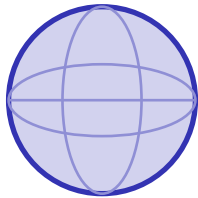


Human Influences on Ecosystems

IGCSE Biology ■ Topic 20

IGCSE Biology



What we will cover

- 1 Increasing food supply
- 2 Habitat destruction
- 3 Water pollution
- 4 Plastics & climate change
- 5 Conservation



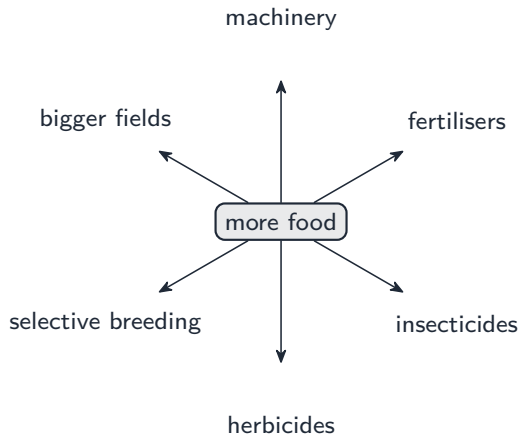
protect, do not clear

conservation

1

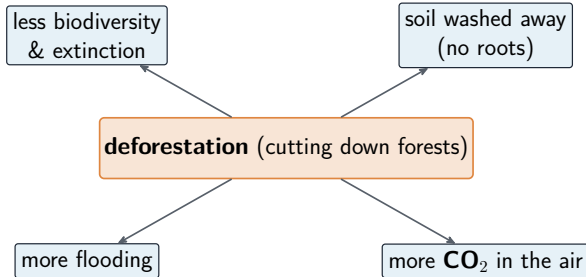
Pressures

Increasing food supply



- **agricultural machinery** to farm larger areas quickly.
- a **monoculture** 单一栽培 – one crop over a large area – gives a big, easy harvest, but one pest or disease can take the whole thing, and it lowers **biodiversity** 生物多样性.
- chemical **fertilisers** 化肥 to improve **yields** 产量.
- **insecticides** 杀虫剂 to kill insect pests.
- **herbicides** 除草剂 to kill **weeds** 杂草 that compete with the crops.

Habitat destruction



- clearing land for housing, crops and livestock – and with fewer trees, more **carbon dioxide** 二氧化碳 stays in the air.
- changing **food chains** 食物链 and **food webs** 食物网, which harms species that were never the target.
- extracting natural **resources** 资源, such as by mining.
- **pollution** 污染 of fresh water and the sea.
- lower biodiversity and the **extinction** 灭绝 of species.

2

Pollution

Water pollution: eutrophication

Plastic pollution is a major human impact on ecosystems.

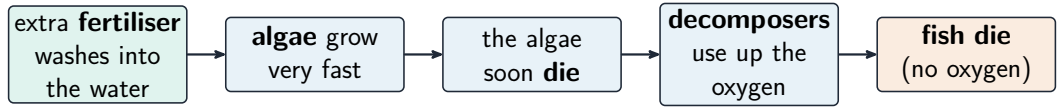
Eutrophication: extra fertiliser makes algae bloom, then the water loses its oxygen and fish die

Eutrophication, step by step

- | | |
|------------------------|---|
| 1. Fertiliser runs off | The fertiliser adds nitrate ions 硝酸根离子 and other ions to the water. |
| 2. Algae bloom | They grow fast and cover the surface, blocking light from the plants below. |
| 3. Plants die | Without light the water plants die, and decomposers 分解者 multiply on the dead material. |
| 4. Oxygen runs out | The decomposers use up the oxygen in aerobic respiration 有氧呼吸, and the fish and insects suffocate. |

The nitrate never poisons anything. The damage is done by what grows on it, and then by what decays.

Water pollution: eutrophication, in detail

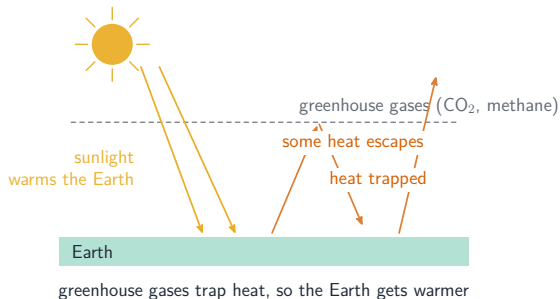


Eutrophication: extra fertiliser makes algae bloom, the plants below die, and the decomposers use up the oxygen – so the fish suffocate

Plastics and climate change

Non-biodegradable 不可降解 plastics build up & harm wildlife.

