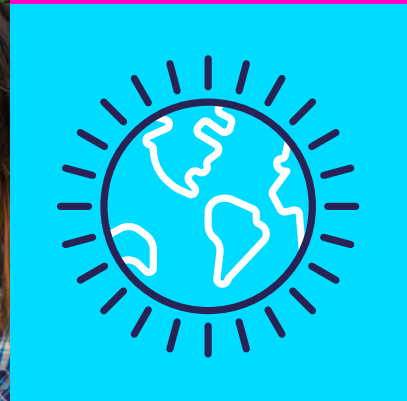
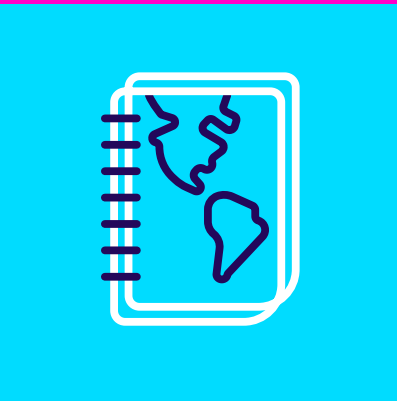
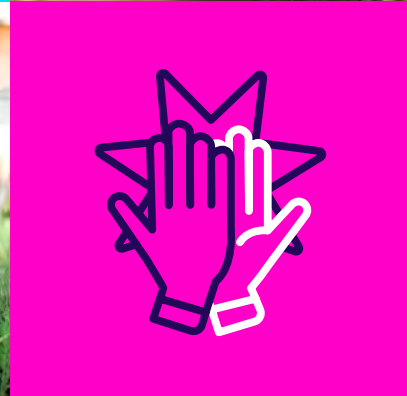
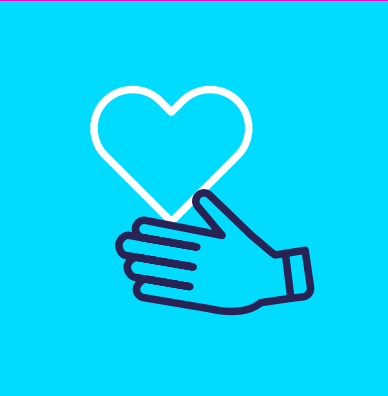
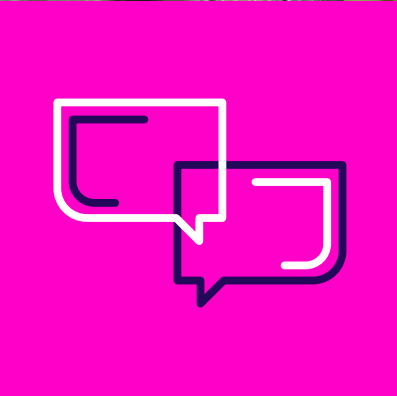
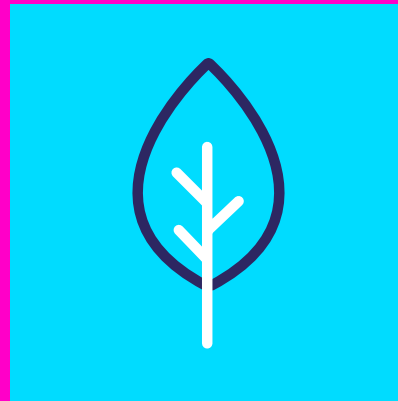


# Schools Connect

## Life on land

Understanding ecological  
interconnectivity



## INTRODUCTION TO LIFE ON LAND

'Human life depends on the Earth as much as the oceans for our sustenance and livelihoods. Plant life provides 80 per cent of the human diet, and we rely on agriculture as an important economic resource. Forests cover 30 per cent of the Earth's surface, provide vital habitats for millions of species, and important sources for clean air and water, as well as being crucial for combating climate change.

'Every year, 13 million hectares of forest are lost, while the persistent degradation of drylands has led to the desertification of 3.6 billion hectares, disproportionately affecting poor communities.

'While 15 per cent of land is protected, biodiversity is still at risk. Nearly 7,000 species of animals and plants have been illegally traded. Wildlife trafficking not only erodes biodiversity, but creates insecurity, fuels conflict, and feeds corruption.

'Urgent action must be taken to reduce the loss of natural habitats and biodiversity which are part of our common heritage and support global food and water security, climate change mitigation and adaptation, and peace and security.'

<https://www.undp.org/content/undp/en/home/sustainable-development-goals/goal-15-life-on-land.html>

### WHAT YOU WILL FIND HERE

This resource aims to promote the importance of life on land and encourage its protection.

The unit is designed to support the development of a pupil's core skills such as creativity, the ability to collaborate and communicate well with others, and the ability to think critically about an issue or a problem to evaluate it effectively.

### Goal 15: Life on land

Protect, restore and promote sustainable use of terrestrial ecosystems, sustainably manage forests, combat desertification, and halt and reverse land degradation and halt biodiversity loss – United Nations

The unit focuses on Sustainable Development Goal 15: Life on land. It can be used to teach English, science, geography, maths, citizenship and other subjects.

The materials can be used either with or without an overseas partner school.

A planning template has been provided to assist in delivering the unit, allowing you to adapt the unit to suit different age groups and contexts. For example, one lesson has been designed around the use of natural history museum collections to inspire pupils' learning about animals from the past and from around the world, but resources are provided if you do not have access to this resource locally or digitally.

*Note: Teachers and schools around the world are facing new challenges as a result of Covid-19, including virtual teaching, maintaining physical distancing and reduced teaching hours. You may need to adapt the activities in this resource in line with local and school guidelines, to ensure they can be delivered safely.*

## OVERVIEW

Extinction is a natural part of the evolution of life on Earth. Indeed, it is necessary for some species to decline while others thrive in order to remain in balance with Earth's ecological systems. For instance, we wouldn't have such a proliferation of mammals – including humans – if dinosaurs had not become extinct approximately 66 million years ago.

Some scientists are, however, warning that we are heading for the Earth's sixth 'mass extinction'. The most concerning aspect of this is that the extinction will not be caused by natural events. For the first time in recorded history, the extinction will be due to the actions of a creature (humans) upon the environment. How can this be?

The problem starts with human population numbers. It took over 200,000 years of human history for the world's population to reach one billion and only 200 years (since the Industrial Revolution) for it to go from under one billion to over seven billion! This rapid growth has led to increased pressure on the land to feed and provide for the vast number of people that now inhabit the planet. As a result, over the last 200 years there has been a dramatic increase in hunting, habitat destruction and now climate change.

Humans are, however, becoming more aware of the threat that they pose to animals and plants on Earth – indeed to their own survival on this planet. Television series like *Planet Earth* have helped in this regard. There is consequently renewed hope that we can turn around the catastrophic number of extinctions that we have caused over the last couple of centuries.

- The rapid loss of species that we are seeing today is estimated to be between 1,000 and 10,000 times higher than the natural extinction rate (WWF)!
- More than 30,000 species are currently threatened with extinction, according to the International Union for Conservation of Nature's (IUCN) Red List – that's 37 per cent of all assessed species.

Life on land may be an emotive topic to teach, but it is now more important than ever that young people understand that we need to live in harmony with nature and how to do so. As well as informing pupils about the extinction facts, we will be inspiring with good news stories where humans have had a positive impact on animal life. We will also be encouraging students to find their own voice about the issue. They will be encouraged to think creatively about the problem and the actions that they can take to mitigate species loss.

The later lessons will focus on insects and invertebrates (or, as we like to call them, minibeasts). Insects are particularly crucial to all life on Earth. They form the basis of all ecosystems, as food for other animals, pollinators and waste recyclers. They can also be found all over the planet, including in your school building and grounds. This resource thus takes a focus on insects as a sometimes maligned and misunderstood group of species, but one which children can easily study in their local area.

## LEARNING OBJECTIVES AND CURRICULUM ALIGNMENT

This unit is designed to support the development of both knowledge and skills. The knowledge centres on the Sustainable Development Goals and, in particular, the causes of and potential solutions for the problem of species extinction and habitat loss. Skills that can be learned during this unit include core skills such as critical thinking and problem solving, creativity and collaboration.

We recommend that each teacher identifies opportunities within their school's curriculum where this knowledge and these skills can be taught, whether in English, citizenship, geography, science or other subjects.

### Learning objectives

**Critical thinking:** Develop a good understanding of why species are threatened by human action and the extent of the problem, as well as different approaches to tackling the issue.

**Creative collaboration:** Work in groups to solve problems, share ideas, and develop and carry out a project that tackles species loss in their local area.

**Science and geography:** Conduct a biodiversity investigation and habitat audit using sampling techniques.

**Citizenship:** Take action to understand global attitudes to wildlife and to promote wildlife in their local area. Begin to appreciate how decisions are made globally and locally and how to make their voice heard on the issue.

Overall, the aim of the project is to inform and empower young people with the knowledge and skills they need to:

- take action to promote biodiversity in their local area
- collaborate locally and globally
- be active local and global citizens.

### PLANNING THE UNIT AND COLLABORATING WITH COLLEAGUES

#### Summary

Here are the suggested steps for planning the unit and collaborating with other teachers in your school and/or internationally:

1. What do we want pupils to learn?
2. What would be the best way for them to learn this?
3. How will we know what they have learned?
4. What resources do we need?
5. What did pupils learn during the unit?
6. What other reflections do we have about the unit?

Please use the planning template to reflect further on these questions.

The learning materials can be adapted to suit different schools and the needs of specific children. Where there is obvious differentiation between ages this is indicated in the text, but each teacher can make their own assessment for their pupils. Some learning activities can be left out to ensure deeper learning from other activities. Or you may wish to add in further learning activities to extend a concept. Throughout the unit there are opportunities to reflect on the learning so far, encouraging the children to apply the knowledge from previous lessons.

It is worth thinking and planning ahead for the type of action pupils may like to take during Lesson 8. For example, considering where materials for a bug hotel or wildflower planting might be obtained, knowing who to write to to encourage local action, etc.

It is also worth considering, in advance, what local resources you might have for Lesson 4. If you have no local natural history museum to visit, perhaps you could speak to scientists at a local college or university (by visiting or in a video-conference).

## LEARNING MATERIALS THAT HAVE BEEN CREATED FOR THIS UNIT

### **Lesson 1: Life on land**

What do we know about how humans affect animal and plant life? What would we like to find out? An introductory, 'hook' lesson exploring the importance of protecting life on Earth and how human life is interconnected with animal and plant life.

### **Lesson 2: The human impact**

How have humans harmed and helped animal and plant life around the world? What is a habitat and how does human activity affect them? Pupils investigate case studies.

### **Lesson 3: Food chains**

How is life interconnected? Who eats what, and what are the consequences of plant life and creatures disappearing from the food chain?

### **Lesson 4: Learning about the present from the past**

Where can we go to learn about animals and plants in our area or across the world? Use the expertise of a local natural history museum to enable children to encounter animals and plants they might not usually see, and to find out why extinction is such a pressing problem.

### **Lesson 5: Local wildlife and habitat study**

This lesson will look at local habitats and wildlife, exploring their current health and how they have changed over time. The young people will plot the habitats that currently exist within their local area and start to consider what impact land-use changes may have had on the number and diversity of natural species.

### **Lesson 6: Invertebrate investigation**

How do local habitats influence the number and diversity of local species? How can we learn about and monitor biodiversity in our own local area? Pupils plan and carry out an invertebrate (minibeast) investigation. Pupils analyse the results of their investigation and draw conclusions about the implications.

### **Lesson 7: Who is to blame?**

Pupils begin to creatively imagine how they can solve local biodiversity problems. Pupils explore habitat creation and what they can do to improve biodiversity in their local area. From writing letters to local politicians, to planning a physical project in their school's grounds, the pupils are supported and encouraged to 'plan for action'.

### **Lesson 8: Habitat protection and creation**

This lesson is locality specific. Having researched their plan for action, (where possible) the pupils now start to put their plan into place. The pupils explore what taking action for their local wildlife means to them.

### **Lesson 9: Caring and sharing**

Pupils review and evaluate their experiences of Life on land. They then share these experiences and their learning with their peers, to encourage further school engagement and future action.

