The variety of life

60 minutes • A4.2.1 to A4.2.3 • Chapters 1, 2, 3

Biodiversity at three levels, richness and evenness, past and present numbers of species, and three case studies of extinction

BY THE END, STUDENTS CAN

- [ ] Describe biodiversity at three levels: ecosystem, species and genetic diversity A4.2.1
- [ ] Compare the number of species alive today with past levels, from fossil evidence A4.2.2
- [ ] Explain the causes of anthropogenic extinction, using the moa, the Caribbean monk seal and a local example A4.2.3

TIMING

0–6	6 min	**Do now: which is more diverse?**
6–18	12 min	**Richness and evenness**
18–30	12 min	**Five crashes**
30–52	22 min	**Gone for good**
52–60	8 min	**Exit**
	60 min	**One lesson**

STARTER

6 min

Do now: which is more diverse?

Two photos: a wheat field and a hedgerow beside it. Pairs list every kind of difference they can see between them, then sort the list into genes, species and habitats.

ON THE BOARD, FROM THE GUIDE

Open the guide on the projector at each chapter (the links work in this PDF). Every figure plays from its own buttons, and the lesson's slides have the same figures, step by step, in the order of this plan.

01 Counting the variety

CHAPTER 01 IN THE SLIDES

Switch the figure through Meadow A and Meadow B, and have the class say what will change before each.

> **Predict box:** A cheetah population passed through a bottleneck and now has very little genetic diversity. Why does that put it at risk? Hands up or mini whiteboards first.
>
> **Answer B: With few alleles, a new disease that kills one cheetah is likely to kill most of them, as none may carry resistance**

02 More than ever, for now

CHAPTER 02 IN THE SLIDES

Step through the figure (3 steps, the arrow keys on a projector). Stop on each caption and ask what changed before you go on.

1. Fossils of sea animals show the number of kinds **rising** over 540 million years, to more than ever today.
2. Five times it crashed: the **mass extinctions**. Each time, recovery took millions of years.
3. About **2 million** species are named today, of perhaps **8.7 million**, and losses are speeding up.

> **Predict box:** Why are so many of the species not yet described thought to be insects and other small invertebrates? Hands up or mini whiteboards first.
>
> **Answer C: They are small, live in hard places to sample, and look alike, so many have simply never been collected and compared**

03 **Gone for good** CHAPTER 03 IN THE SLIDES

Tap the parts of the figure in turn: .

> **Predict box:** Large, slow-breeding animals, such as moa, were wiped out far faster than small birds on the same islands. Why? Hands up or mini whiteboards first.
>
> **Answer A: Each one killed takes years to replace, because few young are born each year, so hunting outstrips births**

THE LESSON

12 min

Richness and evenness

Chapter 1 and its two meadows. Students define richness and evenness, then design a third meadow with the same richness and an evenness between the two.

12 min

Five crashes

Chapter 2 and its step-through. Students mark the five mass extinctions on a timeline and note the named and estimated number of species, then discuss the lumpers and splitters box.

22 min

Gone for good

Chapter 3 and its explorer. In threes, each student takes one species, notes the cause, the date and why the species was vulnerable, and teaches the others. Then each group finds an extinct species from its own area.

ACTIVITIES

FIELDWORK

Two patches compared

Ten random quadrats on a mown lawn and ten on an unmown verge or meadow. Students count the plants of each species, then compare richness and evenness between the two, and suggest why mowing changes them.

Needs: quadrats, a plant identification sheet, random number tables.

RESEARCH

Our own extinction

Each group picks a species extinct from their country or region, from a local museum, wildlife trust or national red list, and makes a one-page case study: what it was, when it was last seen and the human causes. These become the local example the IB asks for.

Needs: internet access or a library.

PLENARY

8 min

Exit

Name the cause of extinction the moa and the monk seal share, and one way their stories differ.

WHAT STUDENTS GET WRONG

"Biodiversity means the number of species." That is richness. Biodiversity also covers evenness, genetic diversity and the variety of ecosystems.

"There were more species in the past." Fossils suggest more species are alive now than ever; the worry is the rate of loss.

"All mass extinctions were asteroids." Only the one 66 million years ago is firmly linked to an impact; the others had volcanic and climatic causes.

STRETCH AND SUPPORT

Support: give the captions of each figure as a cut-up storyboard to put in order, and use the key terms (tap the dotted words) as a glossary.

Support: a frame for each extinction: "The ___ lived in ___. It was vulnerable because ___. People ___. It was last seen in ___."

Stretch: work out Simpson's reciprocal index for the two meadows and say what it adds to richness.

IN THE GUIDE

1 Counting the variety
2 More than ever, for now
3 Gone for good
All The whole guide, with the figures that play
PPTX This lesson's slides, in the order of this plan

EXAM PRACTICE

Check yourself

Set it for homework: a fresh paper of exam-bank questions on A4.2 each time, marked as students go and saved to their Exam practice when they are signed in.

biologybybradford.com/exam-maker/sit?topics=A4.2&level=SL&paper=quiz&marks=15&src=ep

PRACTISE AND REVISE

BUILD FOR YOUR CLASS

- Tarsia puzzle, dominoes and picture reveal on A4.2, built from its key terms and ready to print
- A pub quiz with rounds on A4.2, to present or run with no projector
- An escape room built from the question bank on A4.2

ALREADY ON THE SITE FOR A4.2

- Quiz: Conservation of Biodiversity
- Revision map: A4.2 Conservation of biodiversity, to fill in
- Exam questions: A4.2 in the exam maker, a paper with its markscheme

CARD SETS ON SPLYCR

Open a set to host it as a class game, or make a copy to edit.

- A4.2 Conservation of Biodiversity

How this was made. The course structure, the activities and the teaching choices come from my own classroom, my presentations and my years of teaching IB and AP Biology. I use Claude, an AI, to help write and build the interactive guides, lesson plans, slides and practice questions, and to draw the diagrams and code the interactives. I direct the work and review it against the IB and AP specifications before it goes live.