

Human influences on ecosystems

IGCSE Biology 0610 · Topic 20 revision notes

Everything from the 4 lessons of this topic on a few pages: the key idea of each lesson, the diagram to remember, the points to learn and the traps examiners set. Read it, cover it, test yourself.

1. Food supply

2. Habitat destruction

3. Pollution

4. Conservation

1 Food supply

Syllabus 20.1

Humans have increased food production by using **agricultural machinery** to farm larger areas efficiently, **chemical fertilisers** to improve yields, **insecticides** to improve quality and yield, **herbicides** to reduce competition with weeds and **selective breeding** to improve production by crop plants and livestock. Large-scale **monocultures** and **intensive livestock production** give high yields at low cost, but reduce biodiversity, spread disease and pollute the environment.

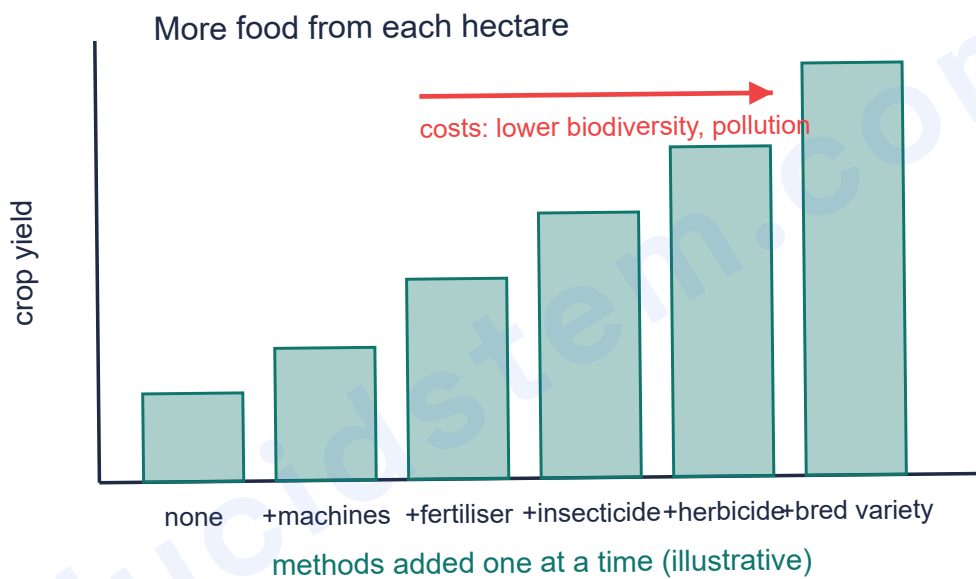


Fig. 1: each method raises the yield further, but intensive farming carries costs for the ecosystem

Name the method, then the reason.

- ✓ **Machinery:** larger areas, more efficiently.
- ✓ **Fertilisers:** mineral ions, better yields.
Insecticides: fewer insect pests.
Herbicides: less competition from weeds.
- ✓ **Selective breeding:** crops and livestock with higher production.
- ✓ **Every advantage has a cost:** biodiversity, disease spread, pollution, animal welfare.

Watch out!

Insecticides kill *insects*; herbicides kill *weeds* (plants). Both are pesticides. Do not mix them up, and remember fertilisers supply mineral ions, not "food" for the plant: plants make their own food by photosynthesis.

"Higher profit" on its own is a weak answer. Say *why*: higher yield per hectare, less labour per tonne, or less energy wasted by the animals.

2 Habitat destruction

Syllabus 20.2

Biodiversity is the number of different species that live in an area. Habitats are destroyed to provide land for **housing, crop plants and livestock**, to **extract natural resources** and by **freshwater and marine pollution**. By altering food chains and food webs, humans can have a negative impact on habitats. **Deforestation** reduces biodiversity, can cause extinction, and leads to loss of soil, flooding and an increase of carbon dioxide in the atmosphere.