### **Activity resources**

The Life on land PowerPoint presentation slides are referred to within the lessons and will help to guide and inform the students about the topic. Within these PowerPoint slides there are occasional links to film footage. If these do not work please visit the internet page indicated. To help you deliver these lessons there are also many paper-based resources that can be printed out and used (worksheets, cards, images). There are also instructions for games and links to more information.

## TEACHER'S PLANNING TEMPLATE

This can be used individually, in collaboration with colleagues in your school or with teachers teaching the same unit in another country.

Question	Notes	Your thoughts
<p>1. What do we want pupils to learn?</p>	<p>Think about the most important learning objectives for this unit:</p> <p>Read through the materials that have already been created and consider what the most important things are for your pupils to learn.</p> <p>Reflect on the objectives suggested (around critical thinking, creativity and collaboration) and revise them if necessary.</p> <p>Consider the standards of your national curriculum and reflect on which standards can be met through the Zero Hunger learning unit.</p> <p>Be realistic about the time that you have available for this unit and what can be achieved in that time.</p>	
<p>2. What would be the best way for them to learn this?</p>	<p>Given the learning objectives you have decided on, think about the learning activities that would be most effective for your pupils, for example:</p> <p>What is the best way for them to learn about the current state of gender inequality in their community, country and internationally?</p> <p>How to learn about the facts (data) and personal experiences (stories) that illuminate different aspects of the current situation.</p> <p>How to learn about the various causes of gender inequality.</p> <p>How this could be used as an opportunity to practise citizenship and critical thinking; for example, to think about an issue from multiple perspectives.</p> <p>How to learn about the potential solutions which could be used to tackle gender inequality, especially those that have been very successful in many countries.</p> <p>How to design a project that addresses gender inequality in their own community.</p>	

Question	Notes	Your thoughts
<p>3. How will we know what they have learned?</p>	<p>Given the learning objectives you have decided on, think about assessment.</p> <p>How will you find out what your pupils already know about this topic before the beginning of this unit?</p> <p>Consider what sort of evidence you would need to see that pupils have learned the knowledge, skills or attributes you would like them to learn.</p>	
<p>4. What resources do we need?</p>	<p>Given the learning activities you are planning, think about the resources you will need.</p> <p>People – who would you like to engage in the unit, so that pupils can learn more about the causes of gender inequality and potential solutions?</p> <p>Written materials, music, art – what additional materials would be beneficial to your pupils in this unit?</p> <p>Places – where would it be useful for your pupils to learn during this unit?</p>	
<p>5. What did pupils learn during the unit?</p>	<p>During and after the unit, think about what pupils learned as part of this unit.</p> <p>To what extent did pupils meet the learning objectives of this unit?</p> <p>What other, surprising things did pupils learn?</p> <p>Were pupils confused about anything?</p>	
<p>6. What other reflections do we have about the unit?</p>	<p>During and after the unit, think about what went well with this unit and what could have been done differently, for example:</p> <p>Which learning experiences were particularly valuable?</p> <p>Were the learning activities appropriate? What worked well?</p> <p>What would you do differently next time?</p>	

## LESSON 1

### Life on land

What do we know about the animals and plants that live on Earth? How do humans affect animal and plant life? What would we like to find out? An introductory, 'hook' lesson exploring the importance of protecting life on Earth and how human life is interconnected with animal and plant life.

#### PUPILS WILL:

- see a variety of images and film footage that shows plants and animals in their natural habitats
- consider their own attitudes towards animals
- reflect on their own current understanding about what can harm animals and plan for their own learning.

#### NOTES ON CORE SKILLS

- Critically explore their own and other's feelings about plants and animals.
- Critically begin to explore the issues around animal and plant extinction.
- Collaborate to decide if a species is Extinct/Endangered/Not under threat.



Jeremy Avery, Unsplash

#### Activity 1

1. Show images and film footage of life on Earth.

**Task:** Use the **Life on land Lesson 1 PowerPoint** to illustrate the diversity of creatures that inhabit the world's major terrestrial biomes (savannah, tropical rainforest, desert, polar, mountains, temperate forest). Additionally, watch the *Planet Earth* documentaries, which present a wonderful overview of the diversity of life on land.

**Task:** Can the children complete the **Which creature lives where? activity** (*Appendix 1*), placing the creature within the environment it is adapted to?

2. How do we feel about animals?

**Task:** Ask the children to complete the All about animals worksheet to explore their animal knowledge and understanding.

- Children aged 4–11 should complete All about animals worksheet A (*Appendix 2*).
- Children aged 11+ should complete All about animals worksheet B (*Appendix 3*).

#### **Task: Animal and plant statements**

(*Appendix 4*). This activity explores the children's thoughts and feelings about animals and plants.

- Children aged 4–7 should place the provided statements into 'agree' or 'disagree'.
- Children aged 7–11 should place the provided statements into 'agree' or 'disagree' and share why they have made this choice.
- Children aged 11+ should rank the statements according to their validity.



## Activity 2

1. Show images and films of endangered/extinct animals.

**Task:** Use the **Life on land Lesson 1 PowerPoint** to demonstrate the number and variety of endangered and extinct creatures from around the world. The PowerPoint shows creatures from different habitats and creatures that have been endangered by different circumstances, to demonstrate the variety of factors that influence creature survival.

**Task:** Children use their knowledge to place the creatures provided in the **Which creature lives where? activity** (*Appendix 1*) in the categories Extinct/Endangered/Not under threat.

2. What do we know about animals being endangered or extinct? What do we want to know?

**Task:** Fill out the first two columns (Know and Wonder) of a **Know/Wonder/Learn (KWL) grid** (*Appendix 5*) for display and future reference. Encourage the children to think about local as well as global species.

## Activity 3

1. Use the **Main causes of biodiversity loss: Teacher notes** (*Appendix 6*) to support you to teach about biodiversity loss and carry out this activity.

**Task:** Introduce the Sustainable Development Goals ([www.globalgoals.org](http://www.globalgoals.org)):

- Children aged 4–7: Have a class discussion about each of the goals. Can they identify which of the goals might affect other creatures and plants?
- Children aged 7+: Place each of the 17 goals in different areas around the classroom. Ask the children to find a partner and then walk around the room, writing on each goal what it means to them. Then, have a class discussion about each goal, using the children's thoughts as a starting point.

2. Introduce the focus goal for this unit: Goal 15: Life on land – halt biodiversity. Do we know what biodiversity means?

**Task:** In groups the children create their own definition of biodiversity. Compare and contrast their definitions.

- Children aged 11+ then research the details of Goal 15.

3. Ask the children if they understand what biodiversity loss means.

**Task:** Can they list possible causes of biodiversity loss?

4. Explain that the project we are starting today will help us learn about and protect life on land. Is there anything we want to add to our KWL grid?

### POTENTIAL COLLABORATION WITH PARTNER SCHOOL

Discuss with colleagues in the partner school how to explore multiple perspectives on endangered species. Perhaps pupils could:

- share their attitudes to animals from Activity 1
- share KWL grid results from Activity 2
- share Red Lists for their local area.

## ACTIVITY RESOURCES

- Life on land Lesson 1 PowerPoint.
- Which creature lives where? activity (*Appendix 1*).
- All about animals worksheet A (*Appendix 2*) or B (*Appendix 3*).
- Animal and plant statements (*Appendix 4*).
- KWL grid (*Appendix 5*).
- Main causes of biodiversity loss: Teacher notes (*Appendix 6*).



Willian Justen de Vasconcellos, Unsplash



Alan Seabright

## LESSON 2

### The human impact

Habitat loss is probably the greatest threat to the variety of life on Earth today. It is identified as a main threat to 85 per cent of all species described in the IUCN's Red List (those species that are described as 'threatened' or 'endangered') (WWF, 2020). What is a habitat and how does human activity affect them? How have humans harmed and helped animal and plant life around the world? Pupils investigate case studies.

#### PUPILS WILL:

- understand what a habitat is, and how the habitat of an area will determine the creatures that live there
- understand the adaptations that creatures have developed to make them suited to life in their particular habitat
- think about how and why humans harm habitats and other creatures.

#### NOTES ON CORE SKILLS

- Work together to think about the sensory experiences within different habitats.
- Decide what makes a creature ideal for a particular environment and then create a creature that combines all of the best adaptations for that environment.
- Start to think critically about the actions that humans take that will affect and harm habitats.
- Begin to question why humans act badly towards other creatures.

#### Activity 1

1. Show images and film footage of six of the world's major terrestrial biomes (savannah, tropical rainforest, desert, polar, mountains, temperate forest). Explain that the different environments provide the creatures living there with different habitats.

**Task:** Use the **Life on land Lesson 2**

**PowerPoint** to demonstrate six of the different biomes that exist around the world and ask the children to note how they might feel if they lived within the different environments.

**Task:** Split the children into groups. Each group is given a different habitat card (*Appendix 7*) and asked to fill in the **Sensory exploration worksheet** (*Appendix 7*). Each group then shares the sensory descriptions of their given environment, and the rest of the class have to guess where they are.

#### Activity 2

1. Explain the link between habitat and adaptation.

**Task:** Using the resources from last lesson's

**Which creature lives where? activity** (*Appendix 1*), can the children match each creature to their habitat and note on the **Habitat and adaptation worksheet** what makes them suited to live there?

- Children aged 4–11 should use **Habitat and adaptation worksheet A** (*Appendix 8*).
- Children aged 11+ should use **Habitat and adaptation worksheet B** (*Appendix 9*).

**Task:** Divide the class into pairs or groups and give each group one of the six habitats. Can the children **design the ideal creature(s)** (*Appendix 10*) for their habitat? When shown the creature(s), can the rest of the class guess where the creature(s) might live?

### Activity 3

1. How do humans harm habitats?

**Task:** Use the **Life on land Lesson 2 PowerPoint** to show the children images and video footage of habitat destruction. Have they ever seen habitat destruction in their local area (e.g. building on a greenfield site, logging)?

**Task:** Can children make a **WANTED poster** for humans, showing the harmful actions we have taken against nature?`

- Children aged 4–11 should make a general poster.
- Children aged 11+ should make a poster referencing a particular locality.

### Activity 4

1. How can humans help creatures?

**Task:** Humans can also have a positive impact on creatures and their habitats. Use the **Life on land Lesson 2 PowerPoint** to show the children images and video footage of habitat creation and creature protection.

**Task:** Split the children into pairs or groups and give each one a different **case study**. The case studies detail how humans are helping plants and animals around the world. Each group shares the information in their case study with their class via a presentation/social media post/film/news article. They may wish to do more research on their case study to get more information for their presentation.

- Children aged 7–11 should read **case studies A** (*Appendix 11*).
- Children aged 11+ should read **case studies B** (*Appendix 12*).

### POTENTIAL COLLABORATION WITH PARTNER SCHOOL

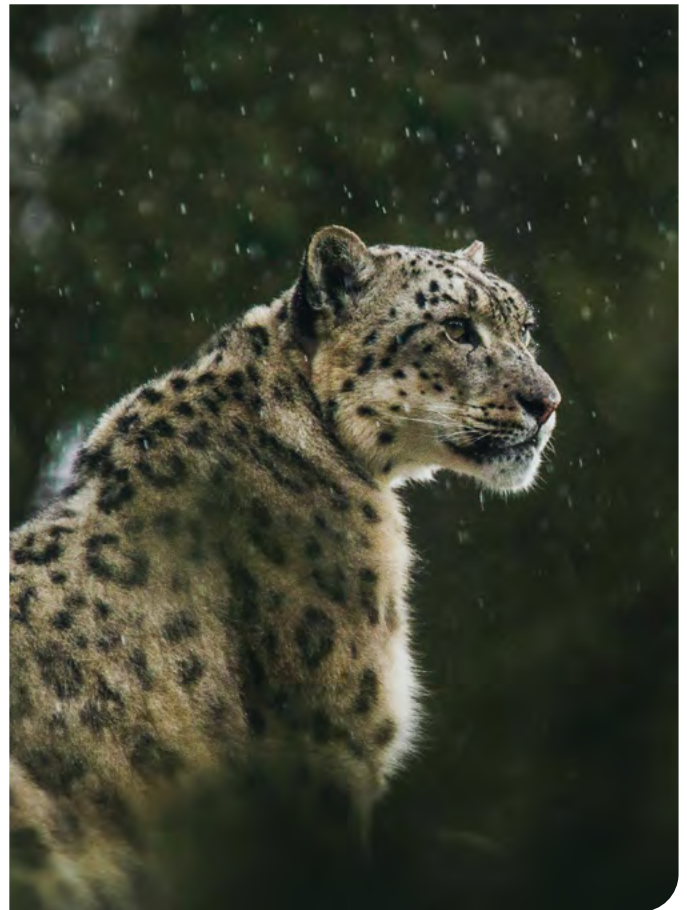
- Share their 'ideal creature' designs and see if the children within the partner school can guess which habitats they have been designed for.
- As a class, or in smaller groups, create an ideal creature for your locality and share this with your partner school, explaining why the adaptations will be useful for the creature's survival.
- Exchange WANTED posters to put up in your schools.
- Share the case study presentations/social media posts/films/news articles.