Greenhouse gases 温室气体 (CO_2 , methane 甲烷) trap heat, strengthening the **greenhouse effect** 温室效应 & driving climate change.



3

Conservation

Conservation

sustainable 可持续 use

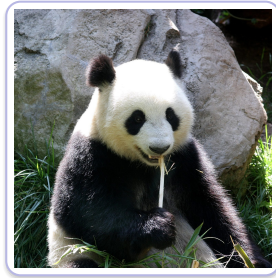
quotas 配额, closed seasons
禁渔期, mesh sizes, replanting

saving species

protected areas, **cap-**
tive breeding 圈养繁殖,
seed banks 种子库

A very small population loses **genetic variation 变异**, making it harder to survive change.

Saving endangered species



Protected habitats and **captive breeding** 圈养繁殖 in zoos brought the giant panda back. **(Supplement)** Breeding programmes may use **artificial insemination** 人工授精 or **in vitro fertilisation** 体外受精; **seed banks** 种子库 do the same job for plants.

Why species are lost, and why we conserve them

Why they are lost

Numbers fall through climate change, habitat destruction, **hunting** 狩猎, **overharvesting** 过度捕捞, pollution and **introduced species** 外来物种.

What conservation keeps

Biodiversity, fewer extinctions, working ecosystems – and the functions they carry out: recycling nutrients, and providing food, **drugs** 药物, fuel and useful **genes** 基因.

How

Protected habitats, captive breeding and seed banks, controlled harvesting, and education.

The strongest exam answer names a *use* we would lose – a crop gene, a medicine – alongside the ethical case.

Deforestation and lost habitats



Clearing forest destroys habitats and reduces biodiversity.

Pollution



Plastic pollution is a major human impact on ecosystems.

Water pollution, sustainability and conservation

untreated sewage 污水	with fertiliser run-off, it damages river ecosystems 生态系统
the mechanism	nutrients cause algal growth, the algae die, decomposition 分解 by bacteria uses the oxygen, and fish suffocate – eutrophication
a sustainable resource 可持续	one produced as fast as it is used up , so it never runs out
endangered 濒危	a species whose numbers fall through climate change, habitat loss, pollution, hunting 狩猎 or introduced species
how species are conserved 保护	protected habitats, breeding programmes, education, and legal protection
seed banks 种子库	store seeds safely – cheap, compact, and they preserve the genes 基因 of crop plants 农作物 and wild relatives

Conservation protects **genetic diversity**, not only individuals – which is why a seed bank is worth as much as a reserve for some species.

Exam tips

- More food: machinery, fertilisers, insecticides, herbicides, selective breeding. Monocultures and intensive farming each have advantages and disadvantages.
- Deforestation: less biodiversity, extinction, soil loss, flooding, more carbon dioxide.
- Eutrophication (Supplement): fertiliser → more producers → more decomposers → less dissolved oxygen → organisms die.
- Greenhouse gases (carbon dioxide, methane) → enhanced greenhouse effect → climate change.
- Conservation: sustainable use, protected areas, quotas, captive breeding and seed banks. Small populations lose genetic variation.

4

Recap

Worked example – eutrophication

Fertiliser washes into a river and the fish die. Put the steps in order.

- Fertiliser **leaches** into the water, adding nitrate.
- Algae grow rapidly – an **algal bloom** 藻华 – and cover the surface.
- The bloom **blocks the light**, so the plants below die.
- **Decomposer bacteria** feed on the dead plants and multiply.
- They **respire aerobically**, using up the dissolved oxygen $\Rightarrow$ **the fish suffocate**.

The fish die of **no oxygen**, not of poisoning. The bacteria – not the algae – take the oxygen. Get that order right and the marks follow.

Topic 20 – key takeaways

1

Food

machinery, chemicals, breeding;
monoculture risk

2

Deforestation

less biodiversity, soil loss, more
CO₂

3

Eutrophication

fertiliser → algae → no oxygen →
fish die

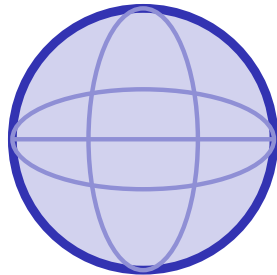
4

Conservation

quotas, captive breeding, seed
banks

Check yourself

- 1 Why is a monoculture risky?
- 2 Name one effect of deforestation.
- 3 What uses up the oxygen in eutrophication?
- 4 Name one way to save an endangered species.



Answers 1. one disease can destroy the whole crop 2. e.g. soil loss / more CO₂
3. decomposers 4. e.g. captive breeding