse gases (CO₂) which seriously affect our environment. The greenhouse gases trap heat in the atmosphere and intensify greenhouse effect, causing global warming.

- (b) More generating units will be built to generate more electricity in future. Explain why.

It is because of population growth and rapid economic development.

or any reasonable answers.

- (c) Which kind of fossil fuels should be more widely used in the new generating units? Explain why.

Natural gas: cleaner energy, thus reducing pollutants and greenhouse gases.

This helps mitigate climate change.

(d) Do you think that using a mixture of different types of fossil fuels only can help minimise climate change in future? Why?

No. Natural gas can reduce carbon emission but the increase in demand of electricity still causes the combustion of more natural gases, resulting in more carbon emission.

or any reasonable answers.

Stop 4 Lamma Winds

Part 1 Is the use of renewable energy a way out in Hong Kong?

Pre-trip Task:

Collect the following data at night from the website of HK Electric below before the field trip:

Source: HK Electric

<https://www.hkelectric.com/en/our-operations/lamma-wind-power-station/real-time-operation>

	Before the field trip (collect from website after 9:30 pm)	During the field trip (collect at Lamma Winds)
Date & time	_____ _____	_____ _____
Present wind speed	_____m/s	_____m/s
Present power output	_____kW	_____kW
Cumulative electricity generated	_____kWh	_____MWh
Amount of carbon dioxide (CO) ₂ saved	_____kg	_____tonnes

Remarks: The units of cumulative electricity generated and amount of carbon dioxide saved shown on HK Electric's website are different from those shown at the tower base of the wind turbine.

1.(a) Collect the data at the tower base of the wind turbine and complete the above

table.

(b) What is the relationship between wind speed and power output?

Positive relationship.

(c) Explain why this wind turbine cannot be designed to produce a lot of electricity.

- Wind condition is unstable.
- Wind speed is not very high.
- Moderate height restriction.
- Current technology is limited.

or any reasonable answers.

(d) By observation, list the environmental problem(s) caused by the wind turbine.

It may threaten birds and create visual and noise pollution.

2. Table 4 shows the capacity of the Lamma Power Station.

Table 4 Capacity of the Lamma Power Station in 2013

	Number of units	Capacity of each unit (MW)	Total capacity (MW)
Coal-fired Generating units	3	250	750
	5	350	1750
Oil-fired Generating Units	4	125	500
	1	55	55
Gas-fired Combined-cycle Generating Units	1	335	335
	1	345	345
Solar Power System			1
Lamma Winds			0.8
Total			3736.8

Source: HK Electric

https://www.hkelectric.com/en/MediaResources/Documents/LPS_2014.pdf

(a) Compare the capacity of electricity generated by fossil fuels and renewable energy.

The capacity of electricity generated by fossil fuels is much greater than those by renewable energy.

(b) What are the limitations of developing renewable energy in Hong Kong?

Limitations	Explanation
Cost	<u>Cost is high due to the advanced technology used and high cost of maintenance.</u>
Space	<u>There is limited space in HK.</u>
Stability of power generation	<u>Unstable. Supply of sources of renewable energy sources such as wind and solar is not stable.</u>
Amount of power generated	<u>Very small.</u>
Others	<u>Objection from the residents nearby due to noise pollution.</u> <u>or any reasonable answers.</u>

3. Should different types of renewable energy, particularly solar energy and wind energy, be further developed in Hong Kong?

Each group will be assigned one of the following roles. Study the exhibition board and collect the information from the exhibition panels for discussion.

Role	Tasks
Government	Discuss why different types of renewable energy should be further developed in relation to existing environmental problems
Spokesman from a power company	Discuss whether the development of different types of renewable energy is cost-effective
Environmentalist	Discuss the negative impact of the development of different types of renewable energy on the environment
Urban planner	Discuss the problems in the selection of suitable sites for the development of different types of renewable energy
Spokesman from Department of energy	Discuss whether different types of renewable energy can give abundant and reliable energy supply in Hong Kong and their energy efficiency

Your role: Any reasonable answers.

Your opinion: Any reasonable answers.

4. The use of technical measures, like fuel mix and renewable energy, seems not to be the most sustainable way to combat climate change caused by power station. Then what else can we do to solve this problem? Suggest two ways and explain your reasons.

- People can develop green habits and reduce waste disposal.
 - People can reduce energy consumption and choose energy-efficient appliances.
- or any reasonable answers.

Part 2 Putting 'waste' into use

1. (a) What material is used to make the bricks in the footpath? Where does this material come from?

Furnace bottom ash. It is one of the major solid by-products of burning coal.

(b) How can this way of using this material reduce carbon emission?

Furnace bottom ash can be used for landfill purposes or making cement and brick as well as construction materials. As this material is recycled, it helps reduce carbon emission and conserve resources.

or any reasonable answers.

Step 5 Hung Shing Yeh Beach Tree Planting Site

1. Read the information from the interpretive plate. What are the two types of trees? Give one example of each type of trees.