## ACTIVITY RESOURCES

- Life on land Lesson 2 PowerPoint.
- Sensory exploration worksheet and habitat cards (*Appendix 7*).
- Habitat and adaptation worksheet A (*Appendix 8*) or B (*Appendix 9*).
- Design an animal (*Appendix 10*).
- Case studies A (*Appendix 11*) or B (*Appendix 12*).



Bee, UK – Dmitry Grigoriev, Unsplash



Snow leopard, Nepal – Frida Bredesen, Unsplash

## LESSON 3

### Food chains

How is life interconnected? Who eats what, and what are the consequences of plant life and creatures disappearing from the food chain? How much habitat needs to exist for a species to survive?

#### PUPILS WILL:

- learn about food chains and food webs and the interdependence of life on the planet
- understand that different creatures need different areas of habitat to survive, and that large mammals need the greatest area
- consider how humans affect the food supplies of other creatures and so their survival.

#### NOTES ON CORE SKILLS

- Critically think about how every creature on the planet is interconnected by their food supply.
- Create food webs to display the interdependence of life on the planet.
- Critically think about the impact of migration on global food sources, and explore the consequences of human impact at this level (children aged 11+).
- Collaborate to create case studies that document the human impact on food webs.

#### Activity 1

1. What do different creatures eat?

**Task:** Use the **Life on land Lesson 3 PowerPoint**, show the children images of creatures and ask them what they think each creature eats.

- Children aged 4–7: Meat, vegetable or both.
- Children aged 7–11: Carnivore, herbivore or omnivore.
- Children aged 11+: Carnivore, herbivore or omnivore and name of creatures/plants consumed.

**Answers:** Herbivores = deer and rabbit; omnivores = bear, hedgehog and human (although some choose to be herbivores); carnivores = eagle, spider and wolf.

2. Explore how different creatures are interconnected by their food.

**Task:** Illustrate simple food chains (children aged 4–7) through to more complicated food webs (children aged 7+) by playing games.

- Children aged 4–7 play the **Food chains game** (*Appendix 13*).
- Children aged 7+ play the **Food web game** (*Appendix 14*).

#### Activity 2

1. Explore the link between an animal's food source and its range. Learn that large mammals need to consume more food and so need a much larger area of habitat to survive.

**Task:** Use the **Life on land Lesson 3 PowerPoint** to explore the habitat range of different mammals.

**Task:** Play the **I am hungry! matching game** (*Appendix 15*) to link the mammal to its food source. Can the children decide whether the mammal needs a small, medium or large habitat?.

2. Explore the range of different creatures and their impact on local food webs.

**Task:** Draw a large **world map** (*Appendix 16*) on the playground floor in chalk. Place the species from the **I am hungry! matching game** (*Appendix 15*) on top of the locations in which they can be found. Can the children identify other creatures and plants for each locality and detail what they eat/what they might be eaten by? Note them down on the world map in chalk.

**Task:** Draw lines between the species to connect what eats what.

- Children aged 7–11: How big can we make our food web?
- Children aged 11+: Can we make it extend across the globe?

### Activity 3

1. Investigate how humans have affected food webs across the world, to illustrate how the effects of human influence on food chains extend beyond local habitat boundaries.

**Task:** Create case studies that explore human impact on food chains/webs.

- Children aged 4–7 research what happened to the dodo.
- Children aged 7–11 research animals that have been hunted to extinction by humans and start to explore which other creatures also ate these animals.
- Children aged 11+ research the impact of human hunting, poaching, pollution and land-use change on food webs.

### POTENTIAL COLLABORATION WITH PARTNER SCHOOL

- Explore the habitat range of the creatures that live within your country and share this information with your partner school. Do any of the creatures within your locality move across country borders?
- Exchange a photograph of the world map food web that you created. Did you identify any of the same interconnections?

### Activity resources

- Life on land Lesson 3 PowerPoint.
- Food chains game (*Appendix 13*).
- Food web game (*Appendix 14*).
- I am hungry! matching game (*Appendix 15*).
- World map (*Appendix 16*).



Kangaroo rat, Pacific Southwest region, Wikimedia Commons; Kidaha, Pixabay

## LESSON 4

### Learning about the present from the past

Where can we go to learn about past and present animals and plants in our local area or across the world? Use the expertise of a local natural history museum, or books/other sources, to enable children to encounter animals and plants they might not usually see, and to put the problem of extinction into its historical context.

#### PUPILS WILL:

- learn about plants and animals that have existed in the past
- explore why animals have gone extinct in the distant past (before the age of humans), using the example of dinosaurs
- consider similarities and differences between these past causes and the current causes of extinction
- think about who is the most powerful species: human beings or the dinosaur?
- evaluate the usefulness of natural history museums for learning about extinction.

#### NOTES ON CORE SKILLS

- Working together, critically think about how it is possible to know that species existed in the past.
- Working together, critically think about why dinosaurs died out.
- Critically think about whether humans or dinosaurs are more powerful.
- Critically evaluate the impact of humans on global species numbers.

**Note:** Depending on the availability of natural history museums in your area, you might carry out some or all of this activity either in a local natural history museum or using the image resources provided by Manchester Museum, Manchester, UK and images from books/the internet.

#### Activity 1

1. Children explore the different plants and animals that have existed over time and how they have changed.

*If a natural history museum exists nearby, visit it and complete:*

**Task:** Fill in the **Past plant and animal museum discovery worksheet** (Appendix 17).

*If a natural history museum does not exist nearby:*

**Task:** Collect images of different plants and animals that existed in the past using a variety of different sources (Manchester Museum images, photos, books, the internet, drawings, etc.).

Using the **Natural History Museum plaque template** (Appendix 18), create plaques to go underneath the images to construct your own natural history museum.

2. How do we know that these plants and animals existed in the past?

**Task:** Children work in groups to answer this question and then share their answers.



## Activity 2

1. Show the class a picture of a *Tyrannosaurus rex* (Appendix 19), a carnivorous dinosaur. Ask the pupils to discuss which creature is the most powerful – a human or a dinosaur – and why?

**Task:** Take a class vote.

2. Do pupils know any of the scientific theories about why dinosaurs went extinct?

**Task:** Divide the class into pairs or groups and give each one a set of **dinosaur extinction theory summary cards** (Appendix 20).

- Children aged 4–11 rank the cards in order of most likely to least likely.
- Children aged 11+ have an open discussion, within their pairs/groups, about each theory.

At the end, give each group time to state their theory preference to the class.

Explain to children that the most popular theory among scientists is currently the meteor theory – but that this may change if new evidence comes to light!

## Activity 3

1. Look at (pictures of) animals that have become extinct during the last 150 million years.

**Task:** Go outside and create a **species and extinction timeline** (Appendix 21) for Earth using the provided cards and instruction sheet. Give the children extinction cards, showing a species, and ask them to place the cards on the timeline to indicate when they disappeared.

2. Discuss the differences between the possible causes of dinosaur extinction versus animal extinction now.

**Task:** Children aged 11+: Split the children into groups and give each group a set of **age of humanity timeline cards** (Appendix 22). Can they create the timeline for the ‘age of humanity’ and then place on it the six mass extinction cards? What do they notice?

3. Discuss whether the *Tyrannosaurus rex* would be affected by the current threats from humans. Does that make us change our mind about which creature is the ‘most powerful’?

**Task:** Take another vote.

### POTENTIAL COLLABORATION WITH PARTNER SCHOOL

- Share your pictures of your museum’s collections of animals and plants and the worksheet that you completed with your partner school. Or share the natural history museum that you made in your school with your partner school.
- Share your theories for the dinosaur extinction and state what influenced your thoughts.
- Discuss whether your school voted for humans or dinosaurs as the most powerful species and why. If you voted differently, can you persuade your partner school to change their view?

## ACTIVITY RESOURCES

- Life on land Lesson 4 PowerPoint.
- Past plant and animal museum discovery worksheet (*Appendix 17*).
- Natural History Museum plaque template (*Appendix 18*).
- Picture of a *Tyrannosaurus rex* (*Appendix 19*).
- Dinosaur extinction theory summary cards (*Appendix 20*).
- Species and extinction timeline (*Appendix 21*).
- Age of humanity timeline (*Appendix 22*).

### Suggested pictures



Dr Christine Twigg  
Gorgosaurus4



Ant Clausen  
© Manchester Museum



Alan Seabright



© Manchester Museum

'This Trilobite, called *Paradoxides*, became extinct about 488 million years ago. Other trilobite species thrived until the end Permian mass extinction 248 million years ago when 96% of all plants and animals became extinct.'

## LESSON 5

### Local wildlife and habitat exploration

This lesson will look at local habitats and wildlife, exploring their current health and how they have changed over time. The children will plot the habitats that currently exist within their local area and start to consider what impact land-use changes may have had upon the number and diversity of natural species?

#### PUPILS WILL:

- learn about the different habitats that exist in their local area
- learn how these habitats have changed over time
- learn what species the habitats support/ supported in the past.

#### NOTES ON CORE SKILLS

- Work together to decide which creatures lived/live within their locality.
- Work together to establish if any of the creatures that live within their locality are endangered.
- Critically evaluate the danger(s) that creatures within their locality may face.
- Problem solve how to check if their assumptions are correct.

#### Activity 1

1. What creatures do the pupils think exist/existed in their local area?

**Task:** Can the children compile two lists of creatures, one for creatures that currently exist in their locality and one for those that used to live there? Why might some creatures no longer live there?

2. Do the pupils think that any of the creatures that currently live in the area are in danger?

**Task:** Can the children place their listed creatures against the following categories?

- Children aged 4–7: In danger or Safe.
- Children aged 7+: Endangered or Not under threat.

3. Can the pupils identify the potential threats to local species' existence?

**Task:** Using the creatures they listed in the In danger or Endangered category:

- Children aged 4–7 use the **Life on land Lesson 5 PowerPoint** dangers slide. Can they state what danger each of their listed creatures are in?
- Children aged 7+ use the **danger prompt cards** (*Appendix 23*). Can they state what threatens each of their listed creature's existence and if the threat is local, national or global in origin?

4. How can we check if we are right?

**Task:** The IUCN Red List of Threatened Species (<https://www.iucnredlist.org/search>) is a critical indicator of the health of the world's biodiversity. It categorises different species from Critically endangered to Least concern. Search for information on national and local endangered species to create your own class Red List.

## Activity 2

1. Can the children identify different local habitats and then explore/map them?

**Task:** Use the **Exploring and mapping local habitats: Teacher notes** (*Appendix 24*) to support you with this task.

- Children aged 4–7: Walk around the school grounds and point out the different land uses (e.g. car park, building, mown grass, long grass, woodland). Ask the children to take a photograph or draw a picture of the habitats they discover. Encourage the children to use all of their senses to explore questions such as what is different about the land here? Can you see any new plants? Can you hear traffic? Can you smell pollution?
- Children aged 7–11: Give each child a map of the school and the school grounds. Walk around the school grounds and ask the pupils to colour in the different land uses/habitats according to a provided key.
- Children aged 11+: Give each child a map of their local area and safe access to the internet. Ask them to use the internet and field research to create a land-use plan.