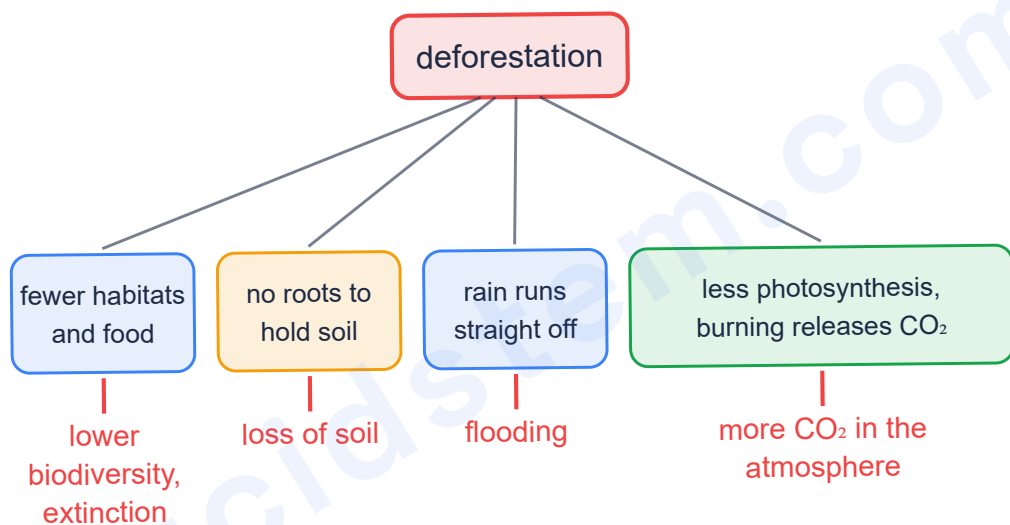


Fig. 1: the undesirable effects of deforestation

Five effects, five reasons.

- ✓ **Biodiversity:** the number of different species in an area.
- ✓ **Reasons:** housing, crops and livestock; extracting natural resources; freshwater and marine pollution.
- ✓ **Deforestation:** biodiversity down, extinction, soil loss, flooding, more carbon dioxide.
- ✓ **Link each effect to the trees:** habitat, roots, water uptake, photosynthesis.

Watch out!

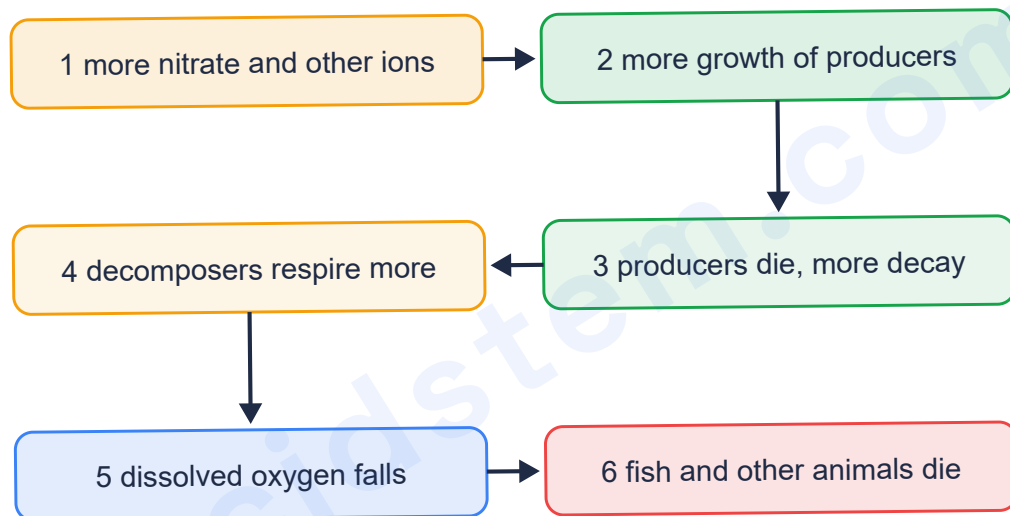
Biodiversity is the number of different species, not the number of individual organisms. A field of a million wheat plants has very low biodiversity.

Do not write that deforestation "reduces oxygen so animals suffocate". The expected effects are lower biodiversity, extinction, soil loss, flooding and more carbon dioxide.