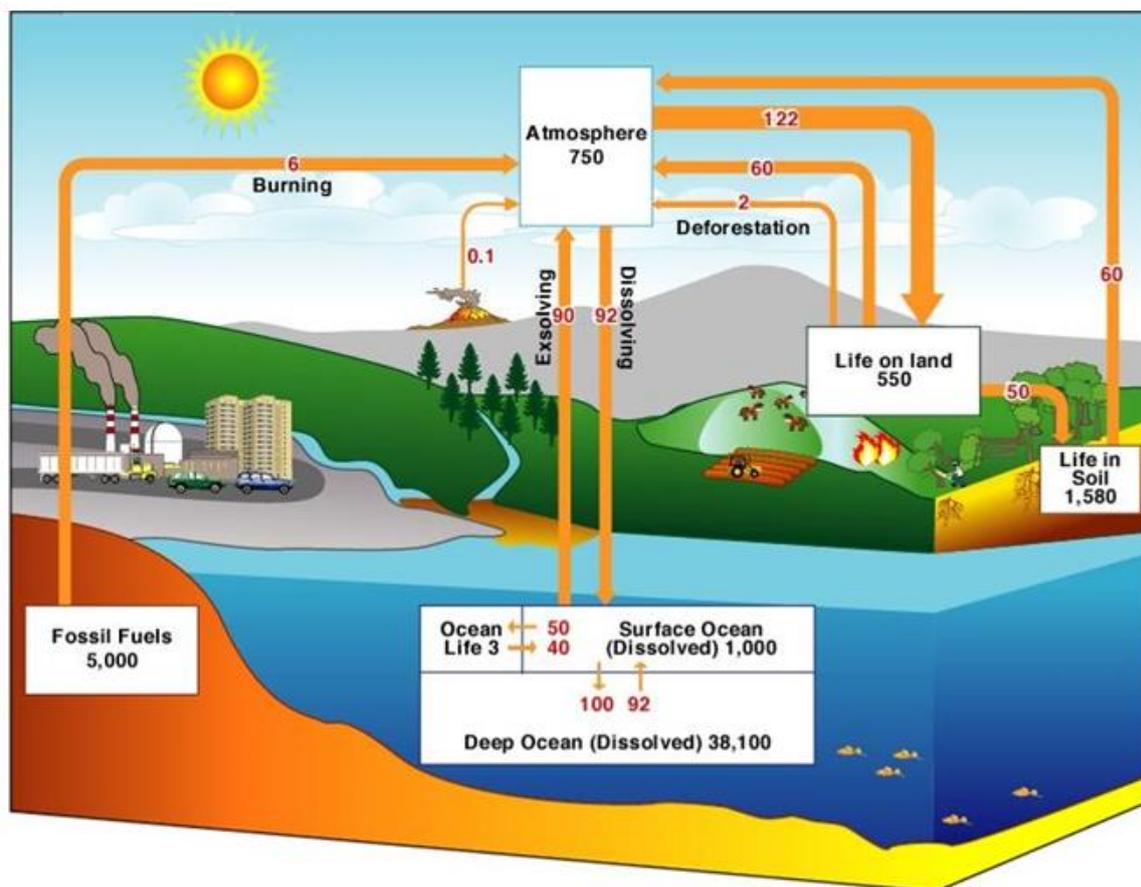
Type	Example
Exotic species	Earleaf Acacia
Native Species	Ivy Tree

2. How can the planting of trees help reduce climate change?

Trees absorb carbon dioxide through photosynthesis. The increase in tree cover helps absorb carbon dioxide.

3. Figure 5 shows the carbon cycle. Study the figure and answer the question.

Figure 5 Carbon Cycle



Remarks: It is a simplified version of the carbon cycle. The figures are in gigatonnes (1000 million tonnes). The figures in black are estimates of the total mass of carbon (worldwide) in the different spheres. The figures in red are the estimated flows of carbon between spheres.

Source: Climate Change - A Cross-curricular Learning and Teaching Resources Pack, Education Bureau

(a) How do human activities affect the balance of carbon dioxide in the air?

Human activities affect the carbon cycle through increasing carbon emission, such as burning of fossil fuels, deforestation and other poor agricultural practices. The amount of carbon emission by humans is absorbed in the carbon cycle by plants to produce oxygen and lead to a disruption in the balance of carbon cycle.

(b) Apart from planting of trees, what else can we do to help reduce climate change? Suggest two methods.

i. Protect the trees.

ii. Reduce the use of paper which helps curb deforestation.

or any reasonable answers.

Stop 6 The Home Farm

At Lo So Shing Village, observe the activity held outside the village houses.

1. What agricultural produce is grown from the farm?

Vegetables.

2. Do you think that the produce is for self-consumption only? Give reason to support your answer.

Yes, it is because the size of farmland and the output are small.

or any reasonable answers.

3. How can the growing of our own food help reduce carbon emission in Hong Kong?

Save fuel for transportation, production or packaging. As there are less fossil fuels being burned, carbon emission is reduced.

4. Could you grow your own food at home? Why or why not?

No, there is only limited space.

5. What else can we do for food supply to reduce climate change?

- Eat locally-produced food
- Choose a diet with more vegetable and less meat.

Stop 7 Mudflat

1. What are the characteristics of mudflat?

(a) What is its relief? Flat, low-lying land.

(b) What is made up of the mudflat? Sand and mud.

(c) Does the depth of water vary from time to time? Yes.

2. What kinds of living organisms live in the mudflat?

	Examples
Plants	<u>Mangrove</u>
Wetland Animals	<u>Fiddler Crabs, Mudskippers, Little egret, Shellfish</u>

3. What does mudflat provide for these living organisms?

Habitat.

4. How will climate change affect the living organisms in the mudflat?

The sea ice melts due to climate change. Melting of sea ice causes water level in the mudflat to rise. The living organisms will be under water all the time. Some cannot find their food and may die, causing extinction of some species.

5. What should you do to protect these living organisms in our daily life?

- Use less paper.
- Save energy.
- Consume locally produced products.

or any reasonable answers.

Discussion

Discuss the following questions with your group members.

1. What are the new opportunities of climate change?

Any reasonable answers.

2. "We do not have to combat climate change as the nature is able to resume equilibrium itself". Do you agree? Why?

Any reasonable answers.