## Activity 3

1. Identify the habitats that have existed in the local area over time.

**Task:** Children aged 7+: Research what the local area looked like over time by looking at old maps and photographs, talking to elderly residents, visiting a local library and internet research.

## POTENTIAL COLLABORATION WITH PARTNER SCHOOL

- Compare and contrast the creatures that live/have lived within your locality with your partner school.
- Have species become extinct? If so, have they died out for the same reasons?
- Are species endangered? If so, are they endangered for the same reasons?
- Share photographs, maps and data about your locality with your partner school.

## Activity resources

- Life on land Lesson 5 PowerPoint.
- Danger prompt cards (*Appendix 23*).
- Exploring and mapping local habitats: Teacher notes (*Appendix 24*).
- Cameras/iPads (or similar).
- Clipboards, paper and pencils.
- Created maps of the school and locality.
- Old maps and photographs of the school and locality.

## LESSON 6

### Invertebrate investigation

How do local habitats influence the number and diversity of local species? How can we learn about and monitor biodiversity in our own local area? Pupils plan and carry out an invertebrate (minibeast) investigation.

This lesson, and some of the previous/following lessons in this unit, uses outdoor learning as a tool for teaching children about life on land. By stepping outside of the classroom, children can apply their knowledge and have first-hand experiences of life on land in their locality.

Outdoor learning is a method to be used and drawn upon as part of a whole education. By enabling learning in both indoor and outdoor environments, opportunities are provided for all learners. Outdoor learning can be used in many different ways to improve curriculum outcomes, including:

- using natural resources to create characters as an introduction to a story writing lesson
- allowing enough space to act out the movements of the planets in our solar system
- providing a suitable environment to carry out messy science experiments like dissolving different materials
- the opportunity for real application of maths concepts by hunting for shapes and angles in the school grounds in a maths lesson.

During this lesson, notice the impact that outdoor learning has on your pupils. Perhaps, at the end of the lesson, you could ask them how they found learning in an outdoor environment.

Carry out an investigation into the invertebrates that exist within the local environment and then analyse the results and draw conclusions about the implications. How you carry out your investigation will depend on the resources available to you, the time you have available and how closely you wish to link it to your science curriculum. Please see the **Minibeast investigation: Teacher notes** (*Appendix 25*) for helpful suggestions and information.

#### PUPILS WILL:

- learn about different, local habitats and the minibeasts that they support
- be shown how to carry out a minibeast investigation
- complete a scientific enquiry.

#### NOTES ON CORE SKILLS

- The pupils will work together to carry out the minibeast investigation, sharing equipment and supporting one another to identify the different minibeasts.
- Problem solve how to make the investigation a fair test.
- Critically evaluate the results of the test to establish if the habitat does influence the number and diversity of minibeasts within an area.

### Activity 1

1. Carry out a habitat analysis, choosing a variety of different habitats to study (e.g. long grass, mown grass, tarmac, woodland).

**Task:** Using the information on land use from last lesson (Lesson 5), identify three contrasting habitats within the school grounds or the immediate vicinity of the school. Visit each of these localities to take a photo and then ask the children to describe the habitat:

- verbally (children aged 4–7)
- through notes (children aged 7–11)
- via an annotated field study sketch (children aged 11+).

Encourage the children to notice the different surfaces, the variety and density of the vegetation, the micro-climate, etc. in each habitat.

### Activity 2

1. Explore if the habitats contain different numbers of and diversity of minibeast species.

**Task:** At each of the three chosen habitats, carry out a minibeast investigation. Working in groups, the children hunt for minibeasts.

- Children aged 4–7: The minibeasts found are shown to the teacher/teaching assistants, who note down which minibeasts are found.
- Children aged 7+: Each group identifies a group leader who writes down the number and types of minibeasts found.

### Activity 3

1. Establish if the habitat does influence the number and diversity of species within an area by analysing and comparing the results of the minibeast investigation.

**Task:** Explore the children's results, taking each habitat in turn. Complete a class tally chart for each habitat, noting the number and variety of species found in each case.

- Children aged 4–7: The teacher shares the results with the children.
- Children aged 7–11: The group leaders share their results with the rest of the class to produce one large dataset.
- Children aged 11+: The individual groups complete their own analysis and then compare their results with the other groups. Do the same habitats have similar datasets?

2. Create graphs to display the data.

- Children aged 7–11 create a simple bar chart for each habitat.
- Children aged 11+ use a variety of techniques to compare and contrast the datasets.

### POTENTIAL COLLABORATION WITH PARTNER SCHOOL

- Share the results of the habitat analysis (including pictures). Does the partner school have similar habitats within their locality?
- Share pictures/images of the minibeasts found. Does the partner school have the same/similar minibeasts?
- Share the results of the minibeast investigation. Did the partner school's investigation reveal similar results?

## ACTIVITY RESOURCES

- Life on land Lesson 6 PowerPoint.
- Minibeast investigation: Teacher notes (*Appendix 26*).
- Clipboards, pencils and paper to record the results.
- A camera/iPad (or similar).
- Minibeast collection equipment (collection jars, magnifying glasses, sweep nets, etc.) (*see Appendix 26 for more details*).
- Minibeast identification (ID) sheets (*see Appendix 26 for more details*).

### Suggested pictures



*Lixus paraplecticus* – Wevil  
© Marv Wilson photography



Manchester Museum – Noble Chafer Beetle  
© Marv Wilson photography

## LESSON 7

### Who is to blame?

Pupils begin to creatively imagine how they can solve local biodiversity problems. Pupils explore habitat creation and what they can do to improve biodiversity in their local area. From writing letters to local politicians, to planning a physical project in their school's grounds, the pupils are supported and encouraged to 'plan for action'.

#### PUPILS WILL:

- discuss all that they have learnt so far to produce a comprehensive list of 'threats' to biodiversity
- explore their own and other people's feelings about the current biodiversity situation
- establish a plan for action and identify the resources/support that they will need to carry out their plan to help prevent further biodiversity loss.

#### NOTES ON CORE SKILLS

- The pupils collaborate to produce a comprehensive list of the threats that exist towards creatures on the planet.
- Critically explore their own and other's feelings about the current biodiversity challenge.
- Pupils use their critical thinking and problem solving skills to explore how they can influence the plight of biodiversity and reverse the current trend towards species extinction at a global/local level.

#### Activity 1

1. Discuss what threatens the existence of creatures on this planet.

**Task:** The children list everything that they can think of that threatens the existence of creatures on this planet, using the **danger prompt cards** (*Appendix 23*) as a prompt if needed.

- Children aged 4–7 verbally contribute to a teacher list.
- Children aged 7+ work in groups to compile a list and then compare and contrast the lists as a class.

2. Establish how the children feel about the issue.

**Task:** Complete an emotional barometer exercise by asking the children to stand between two contrasting emotions, according to how they feel about the issues of biodiversity loss:

- a happy and a sad face (children aged 4–7)
- the words 'hope' and 'despair' (children aged 7+).

Explain that over the course of the next couple of lessons you hope to move them from the negative to the positive end of this scale.

3. Which of these threats can you influence?

**Task:** Highlight which of the identified threats on the **danger prompt cards** (*Appendix 23*) the children can influence.

- Children aged 4–7: Conduct a simple question and answer session.
- Children aged 7–11: Place the children in groups and ask them to place the cards into the following categories: Can influence, Some influence and No influence.
- Children aged 11+: Rank the cards according to what they feel they can and cannot influence

**Task:** Use the **Life on land Lesson 7**

**PowerPoint** to inspire the children, informing them about the different actions that they can take to help mitigate the different threats.

#### Activity 2

1. Plan for action.

**Task:** Using the children's ideas, support them to make a plan to take action (e.g. create posters to raise awareness, create new habitats within the school grounds). Use the **Taking action: Teacher notes** (*Appendix 26*) to support you with this.

2. Prepare for action.

**Task:** Pupils list the help and resources that they think they will need to carry out their plan for action.



### POTENTIAL COLLABORATION WITH PARTNER SCHOOL

- Communicate their feelings about the issue by sharing the result of the class emotional barometer exercise.
- Share the actions that your school is considering taking to tackle the various threats to biodiversity. Can your partner school help you in any way?
- Work with your partner school to learn about the issues that are affecting them. Use this information to raise awareness of their issue(s) within your own community.

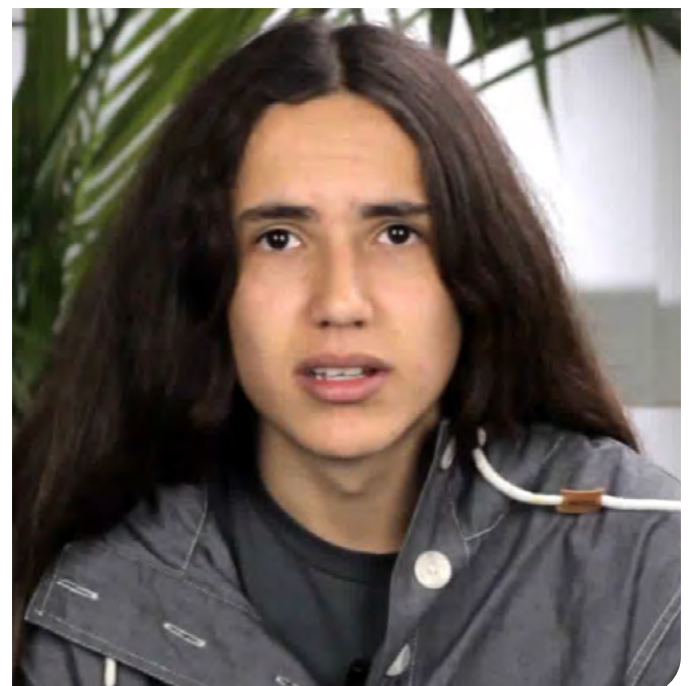
### Activity resources

- Life on land Lesson 7 PowerPoint.
- Danger prompt cards (*Appendix 23*).
- Taking action: Teacher notes (*Appendix 26*).

### Suggested pictures



Climate activist – Greta Thunberg



Climate activist – Xiuhtezcatl Martinez

## LESSON 8

### Habitat protection and creation

This lesson is locality specific. Having researched their plan for action, (where possible) the pupils now start to put their plan into place. The pupils explore what taking action for their local wildlife means to them.

#### PUPILS WILL:

- learn about the skills that are needed to put their 'plan for action' into practice
- appreciate that they can have a positive influence on biodiversity protection.

The rest of their learning will very much depend on the nature of their plan for action but might involve literacy skills (e.g. if letter writing/creating a poster/writing a blog), science skills (e.g. if completing species recording and monitoring to feed into a database like iRecord from the National Biodiversity Network), design and technology (e.g. if creating bee or hedgehog homes), etc.

#### NOTES ON CORE SKILLS

- Collaborate to carry out their plan for action.
- Solve any problems and issues that may arise when carrying out their plan for action.
- Express their feelings about the plan for action and the end result.

#### Activity 1

1. Review the plan for action and make sure that everyone is happy with it and understands why you are doing it.

**Task:** Ask the class if they can remember their plan for action. Can any of them inform the rest of the class about it? Share the work that was completed last time.

2. Establish if you have all of the necessary resources.

**Task:** Revisit the list of required resources and information that was produced in the last lesson, and make sure that everything has been collated.



### Activity 2

1. Carry out your plan for action.

**Task:** This element will vary, based on what the children decided to do for their plan for action. It could include:

- creating posters to raise awareness of the issue
- writing to politicians to raise awareness of the issue
- staging a mini protest within your school grounds
- pledging to support the issue through website engagement
- creating your own petition
- taking action to create or improve existing habitats within the school grounds
- supporting local volunteer habitat creation projects.

