

Modern extinction – Teacher Guide

Overview of activities:

Students will explore recent extinctions in the context of mass extinctions from Earth's past. Activities include listing extinct and endangered species, creating a timeline of mass extinctions, and exploring the cause of extinctions. Students produce a case study of a recently extinct species to investigate the connections between human activities and extinctions.

Curriculum links:

- Geography: Conservation and sustainable management
 - Impact of human activities on the environment
 - Threats to ecosystems
- Biology: Extinction
 - Environmental changes
 - Biodiversity

Racing Extinction video clips:

Links to these videos can be found within the “Lesson resources” download, via

<http://www.discoveryeducation.co.uk/racingextinction>.

- **Video clip 1: *The world is singing***

This clip features the endangered blue whale, which has the loudest song in the animal kingdom. Also in the segment, a scientist at the Cornell Bioacoustic Research Program reveals a vast library of recorded animal sounds. Many of the animals in the library have recently become extinct.

- **Video clip 2: *Mass extinction events***

This clip identifies the five mass extinction events that have occurred on Earth since life began. Experts believe that humans have a huge influence on future mass extinction events.

- **Video clip 3: *Vanishing species***

This clip compares natural extinction rates with the elevated extinction rates of today. Over the next 100 years, we could lose half of all species on Earth.

Objectives:

Students will...

- Define extinction.
- Give examples of (1) past mass extinctions (2) and recent species extinctions.
- Compare current extinction rates with background extinction rates.
- Explore the causes of extinction.
- Analyse the connection between recent extinctions and human activities.

Questions:

- Why do some species become endangered or extinct?
- Which species have become extinct in modern times?
- What are the characteristics of mass extinctions in the past?
- How do modern extinction rates compare with natural (background) rates?
- What are the connections between human activities and species extinctions?

Background information:

The Racing Extinction documentary highlights the evidence that humans are causing an unprecedented rise in the extinction rate of plant and animal life. The current spike in species extinctions is a global crisis and is intertwined with problems such as climate change, pollution and overpopulation. In these activities, students explore the evidence for historical mass extinctions, study the causes and consequences of extinctions, and come up with ideas to bring about greater awareness of this issue.

Key learning points:

- Mass extinctions events are characterised by a dramatic decrease in species numbers over a short geological timescale. In the current era, the relatively high rate of species extinction is concerning, and if the trend continues, then we could enter the next mass extinction era.
- Extinctions are complex events influenced by changes in species' interactions and environmental conditions. Tracking past extinctions is challenging, given the incomplete fossil record. However, scientists have highlighted the mounting evidence that suggests that the current extinction rates are significantly higher than the natural rate of extinction.
- Local extinctions occur when a sub-population of a species disappears. A species may recover from local extinction if additional populations survive elsewhere on Earth. A total species extinction is permanent and occurs when all of a species' sub-populations die out.
- Over 99 per cent of the species that have ever existed on Earth are extinct. Extinction occurs naturally, but dramatic variations in the rate of extinction occur infrequently. We are but one of the millions of species living on Earth, yet our actions have the power to influence the ecosystems on the entire planet.
- To estimate background extinction rates, scientists use fossil records, speciation rates (as a consequence of evolution) and case studies of biodiversification in different parts of the world.
- The basic unit used to measure extinction rate is the fraction of species going extinct per unit of time — usually a year. The rate is small, so scientists often express it as the number of extinctions per million species, per year.
- For case studies, students can draw from numerous examples of species extinction in modern times (dodo, passenger pigeon, Tasmanian wolf, etc.).

Starter activity

1. Show the Racing Extinction video clip: *The world is singing*.
2. Students name their favourite animals and describe their associated natural habitats.

3. If time allows, students can explore the Cornell [Macauley Library](#) website (featured in the Racing Extinction film) to hear additional animal songs and sounds.
4. Students should list species that they believe to be extinct and / or endangered. If necessary, prompt students with one or two examples they will know, such as dinosaurs or mammoths.
5. Students write their own definition of the word 'extinction' in their books.
6. Students choose one species from their list and write a short passage describing:
 - how the animal was adapted to the habitat in which it lived and what might have caused its extinction (for extinct species)
 - how the animal is adapted to the habitat in which it lives and why there is now the threat that it may become extinct (for endangered species)

Main activity 1

1. Students watch the video clip: *Mass extinction events*.
2. In groups, students research online resources to discover data regarding prior mass extinctions on Earth. Example websites:
 - Penn State College of Earth and Mineral Sciences: [Extinction over Earth's History](#)
 - National Geographic: [Mass Extinctions](#)
3. From their research, each group creates a timeline of extinctions that includes the past five mass extinctions.
4. Each group chooses a particular mass extinction event to feedback details to the class. Ensure that the class, as a whole, includes all of the five mass extinctions. See the [BBC website](#) for a summary list of the events.

Main activity 2

1. Students come up with factors that may contribute to species extinction.
2. Students sort the following factors into two categories (i) natural and (ii) human influences:

- a. habitat loss
- b. pollution
- c. climate change
- d. overpopulation
- e. disease
- f. disaster
- g. hunting
- h. competition

Share how students have categorised the factors. Differences in opinions are a rich source for debate, use it to explore the extent of human influence on all of the above factors.

Main activity 3

1. Students watch the Racing Extinction video clip: *Vanishing species*.
2. Habitat change activity and discussion — students answer the following questions:
 - a. What do organisms need to survive? (e.g. shelter, water, food)
 - b. What causes habitats to change? Give natural and human influences.
 - c. What are the consequences of habitat change?
 - d. What can be done to reduce the impact of human activities on habitats?

Whilst students are answering the questions above, cordon off sections of the room (with rope, for example). Progressively cut-off further areas of the classroom; you may wish to move some students onto crowded tables! Also, run a heater and a fan in different parts of the room to create areas of high and low temperature.

Begin a review of the questions by asking the students how the classroom environment might be related to the lesson topic. Relate the room to a habitat and the reduction of space to habitat loss; discuss resources and competition (reference question a). Relate the heater and fan to changes in climate

(reference question b) and debate the influences of human activities on driving wildlife away from their natural habitats.

Main activity 4

1. Working in groups, each group produces a case study for a species that has gone into extinction in modern times. The group researches online resources to explore the causes of the extinction of their chosen species. Resources include:
 - International Union for the Conservation of Nature: [IUCN Red List](#) (click “Extinct” in the top menu)
 - OneKind, animal welfare charity: [The 10 best known extinct species](#)
2. Each group creates a concept map to illustrate the case study of a species that has gone extinct in modern times. Ensure that the concept map contains key data, including:
 - species names
 - illustrations or photos if available
 - dates of discovery and extinction
 - biogeographical data (location, initial population size, ecology, and behaviour)
 - causes of extinction
 - possible actions that may have prevented the extinction
3. Working individually or in groups, students create specific activities that publicise and educate about a possible sixth mass extinction. Discuss which activities are feasible to implement in a school setting. Where possible, implement these ideas to reach a wider audience, such as the year group / school / local community.

Plenary activities

- Write a short passage describing characteristics of past mass extinctions.
- Describe how modern extinction rates compare with natural (background) rates.
- Describe five kinds of human activities that result in species extinctions.

- List three species that have become extinct due to human activities and the causes of those extinctions.

Further resources on Discovery Education Secondary:

Fearless Planet – Great Barrier Reef: [Environmental threats to the reef](#)

Fearless Planet – Earth Story: [65 million years ago: asteroid impact and climate change](#)