3 Pollution

Syllabus 20.3

Untreated sewage and **excess fertiliser** entering rivers and lakes cause algae to grow rapidly and then oxygen levels to fall, killing fish and other animals. Extended: this process is **eutrophication**: more nitrate and other ions, more growth of producers, more decomposition after they die, more aerobic respiration by decomposers, less dissolved oxygen and death of organisms that need it. **Non-biodegradable plastics** are not broken down by decomposers, so they harm animals on land and in water for many years. Extra **carbon dioxide** and **methane** cause the **enhanced greenhouse effect** and climate change.



source: excess fertiliser or untreated sewage washed into water
algae on the surface also block light from plants below

Fig. 1: the six steps of eutrophication (Extended)

Ions, growth, death, decay, respiration, suffocation.

- ✓ **Eutrophication (Extended):** ions up, producers up, producers die, decomposers up, oxygen down, animals die.
- ✓ **The oxygen is used by decomposers**, not by the algae.
- ✓ **Plastics:** non-biodegradable; eaten, entangling, microplastics in food chains.
- ✓ **Carbon dioxide:** fossil fuels and deforestation. **Methane:** cattle, rice, landfill.

Watch out!

Fish do not die because the algae "use up the oxygen". In the light algae produce oxygen. The oxygen is used up by the huge numbers of decomposers respiring aerobically as they break down the dead producers.

Breaking into tiny pieces is not the same as being decomposed. Microplastics are still plastic: no decomposer has broken them down.

The greenhouse effect itself is natural and necessary. The problem is the enhanced greenhouse effect caused by extra gases. Also, it is not the same as the hole in the ozone layer.

4 Conservation

Syllabus 20.4

A **sustainable resource** is one which is produced as rapidly as it is removed from the environment, so that it does not run out. **Forests** and **fish stocks** can be conserved and managed sustainably. Organisms become endangered or extinct through **climate change, habitat destruction, hunting, overharvesting, pollution and introduced species**. They can be conserved by **monitoring and protecting** species and habitats, **education**, **captive breeding programmes** and **seed banks**.

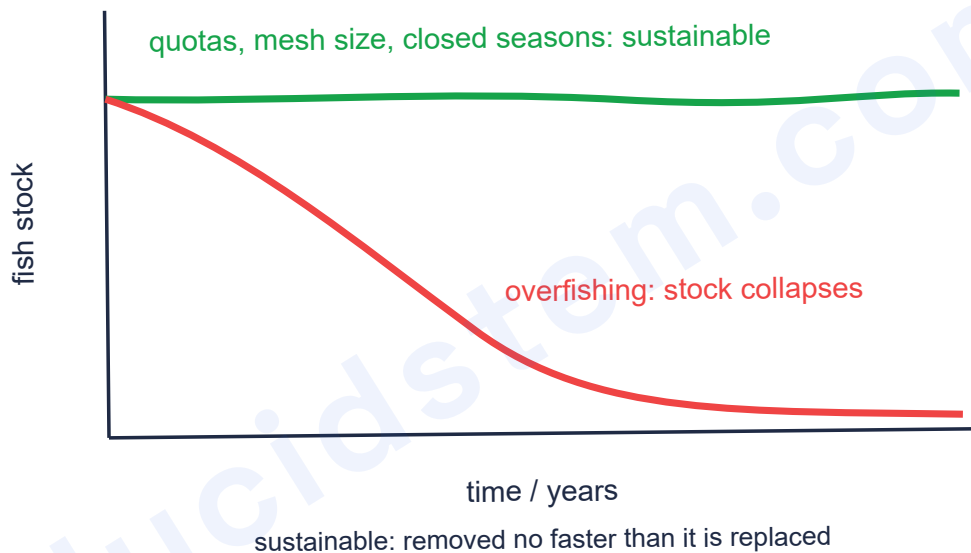


Fig. 1: a fish stock managed sustainably stays steady; with overfishing it collapses

Replace what you remove.

- ✓ **Sustainable:** produced as rapidly as it is removed, so it does not run out.
- ✓ **Fish (Extended):** education, closed seasons, protected areas, net types and mesh size, quotas, monitoring.
- ✓ **Forests (Extended):** education, protected areas, quotas, replanting.
- ✓ **Small populations (Extended):** low genetic variation; AI and IVF bring in new alleles.

Watch out!

A larger mesh size lets *young, small* fish escape, so they survive to reproduce. It does not mean catching bigger fish to make more money.

Increasing the *number* of animals does not restore genetic variation on its own. New alleles must come from unrelated animals, for example by AI or IVF with animals from other populations.