### Activity 3

1. Explore how the children feel about the work that they have done so far.

**Task:** Re-do the emotional barometer exercise by standing on the ground between the two contrasting emotions, according to how they feel about the work they have just done:

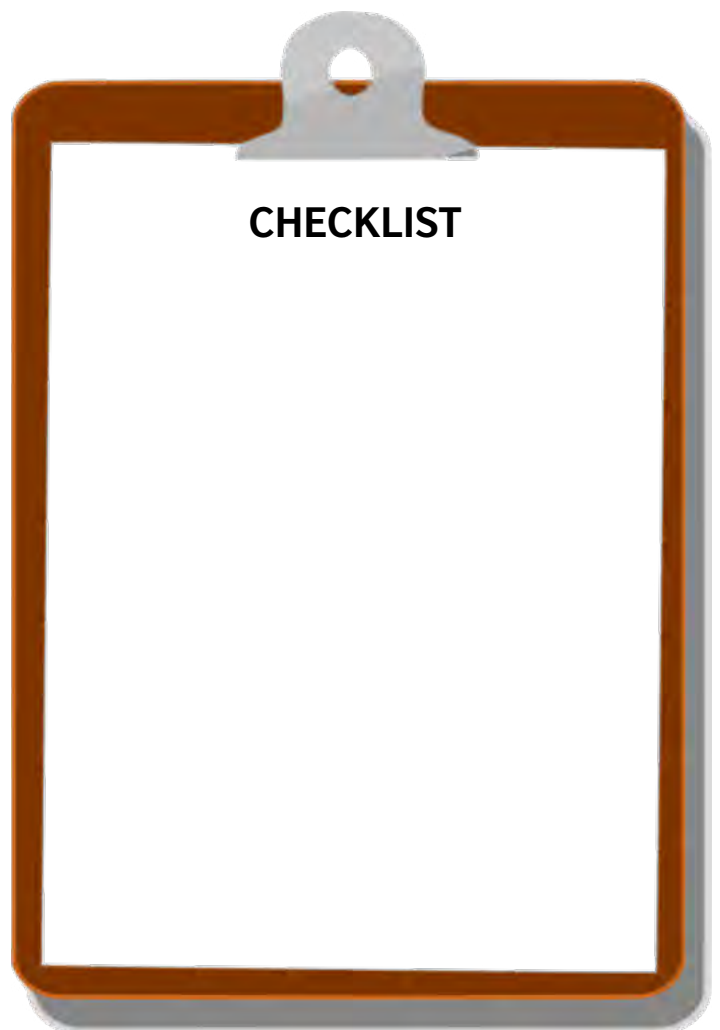
- a happy and a sad face (children aged 4–7)
- the words ‘hope’ and ‘despair’ (children aged 7+).

### POTENTIAL COLLABORATION WITH PARTNER SCHOOL

- Share the actions that your school has taken to mitigate against biodiversity loss and inform them of any feedback that you have received.
- Be supportive of the actions that your partner school has taken.
- Share how you feel about the actions that you have just taken, by showing your partner school a picture of your new emotional barometer.

### Activity resources

- Life on land Lesson 8 PowerPoint.
- Plan for action produced during the last lesson.
- The list of required resources/information that was produced in the last lesson.



Vectors – Pixabay

## LESSON 9

### Caring and sharing

Pupils review and evaluate their experiences of Life on land. They then share these experiences and their learning with their peers, to encourage further school engagement and future action.

#### PUPILS WILL:

- write their own biodiversity pledge
- learn how others are acting to protect biodiversity across the globe and about the careers that exist to protect biodiversity
- create a presentation to share with the rest of their school/family/the community to raise awareness of the need to protect biodiversity and habitats
- evaluate the impact of their Life on land learning.

#### NOTES ON CORE SKILLS

- Critically evaluate how they can continue to help to protect biodiversity.
- Collaborate to produce a presentation to influence the hearts and minds of others.
- Successfully communicate their thoughts and feelings about the issue.
- Critically think about the effect the Life on land lessons have had on them.

#### Activity 1

1. Explore how the children feel about the issue of biodiversity loss and the work that they have done during Life on land.

**Task:** Ask the children to create a **biodiversity pledge** (*Appendix 27*) to place onto a display (e.g. a pledge tree) in school. Explore what the children have written on their pledges.

**Task:** Re-do the emotional barometer exercise by standing on the ground between the two contrasting emotions, according to how they feel about the issue of biodiversity loss:

- a happy and a sad face (children aged 4–7)
- the words ‘hope’ and ‘despair’ (children aged 7+).

How do the results compare with the last two emotional barometer exercises?

**Task:** Encourage the children to voice and share their remaining concerns.

- Children aged 4–11 use the circle time model. Children sit in a circle and an object is passed around. Children may only speak if they have the object in their hand, allowing all children the opportunity to share and be listened to.
- Children aged 11+ note feelings down on a piece of paper and then post them. Discuss the anonymous submissions in an open discussion.

2. Are there constructive ways of sharing these feelings/taking further action?

**Task:** Use the **Life on land Lesson 9 PowerPoint** to explore how others who are concerned about biodiversity loss are tackling the issue and expressing their feelings.

**Task:** Children aged 11+: Research and list other inspirational people and careers focused on alleviating the biodiversity challenge.

### Activity 2

1. Share your feelings with your school.

**Task:** Support the pupils to create a presentation that raises awareness of biodiversity loss and the action that we can all take to improve the situation. Perform this to their peers or parents/ carers.

### Activity 3

1. Revisit the Know/Wonder/Learn (KWL) grid to evaluate pupil progress with respect to Life on land.

**Task:** Fill in the Learn column of the **KWL grid** (*Appendix 5*). Has their learning moved on? Do they still have questions that remain unanswered?

### Activity resources

- Life on land Lesson 9 PowerPoint.
- Biodiversity pledge (*Appendix 27*).
- KWL grid (*Appendix 5*) from Lesson 1.

### POTENTIAL COLLABORATION WITH PARTNER SCHOOL




- Share your feelings about the issue of biodiversity loss.
- Share your presentations. Perhaps even include a message from your partner school within your presentation, to give it a global perspective.
- Share your KWL grids.
- Share your biodiversity pledge with teachers and students globally. Take a picture and tweet us @Schools\_British

## APPENDIX 1

Which creature lives where? (*Lessons 1+2*)






Bjorn Christian Torrissen, Wikimedia Commons

Lion	Giraffe	Zebra
 <p>Jeremy Avery, Unsplash</p>	 <p>elCarito, Unsplash</p>	 <p>Ron Dauphin, Unsplash</p>






Nick van den Berg, Unsplash

<b>Jaguar</b>	<b>Scarlet macaw</b>	<b>Poison dart frog</b>
 <p>skeeze, Pixabay</p>	 <p>Giovanni Poveda, Unsplash</p>	 <p>skeeze, Pixabay</p>



Keith Hardy, Unsplash

<b>Scorpion</b>	<b>Fennec fox</b>	<b>Sand viper</b>
 <p>andrey_barsukov, Pixabay</p>	 <p>Pixabay; Tj Holowaychuk</p>	 <p>Foto-Rabe, Pixabay</p>




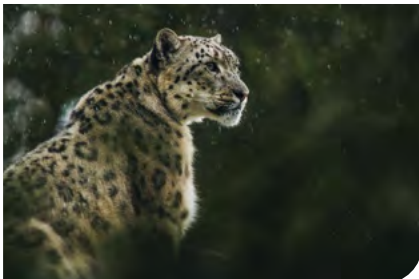



William Justen de Vasconcellos, Unsplash

<b>Polar bear</b>	<b>Arctic fox</b>	<b>Harp seal</b>
 <p data-bbox="134 1892 343 1921">Jonatan Pie, Unsplash</p>	 <p data-bbox="592 1892 917 1921">Alan Wilson, Wikimedia Commons</p>	 <p data-bbox="1042 1892 1220 1921">Lysogeny, Pixabay</p>






Ales Krivec, Unsplash

<b>Mountain yak</b>	<b>Snow leopard</b>	<b>Brown bear</b>
 <p data-bbox="134 1890 357 1917">Lieve Ransijn, Unsplash</p>	 <p data-bbox="592 1890 836 1917">Frida Bredesen, Unsplash</p>	 <p data-bbox="1042 1890 1327 1917">Zdeneck Machacek, Unsplash</p>



Rural Explorer, Unsplash

Red fox	Mouse	Grey squirrel
 <p data-bbox="134 1890 351 1917">Gary Bendig, Unsplash</p>	 <p data-bbox="592 1890 809 1917">Alexas_Fotos, Pixabay</p>	 <p data-bbox="1042 1890 1259 1917">Shane Young, Unsplash</p>

## APPENDIX 2

All about animals worksheet A (ages 4–11) (Lesson 1)

### All about animals (A)

The country I live in is called: .....

The area I live in is called: .....

These are the animals that can be found around my area:

.....  
.....  
.....

This is my favourite animal from my country:.....

Can you draw a picture of it?



This is my favourite animal from across the world:.....

Can you draw a picture of it?



This is what I know about endangered animals:

.....  
.....  
.....

## APPENDIX 3

All about animals worksheet B (ages 11+) (*Lesson 1*)

### All about animals (B)

Which country do you live in?

.....

Can you name creatures that are indigenous to your country? (Indigenous creatures are those that occur naturally in your area or country.)

.....

.....

.....

Do you know of any creatures that used to exist in your country but are now extinct?

.....

.....

.....

Do you know of any creatures that are currently endangered in your country?

.....

.....

.....

Do you know the creatures that are most endangered globally?

.....

.....

.....

.....

## APPENDIX 4

Animal and plant statements (*Lesson 1*)

### Animal and plant statements

<i>'I like animals.'</i>	<i>'I like plants.'</i>
<i>'Animals are important.'</i>	<i>'Plants are important.'</i>
<i>'Animals are useful.'</i>	<i>'Plants are useful.'</i>
<i>'Animals exist to help human beings.'</i>	<i>'I like to see different plants in the park.'</i>
<i>'Humans need to grow different plants as their local areas are changing.'</i>	<i>'Some plants grow in different ways as their habitats change.'</i>
<i>'Animals are threatened.'</i>	<i>'Humans are part of nature.'</i>
<i>'Humans should help animals.'</i>	<i>'Humans are different to nature.'</i>
<i>'I see wild animals every day.'</i>	<i>'Humans are not the same as animals.'</i>

## APPENDIX 5

Life on land KWL grid (*Lessons 1+9*)

Life on land		
<b>K</b> What do we already know?	<b>W</b> What would we like to find out?	<b>L</b> What have we learned?

## APPENDIX 6

### Main causes of biodiversity loss: Teacher notes (*Lesson 1*)

#### **Main causes of biodiversity loss**

As humans, we are putting increasing pressure on the planet. By using and consuming more resources than ever before, we risk upsetting the balance of ecosystems and losing biodiversity – the variety of animals, plants, fungi and micro-organisms that make up our world (WWF, 2020).

#### **The five main causes of biodiversity loss are:**

- habitat destruction and degradation
- over-exploitation of resources, including the wildlife trade
- impact of invasive species and diseases
- pollution
- climate change.

#### **Habitat destruction and degradation**

This is the destruction of habitats to create space for various human activities such as farming, plantations and human developments, e.g. places to live, roads, recreation and business areas. It also includes destroying habitats to extract natural resources, e.g. minerals and ores for roads, construction and manufacturing, and the loss of rainforest for palm oil plantations.

As well as loss of habitat, another cause of biodiversity loss is degradation. This can be caused by pollution – such as littering and toxic spills – or through fragmentation. Fragmentation is where a habitat is divided into smaller pieces caused by small areas being lost on the ground. For example, a large forest may remain but sections across the forest may be lost to buildings, roads and houses, so that the forest habitat is divided into separate pieces that are together smaller than the original forest. As a result, the food and shelter resources of the habitat are reduced, leading to loss of biodiversity.

#### **Over-exploitation of resources, including the wildlife trade**

This is the extraction or harvesting of wildlife for commodities such as food, medicines or natural ingredients. This includes hunting for food or for animal products such as elephant ivory and rhino horn. It also includes the wildlife trade. An example of over-exploitation is the overfishing of cod in the UK and of bluefin tuna in Japan.

Within this there is also control of species to protect fishing or farming stocks, for example the control of osprey in Scotland when they were viewed as a threat to fish stocks.



