Biodiversity

4.7.3.1 · Ecology · revision notes

Biodiversity is the variety of all the different species on Earth or in an ecosystem. You need to explain why high biodiversity makes ecosystems stable and why it matters to humans. Expect definitions and 2 to 3 mark 'explain' questions, often at the start of a longer question on human impacts.

Key facts

- Biodiversity = the variety of all the different species on Earth or in an ecosystem
- Why: species depend less on any one species for food, shelter and maintaining the physical environment
- Many human activities reduce biodiversity
- High biodiversity → more stable ecosystem
- The future of humans relies on maintaining biodiversity

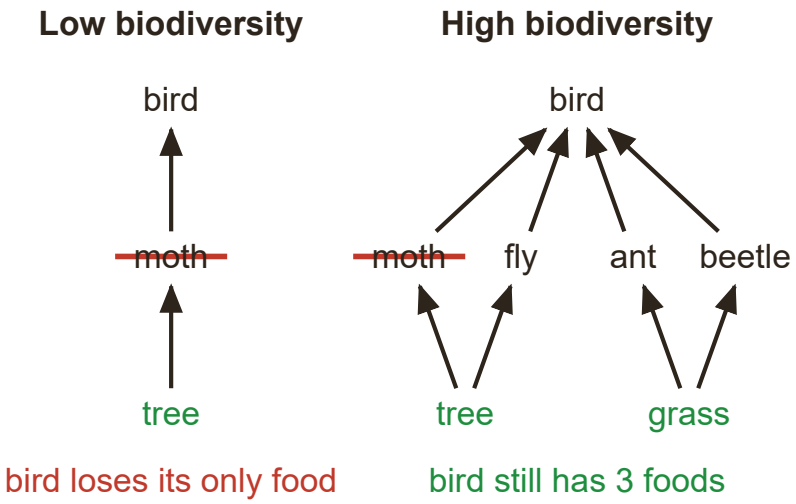
Notes

What biodiversity is

- **Biodiversity** is the variety of all the different species of organisms on Earth, or within an ecosystem.
- An ecosystem with many different species, such as a tropical rainforest or a coral reef, has high biodiversity. A field of a single crop has low biodiversity.

Why it makes ecosystems stable

- High biodiversity keeps an ecosystem stable, because each species is less dependent on any one other species for food, shelter and keeping the physical environment suitable.
- In a food web with many species, if one food source declines, animals can eat something else, so their populations are less affected.
- Example: a bird that eats ten kinds of insect is less affected if one insect species dies out than a bird that eats only one kind.



The more species in a food web, the less any one species depends on another.

- Many plant species together help keep the physical environment suitable, e.g. roots hold the soil together and leaves shade the ground, so losing one species matters less.
- More plant species provide more types of food and more types of habitat (shelter, nest sites), so more animal species can live there.
- In an ecosystem with low biodiversity, the loss of one species can cause large changes to many others.

Humans and biodiversity

- Our own future as a species depends on keeping a good level of biodiversity.
- We depend on other species for food, materials such as wood, and many medicines, and on insects to pollinate many crops.
- Many human activities are reducing biodiversity, e.g. pollution, building, quarrying, growing single crops, deforestation and global warming.
- Serious efforts to slow this loss have only started quite recently.

How to answer each type of question

Define biodiversity

1 mark | Grade 3

1. Use the words 'variety' and 'different species'.
2. Add 'on Earth or in an ecosystem'.

Example. What is meant by **biodiversity**?

Model answer. The variety of all the different species (of organisms) on Earth or in an ecosystem (1).

Explain why high biodiversity makes an ecosystem stable

2 marks | Grade 6

1. Say that species depend less on any single species (for food, shelter or maintaining the environment).
2. Say that if one species is lost, others can be eaten or used instead, so populations change less.

Example. Explain why an ecosystem with high biodiversity is more stable than one with low biodiversity.

Model answer. With high biodiversity, species depend less on any one other species for food or shelter (1). If one species declines, animals can eat other species instead, so the populations of other species do not change as much (1).

Compare two ecosystems using data

3 marks | Grade 7

1. Compare the numbers of species, quoting the data.
2. Say which ecosystem has lower biodiversity.
3. Explain why it would be affected more, using the idea of dependence.

Example. The table shows the number of species in two ecosystems.

Ecosystem	Number of plant species	Number of insect species
Natural woodland	48	130
Conifer plantation	6	25

A disease kills one species of tree in each ecosystem. Suggest which ecosystem is likely to be affected more. Explain your answer. (3 marks)

Model answer. The conifer plantation (1). It has lower biodiversity, e.g. 6 plant species compared with 48 (1). So the insects and other animals have fewer other sources of food and shelter, and the loss of one tree species affects more of them (1).

Don’t lose marks

- Defining biodiversity as 'the number of organisms'. It is the variety of different species.

- ✗ Saying high biodiversity means 'more food'. The key idea is less dependence on any one species.
- ✗ Forgetting that humans depend on biodiversity too.

More tips

Memory tricks

- Biodiversity = 'bio' (life) + 'diversity' (variety): the variety of life.
- More species means more back-ups: if one food source disappears, there is another.

Exam technique

- Use the phrase 'less dependent on one species' in stability answers.
- When comparing biodiversity from data, quote the numbers of species.
- Biodiversity questions often lead into longer questions on human impacts. Link back to biodiversity in your conclusion.

What each grade needs

What you need to be able to do, from the first marks up to the top grade.

Grade 3 — **Define biodiversity**
The variety of all the different species of organisms on Earth, or within an ecosystem.

Grade 4 — **Name human activities that reduce biodiversity**
For example pollution, building, farming, deforestation and destroying peat bogs.

Grade 5 — **Explain why biodiversity matters to humans**
The future of humans relies on it, e.g. for food, materials, medicines and stable ecosystems.

Grade 6 — **Explain why high biodiversity makes ecosystems stable**
Species depend less on any one other species for food, shelter and maintaining the physical environment.

Grade 7 — **Compare the stability of two ecosystems**
Use the numbers of species to explain which is more likely to be badly affected by a change.

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