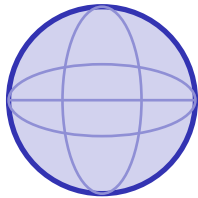


Human Influences on Ecosystems

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



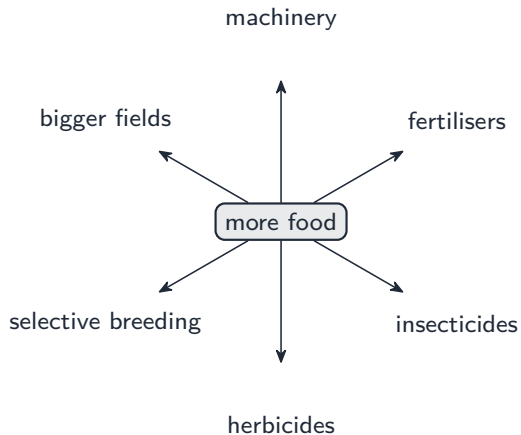
protect, do not clear

conservation

1

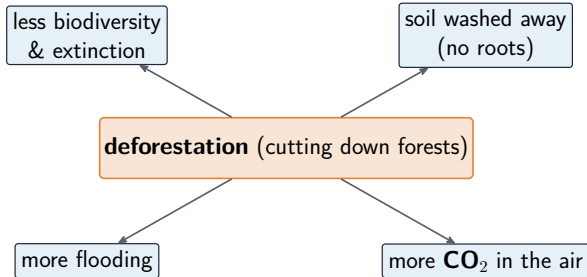
Pressures

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.

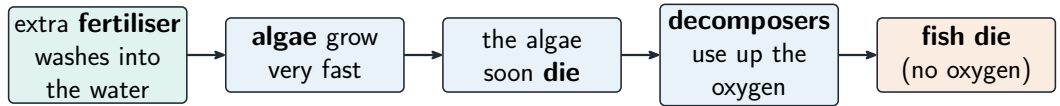
Eutrophication: extra fertiliser makes algae bloom, then the water loses its oxygen and fish die

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



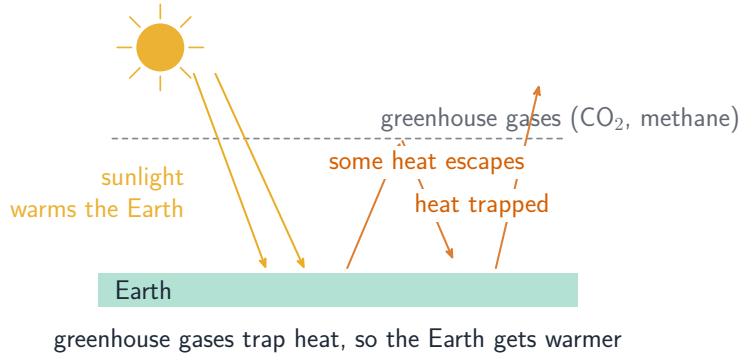
Plastic pollution is a major human impact on ecosystems.

Plastics and climate change

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

Greenhouse gases 温室气体 (CO₂, **methane** 甲烷) trap heat, strengthening the **greenhouse effect** 温室效应 & driving climate change.

Plastics and climate change, in detail



Greenhouse gases trap heat leaving the Earth, so the Earth gets warmer

3

Conservation

Conservation

sustainable 可持续 use

quotas 配额, closed

seasons 禁渔期,

mesh sizes, replanting

saving species

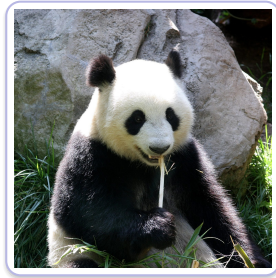
protected areas, **cap-**

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** 捕猎, **overharvesting** 过度捕捞, pollution and **introduced species** 引入物种.

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.

Habitat destruction, continued



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

and excess fertiliser washed into rivers damage water **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 可持续 resource

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

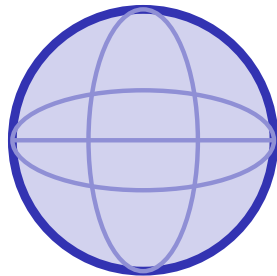
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Conservation

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