### Impact of invasive species and diseases

This is where we have introduced species into parts of the world where they do not occur naturally. These species disrupt the local ecosystem and often come with new pests and diseases that the indigenous species have no immunity against. An example of this is the introduction of grey squirrels to the UK, which has threatened the indigenous red squirrels.

### Pollution

This is where wildlife is harmed by toxins in the ecosystem released by humans. Toxins can accumulate throughout a food chain, affecting the entire food web in that habitat.

An example is the use of pesticides to kill pest insects to protect crops. However, in turn this also kills essential pollinators such as bees and the birds that feed on the pest insects.

### Climate change

This is where habitats are damaged by the effects of changing climate due to global warming caused by humans. Examples are in the warmer tropical seas that cause 'coral bleaching'. The coral reefs are destroyed by the increase in temperature due to climate change, which in turn leads to the whole habitat being destroyed as associated species are lost.

Another example is the melting polar ice caps, which is reducing the feeding grounds of polar bears, leading to lack of food and starvation.

### Biodiversity loss causes the children may know:

- hunting
- habitat loss, for example new housing estates
- deforestation
- pollution
- poaching
- logging
- mining
- farming
- fishing.

## APPENDIX 7

Sensory exploration worksheet and habitat cards (*Lesson 2*)

If you were in your environment what would it be like? Write your thoughts below, using the questions to help you.

What would you hear?

What would you smell?

What would you see?

What could you touch?

What would the temperature be like?



Ales Krivac, Unsplash



Andrzej Kryszpiniuk, Unsplash



David Clode, Unsplash



Nick van den Berg, Unsplash



Gustav Gullstrand, Unsplash



James Padolsey, Unsplash



## APPENDIX 8

Habitat and adaptation worksheet A (ages 4–11) (Lesson 2)

<b>Habitat</b> Where an animal lives	<b>Animal</b>	<b>Adaptations</b> How an animal is suited to live in its habitat
Polar	Polar bear	Thick fur to keep warm. Large paws covered in fur to walk over the snow and ice without sinking or slipping.
Mountains		
Desert		
Savannah grasslands		
Tropical rainforest		
Temperate, deciduous forest (forests where trees shed their leaves annually)		

## APPENDIX 9

Habitat and adaptation worksheet B (ages 11+) (*Lesson 2*)

<b>Habitat</b>	<b>Animal</b>	<b>Adaptations</b>

## APPENDIX 10

Design an animal (*Lesson 2*)

### Design an animal

Design the perfect animal to live in your environment. Think carefully about what features it would need to survive. What colour would it be? What size would it be? How would it move around? Draw and label it below.



## APPENDIX 11

Case studies A (ages 7–11) (*Lesson 2*)

### OSPREY

**Location:** Scotland, UK

#### **Why were they endangered in the UK?**

Ospreys were hunted by local people who were worried that the ospreys would eat all the fish, which the people relied on for food.

#### **How are humans helping?**

Ospreys are now protected by law. No one is allowed to injure or disturb any ospreys, osprey nests or their eggs. Some ospreys even have a 24-hour watch, where volunteers make sure that they and their eggs are safe all through the day and night! There are now approximately 1,400 ospreys in the UK.



Jongsun Lee, Unsplash

#### **LEARN MORE**

Watch a live webcam of an osprey nest at Loch of the Lowes here:

<https://scottishwildlifetrust.org.uk/things-to-do/watch-wildlife-online/loch-of-the-lowes-webcam/>

## SNOW LEOPARD

Location: Nepal

### Why were they endangered?

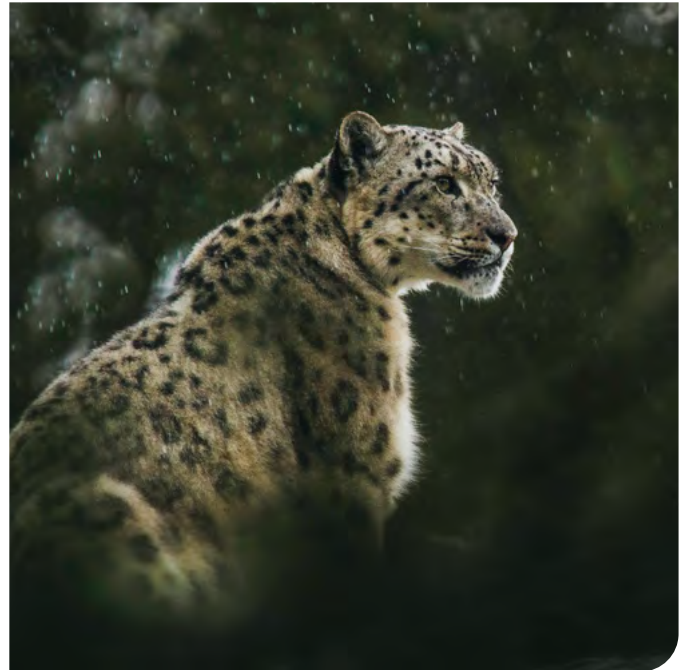
In 2017 it was estimated that there were only 300 to 400 snow leopards left in Nepal.

Snow leopards have to travel large distances in their habitat to find enough prey to eat. But now a lot of their habitat has disappeared due to more farms, houses and roads being built. This means the snow leopards cannot travel as far, so it is harder for them to find prey to eat.

### How are humans helping?

Some areas of the snow leopard's habitats have now been protected. This means nothing can be built on these areas of land.

Education programmes are helping local people learn more about snow leopards and why it is important to protect them.



Frida Bredesen, Unsplash

### LEARN MORE

Watch a National Geographic video to learn lots more facts about snow leopards!

<https://www.youtube.com/watch?v=JTlveCry-mV8>

## RED LAND CRAB

**Location:** Christmas Island, Australia

### Why were they endangered?

Red land crabs live on Christmas Island in Australia. They live in the tropical rainforests located in the centre of the island. Every year between late October and early December, millions of red land crabs come out of the rainforest and travel the short distance to the sea.

However, they have to travel over roads to get to the sea. Lots of crabs were being crushed by cars and bicycles as they crossed the roads, meaning only a small number were reaching the sea.

### How did humans help?

Certain roads are now closed off to cars when the red land crabs are crossing them. Signs are put up and announcements are made on the local radio to tell people which roads are currently closed.

Miles of small fences have been built alongside the road to direct the crabs to a specially built crab bridge or tunnels under the road. This allows the crabs to safely cross the road.



Kirsty Faulkner/Mercury Press

### LEARN MORE

See the red land crabs in action, crossing the specially built bridge:

<https://www.youtube.com/watch?v=UDiUSU-hEAzw>

Learn more about how the rangers prepare for the red land crabs crossing the roads:

<https://www.youtube.com/watch?v=-n9yI51LQ0sI>

## GIANT PANDA

Location: China

### Why were they endangered?

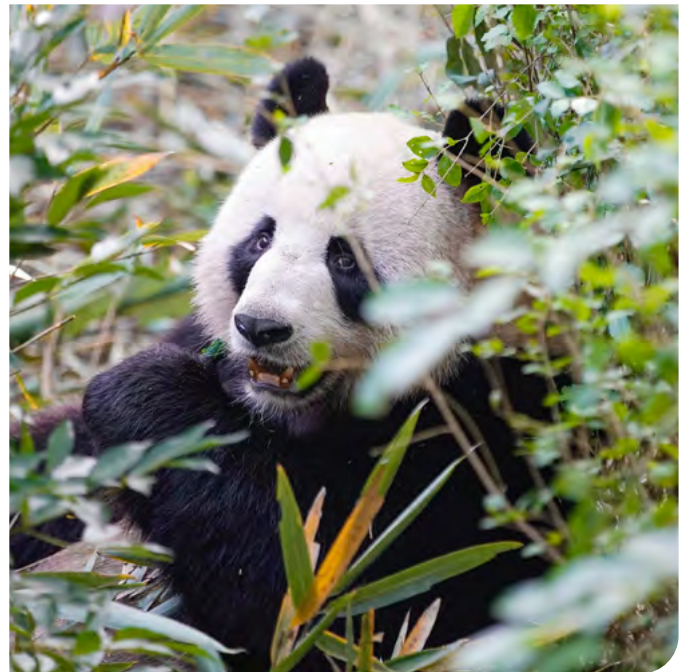
Giant pandas were on the endangered list, with their numbers as few as 1,114 in the 1980s.

Giant pandas only eat bamboo. Humans have cut down lots of areas of bamboo forest to make room for farm animals and new buildings and roads. As a result, there is a lot less bamboo for the pandas to eat and they have a much smaller area to live in.

### How did humans help?

Lots of bamboo forest has now been protected. More patrols are carried out to make sure bamboo is not being cut down and nothing is being built in these protected areas.

Because of this, it is estimated that there are now 1,864 giant pandas living in the wild. Giant pandas are no longer said to be endangered.



毛 祥, Unsplash

### LEARN MORE

Find out more about giant pandas on the WWF website:

<https://www.wwf.org.uk/learn/wildlife/giant-pandas>

## BEE

Location: UK

### Why were they endangered?

Over the last 50 years there has been a massive decline in the UK bee population.

Bees collect pollen and nectar from flowers and trees. They use it to help other flowers, trees and plants grow and to make honey, which they eat. Ninety-seven per cent of the wildflower meadows in the UK have disappeared since the Second World War, making it much harder for bees to collect pollen and nectar from lots of different types of flowers.

### How are humans helping?

Planting more flowers and trees, such as wildflower meadows, allows bees to collect pollen and nectar from lots of different flowers, meaning they will not go hungry as they can make lots of honey. Lots of people are now planting more flowers and trees in their gardens to help the bees!

Building bee hotels gives bees more spaces to nest and build colonies (lots of bees living together).



Dmitry Grigoriev, Unsplash

### LEARN MORE

Explore how to make a bee hotel:  
<https://www.wildlifetrusts.org/actions/how-make-bee-hotel>

Discover which flowers you should plant to help bees:  
<https://www.wildlifetrusts.org/actions/plant-flowers-bees-and-pollinators>



## HEDGEHOG

Location: UK

### Why were they endangered?

Around a third of hedgehogs have been lost since 2000.

To travel between different areas, hedgehogs often have to cross over roads. Sadly, some of the hedgehogs get run over by cars.

Hedgehogs hibernate every year in the winter months. They find a safe, warm place to curl up and stay in all winter. As they stay in the same place for many months, their heart rate and breathing slows right down and their body temperature gets much lower. This allows them to survive on just the food they ate before winter, until spring comes around and there is food available again. But new buildings and roads means that there are fewer available places for hedgehogs to hibernate in.

### How are humans helping?

Small tunnels under the road and wildlife bridges over the road have provided a way for hedgehogs to safely get from one side of the road to the other.

Creating hedgehog homes in gardens, school grounds and parks has helped provide warm and safe places for hedgehogs to hibernate in over the winter months.

Lots of schools and community groups are carrying out litter picks in their local area and learning more about why it is important to put litter in the bin. This prevents hedgehogs from getting injured by pieces of litter.



Piotr Laskawski, Unsplash

### LEARN MORE

Read a guide on how to help British hedgehogs by the British Hedgehog Preservation Society:

<https://www.britishhedgehogs.org.uk/leaflets/A-guide-to-helping-hedgehogs.pdf>

## APPENDIX 12

Case studies B (ages 11+) (Lesson 2)

### OSPREY

**Location:** Scotland, UK

#### Why were they endangered in the UK?

Ospreys were hunted to extinction in 1916, mainly because they were seen as a threat to local fish stocks but also for taxidermy and egg collections.

In 1954 a pair of ospreys came over from Scandinavia to naturally recolonise in the UK. Again, they lost many eggs to human thieves.

#### How are humans helping?

It was decided that a huge amount of help and protection was needed to grow the UK osprey population. Ospreys now have the highest full legal protection under UK law; it is an offence to injure or disturb any ospreys, their nests or their eggs. Some ospreys even have a 24-hour watch, where a rota of volunteers monitor their nest day and night to ensure that they and their eggs are kept safe.

Education programmes about the birds resulted in huge public enthusiasm to ensure their survival.

Thanks to this protection and education there are now approximately 1,400 ospreys in the UK.



