

Biodiversity and the effect of human interaction on ecosystems

Revision notes • What biodiversity is, and how waste, land use, deforestation and global warming reduce it, and how people try to maintain it.

For AQA GCSE Biology 8461 and Combined Science: Trilogy 8464. **Triple only** is not in Combined Science. **Higher tier** is only on the Higher paper.

Biodiversity and the effect of human interaction on ecosystems

Spec 4.7.3

Biodiversity **Spec 4.7.3.1**

Biodiversity

The variety of all the different species of organisms on Earth, or within an ecosystem.

A great biodiversity ensures the **stability** of ecosystems by reducing the dependence of one species on another for food, shelter and the maintenance of the physical environment.

The future of the human species on Earth relies on us maintaining a good level of **biodiversity**. Many human activities are reducing biodiversity, and only recently have measures been taken to try to stop this reduction.

The next sections explain how waste, land use, deforestation and global warming each have an impact on biodiversity.

Exam tip: Biodiversity is about the number of different species, not the number of individuals. A field with a million of one species has low biodiversity.

Waste management **Spec 4.7.3.2**

Rapid growth in the human population and an increase in the standard of living mean that increasingly more resources are used and more **waste** is produced. Unless waste and chemical materials are properly handled, more **pollution** will be caused.

Where pollution can occur

Where	Causes
In water	Sewage, fertiliser or toxic chemicals
In air	Smoke and acidic gases
On land	Landfill and toxic chemicals

Pollution kills plants and animals, which can reduce biodiversity.

Exam tip: Link the cause to the effect in two steps: pollution kills organisms, and so the number of species falls, which reduces biodiversity.

Land use Spec 4.7.3.3

Humans reduce the amount of land available for other animals and plants by **building**, **quarrying**, **farming** and **dumping waste**.

Peat bogs

The destruction of peat bogs and other areas of peat to produce garden compost reduces the area of this habitat. This reduces the variety of different plant, animal and microorganism species that live there (biodiversity).

The decay or burning of the peat releases **carbon dioxide** into the atmosphere, which contributes to global warming.

There is a conflict. People want cheap, available compost to increase food production, but peat bogs and peatlands need to be conserved as habitats for biodiversity and to reduce carbon dioxide emissions.

Exam tip: In a conflict question give both sides, then reach a conclusion, for example that using peat-free compost protects the habitat but may cost more.

Deforestation Spec 4.7.3.4

Large-scale **deforestation** in tropical areas has occurred to:

- provide land for cattle and rice fields
- grow crops for biofuels.

Environmental implications of deforestation	
Implication	Why
Loss of biodiversity	The habitat is destroyed, so many species lose their food and shelter and die out
More carbon dioxide in the atmosphere	Fewer trees means less photosynthesis, so less carbon dioxide is removed. Decay and burning of the trees release carbon dioxide
Contribution to global warming	Higher carbon dioxide levels contribute to global warming

Cleared land can provide food and fuel crops, so there is a conflict between the economic needs of people and protecting the environment.

Exam tip: To evaluate, state a benefit (land for cattle, rice or biofuel crops), then the environmental costs (less biodiversity, more carbon dioxide), then give a judgement.

Global warming Spec 4.7.3.5

Levels of **carbon dioxide** and **methane** in the atmosphere are increasing, and contribute to 'global warming'.

Some biological consequences

- Loss of habitats, for example as ice melts or as sea levels rise and flood low-lying areas.
- Changes in the distribution of species, as organisms move to cooler areas or cannot survive where they were.
- Changes in the migration patterns of animals.
- Some species may not be able to adapt or move, and may die out, which reduces biodiversity.

The evidence

The scientific consensus about global warming and climate change is based on systematic reviews of thousands of peer reviewed publications.

In a complex context the evidence can be uncertain or incomplete. The climate depends on many factors, and predictions use models, so scientists may not agree on exactly how much the temperature will change.

Exam tip: Be specific when you describe a biological consequence. 'Habitat loss' or 'species move to different areas' will score; 'bad for animals' will not.

Maintaining biodiversity Spec 4.7.3.6

Human interactions in an ecosystem can be **negative** or **positive**. You need to describe both and explain their impact on biodiversity.

Negative interactions	Positive interactions
Building, quarrying, farming and dumping waste reduce the land available	Breeding programmes for endangered species
Pollution of water, air and land	Protection and regeneration of rare habitats
Destroying peat bogs and clearing forest	Reintroduction of field margins and hedgerows in agricultural areas where farmers grow only one type of crop
Releasing more carbon dioxide and methane	Reduction of deforestation and carbon dioxide emissions by some governments
Dumping waste in landfill	Recycling resources rather than dumping waste in landfill

Scientists and concerned citizens have put in place programmes to reduce the negative effects of humans on ecosystems and biodiversity.

Programmes and how they help	
Programme	How it helps biodiversity
Breeding programmes for endangered species	Increase the numbers of a species so it does not die out
Protection and regeneration of rare habitats	Keeps the habitat and the species that depend on it
Reintroducing field margins and hedgerows	Gives shelter and food for wildlife in fields where only one crop grows, so more species can live there
Reducing deforestation and carbon dioxide emissions	Protects forest habitats and slows global warming
Recycling instead of landfill	Uses less land for dumping waste and reduces pollution

Conflicting pressures

Maintaining biodiversity is not always easy. There are **conflicting pressures**. Farmers want land for crops and animals, people need food, fuel and homes, and conservation costs money. Reducing emissions or protecting habitats may reduce profits or jobs.

Exam tip: When asked to evaluate a method, give a benefit and a drawback, using the information in the question, and then give a conclusion.

Quick check

- 1 . Define biodiversity.
- 2 . Name three ways humans reduce the land available for other organisms.
- 3 . Why does destroying peat bogs add to global warming?
- 4 . Which two gases are increasing in the atmosphere and contributing to global warming?
- 5 . Give two programmes that help maintain biodiversity.

Quick check answers

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1. The variety of all the different species of organisms on Earth, or within an ecosystem.
2. Any three of: building, quarrying, farming, dumping waste.
3. The decay or burning of peat releases carbon dioxide into the atmosphere.
4. Carbon dioxide and methane.
5. Any two of: breeding programmes, protecting rare habitats, hedgerows and field margins, reducing deforestation and emissions, recycling.