Jongsun Lee, Unsplash

#### LEARN MORE

Watch a live webcam of an osprey nest at Loch of the Lowes here:

<https://scottishwildlifetrust.org.uk/things-to-do/watch-wildlife-online/loch-of-the-lowes-webcam/>

## SNOW LEOPARD

Location: Nepal

### Why were they endangered?

In 2017 it was estimated that there were only 300–400 snow leopards left in Nepal.

Snow leopards have to travel large distances in their habitat to find enough prey. Expanding human and livestock populations are rapidly encroaching on their habitats, through the building of new roads, farmland and other infrastructure.

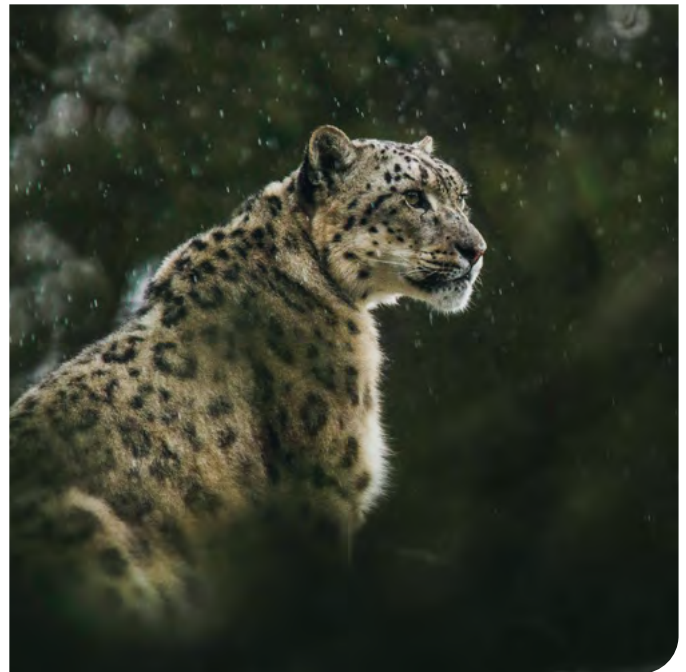
As a result of climate change, grasslands and forests have diminished. Because of this, blue sheep, one of the snow leopard's main prey, have had to move to lower elevations to find food. This movement of blue sheep has also attracted snow leopards to travel to lower elevations, where farms with livestock are located, a tempting prey for snow leopards. This has created conflict between the local people and snow leopards, sometimes leading to herders killing snow leopards in retaliation. The decline in snow leopards' prey, due to hunting, climate change and competition from increasing livestock herds, is forcing them to rely more on livestock for food and increasing the risk of retaliatory killings.

Snow leopards have also long been poached for their patterned fur.

### How are humans helping?

An increasing area of the snow leopard's habitats are now being protected. Potential corridors between habitat areas are being identified and improved to allow snow leopards to access more prey.

Education programmes are helping local people learn more about snow leopards and why it is important to protect them. Local people have been trained as citizen scientists developing skills in GPS handling, camera trapping and monitoring snow leopards and their prey. They are also actively involved in educating other members of their community about the importance of snow leopard conservation.



Frida Bredesen, Unsplash

### LEARN MORE

Watch a National Geographic video to learn lots more facts about snow leopards!

<https://www.youtube.com/watch?v=JTIveCry-mV8>

Retaliatory killings have been reduced through the introduction of a community-based livestock insurance scheme, which allows quick monetary relief to owners for livestock killed by snow leopards.

## BISON

**Location:** North America

### Why were they endangered?

Once numbering 30–60 million, in just a few decades their numbers were decimated. By 1877 there were only 512 bison left.

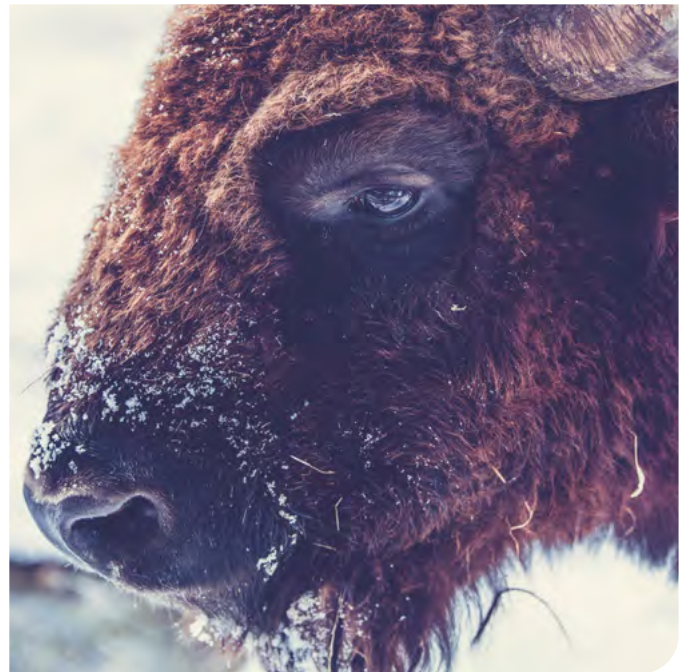
Their plains' habitat was dramatically reduced as humans built infrastructure such as roads and railways on it. Vast areas were also turned into farmland.

Bison were also hunted for food, sport and their thick fur, which was often turned into rugs or robes.

### How are humans helping?

Moving hundreds of miles a year, bison are a vital part of the North American plains ecosystem. During times of deep snow, the bison's massive heads and shoulders allow them to plow through, making highways for other animals to travel through and reach grasses that would otherwise be unattainable. When bison roll on the ground they create depressions in the soil called wallows, which fill with rainwater. These wallows provide a source of drinking water for other animals and a home for specialised plants.

Large protected areas of land have been created, mostly within fenced areas to add an additional layer of protection. Negotiations are taking place with local farmers and landowners for land swapping, allowing private land that previously was blocking expansions of the bison's habitat to be re-established as protected bison habitat. There are now currently 21,000 bison and one day it is hoped that bison will be able to roam right across the great plains of North America as they once did.



Markus Spikse, Unsplash

### LEARN MORE

Learn more about why bison are so important for the North American plains: <https://www.worldwildlife.org/pages/how-bison-help-shape-the-northern-great-plains>

## RED LAND CRAB

**Location:** Christmas Island, Australia

### Why were they endangered?

Red land crabs live on Christmas Island in Australia. They live in the tropical rainforests located in the centre of the island. Every year between late October and early December, millions of red land crabs come out of the rainforest and travel the short distance to the sea to breed.

However, they have to travel over roads to get to the sea. Lots of crabs were being crushed by cars and bicycles as they crossed the roads, meaning only a small number were reaching the sea.

### How did humans help?

Certain roads are now closed off to cars when the red crabs are crossing them. Signs are put up and announcements are made on the local radio to tell local people which roads are currently closed.

Miles of small fences are built alongside the road to direct the crabs to a specially built crab bridge or underpasses under the road. This allows the crabs to safely cross the road.



Kirsty Faulkner/Mercury Press

### LEARN MORE

See the red land crabs in action, crossing the specially built bridge:

<https://www.youtube.com/watch?v=UDiUSU-hEAzw>

Learn more about how the rangers prepare for the red land crabs crossing the roads:

<https://www.youtube.com/watch?v=-n9yI51LQ0sI>

## GIANT PANDA

Location: China

### Why were they endangered?

Giant pandas were on the endangered list, with their numbers as few as 1,114 in the 1980s.

Deforestation and livestock grazing led to large areas of bamboo forest, the giant panda's main food source, being permanently lost. The building of roads, houses and other human infrastructure caused many bamboo forests to be isolated from one another, reducing the areas in which giant pandas could find food.

Giant pandas are also sometimes illegally poached and sold on the black market.

### How did humans help?

There is now an increased area of giant panda habitat under legal protection, currently around 3.8 million acres of forest. Green corridors have also been created to link isolated giant pandas and bamboo forests.

There are more patrols being carried out to prevent poaching, illegal deforestation and building on protected areas of land.

As a result, in the most recent survey (2014) it was estimated that there are now 1,864 giant pandas living in the wild. The giant panda's status has therefore recently been changed from endangered to vulnerable.



毛 祥, Unsplash

### LEARN MORE

Find out more about giant pandas on the WWF website:

<https://www.wwf.org.uk/learn/wildlife/giant-pandas>

## GIANT TORTOISE

**Location:** Galapagos Islands, South America

### Why were they endangered?

The giant tortoise is only found on the Galapagos Islands. They are the largest living tortoise in the world.

The introduction of new predators, such as feral pigs, cats, rats and dogs who will eat giant tortoise eggs and hatchlings, is a key threat.

New roads, buildings and fences around farmland have disturbed the giant tortoise's migration routes, making it harder for them to access the best nesting grounds and find food.

### How did humans help?

Tracking devices have been fitted to some giant tortoises so scientists can track their movements and understand more about their migration routes. This can help scientists plan protection for these routes, allowing the giant tortoises to safely complete their migration.

Nest protection is installed around many giant tortoise nests, to protect the eggs and hatchlings from predators such as feral pigs.



Dušan Smetana, Unsplash

### LEARN MORE

Watch the BBC Earth 'Tracking Giant Galapagos Tortoises' video:

<https://www.youtube.com/watch?v=rEp6pk-kYOgE>

## BEE

Location: UK

### Why were they endangered?

Over the last 50 years there has been a massive decline in the UK bee population.

Bees collect pollen and nectar from flowers and trees, using it to help other flowers, trees and plants grow, and as a food source to feed all the bees in their colony. Ninety-seven per cent of the wildflower meadows in the UK have disappeared since the Second World War, making it much harder for bees to collect pollen and nectar from a variety of species.

### How are humans helping?

Planting more flowers and trees, such as wildflower meadows, ensures that bees will be able to collect pollen and nectar from a variety of species throughout the year, so they will never go hungry. Lots of people are now planting more flowers and trees in their gardens to help the bees!

Building bee hotels gives bees more spaces to nest and build colonies.



Dmitry Grigoriev, Unsplash

### LEARN MORE

Explore how to make a bee hotel:  
<https://www.wildlifetrusts.org/actions/how-make-bee-hotel>

Discover which flowers you should plant to help bees:  
<https://www.wildlifetrusts.org/actions/plant-flowers-bees-and-pollinators>



## HEDGEHOG

Location: UK

### Why were they endangered?

Around a third of British hedgehogs have been lost since 2000. To travel between different areas, hedgehogs often have to cross over roads. This results in many hedgehogs being run over.

Hedgehogs hibernate every year in the winter months, generally between November and March. When hedgehogs hibernate they find a sheltered place to curl up in and stay throughout their hibernation. As they stay in the same place for many months, their heart rate and breathing slows right down and their body temperature drops. This means they use minimal energy throughout their hibernation, allowing them to survive on the food they ate before winter. When spring comes, and food sources become plentiful again, they emerge. However, climate change is having an effect on hedgehogs' hibernation. Because of warmer temperatures in winter, hedgehogs are emerging from their hibernation early. It takes a lot of energy to return to their active state, meaning the hedgehogs become very hungry. Normally in spring the food sources would be plentiful, but now, as hedgehogs emerge early in the winter months, there is very little or no food.

### How are humans helping?

Small tunnels under the road have been built, allowing hedgehogs and other small animals to safely travel from one side to the other. Wildlife bridges have also been built over some roads. These bridges are covered in vegetation, linking habitats together and allowing animals of all sizes to safely cross.

Education on climate change is making more people informed and aware of the impacts it is having on wildlife. People are starting to take action such as planting trees, choosing greener transport options, switching to renewable energy, etc. to help reduce carbon emissions and prevent global temperatures from continuing to rise dramatically.



Piotr Laskawski, Unsplash

### LEARN MORE

Read a guide on how to help British hedgehogs by the British Hedgehog Preservation Society:

<https://www.britishhedgehogs.org.uk/leaflets/A-guide-to-helping-hedgehogs.pdf>

## APPENDIX 13

Food chains game (ages 4–7) (Lesson 3)



Ray Hennessy, Unsplash



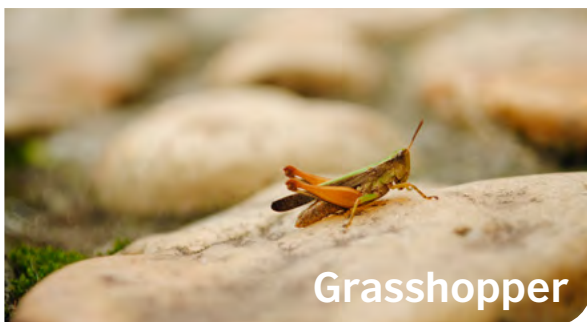
Colter Olmstead, Unsplash



Zoritsa Valova, Unsplash



Abdulaziz Alfawzan, Unsplash



Jairo Alzate, Unsplash




Nick Fewings, Unsplash





James Wainscoat, Unsplash


## FOOD CHAINS GAME SHEET


Can you place the cards in the correct boxes below?

*Eaten by* 

*Eaten by* 

*Eaten by* 

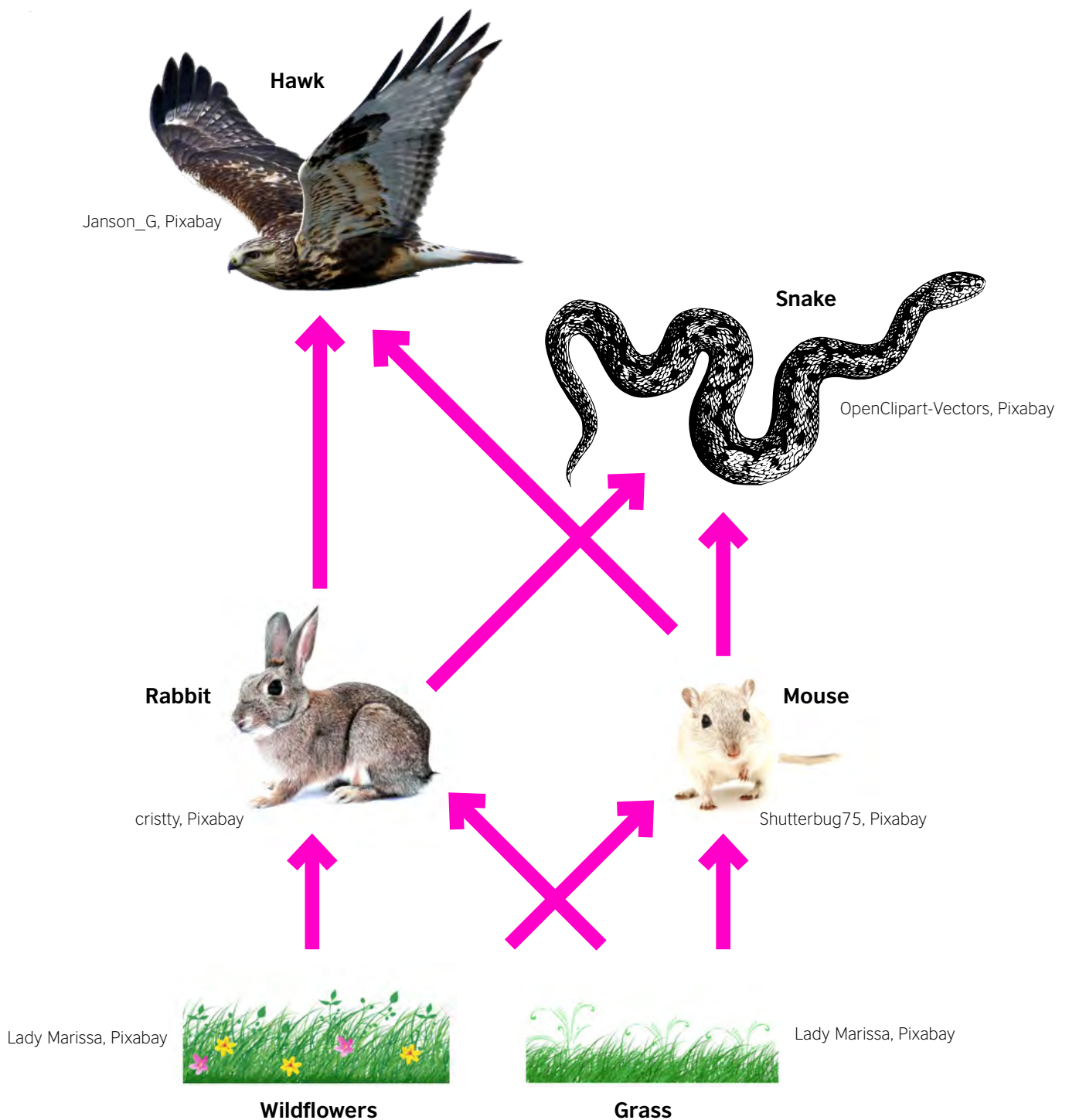
*Eaten by* 

*Eaten by* 

## APPENDIX 14

Food web game (ages 7+) (Lesson 3)

### Food web example

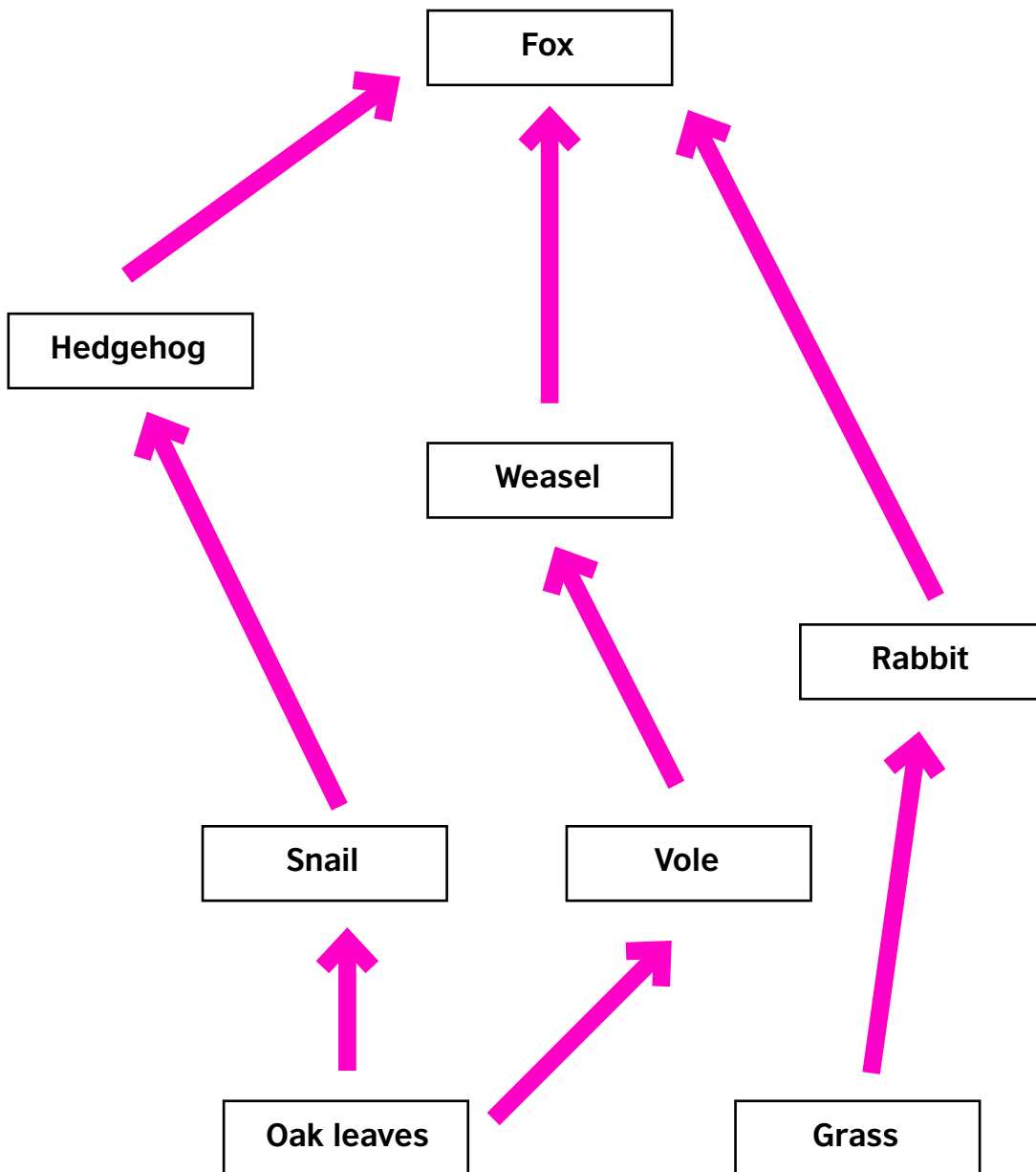


### Food web game: Instructions and answers

Can the children create the food web using the cards provided?

Give the children the cards (located on the next page) and a piece of paper. They need to sort and draw arrows between the cards to show the transfer of energy between organisms. The above UK food web example can be used as a support sheet if necessary.

### Answer





**Fox**

Ray Hennessy, Unsplash



**Rabbit**

Colter Olmstead, Unsplash



**Snail**

Zdenek Machacek, Unsplash



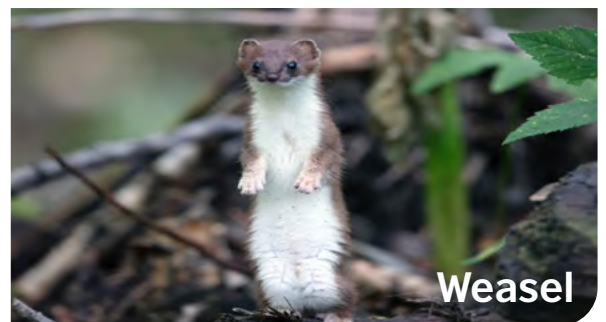
**Hedgehog**

Piotr Laskawski, Unsplash



**Oak leaves**

Scott Webb, Unsplash



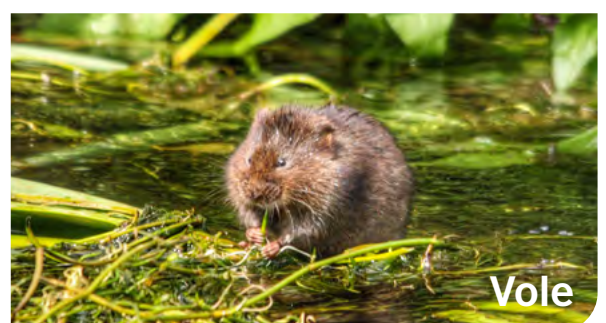
**Weasel**

Brent Jones, Unsplash



**Grass**

Zoritsa Valova, Unsplash



**Vole**

Jonathon Ridley, Unsplash

## APPENDIX 15







I am hungry! matching game (ages 4–11) (Lesson 3)

### I am hungry! matching game







**Step 1:** Cut out the cards.

**Step 1:** The children match the animals to the food they eat. Remind them that some animals are herbivores (they eat plants) and some animals are carnivores (they eat meat).

#### SET 1







Lion	Giraffe	Fruit bat
 <p>Jeremy Avery, Unsplash</p>	 <p>elCarito, Unsplash</p>	 <p>Gary Bendig, Unsplash</p>
Zebra	Tree	Mango
 <p>Ron Dauphin, Unsplash</p>	 <p>elCarito, Unsplash</p>	 <p>arrowmaze, Pixabay</p>

SET 2







Jaguar	Kangaroo rat	Sand cat
 <p>skeeze, Pixabay</p>	 <p>Pacific Southwest Region, Wikimedia Commons</p>	 <p>hansbenn, Pixabay</p>
Monkey	Desert grasses	Spider
 <p>chiselart, Pixabay</p>	 <p>Max Di Cuapa, Unsplash</p>	 <p>Wuestensohn2000, Pixabay</p>



SET 3

<b>Polar bear</b>	<b>Reindeer</b>	<b>Arctic fox</b>
 <p>Jonatan Pie, Unsplash</p>	 <p>Joe Green, Unsplash</p>	 <p>Alan Wilson, Wikimedia Commons</p>
<b>Seal</b>	<b>Moss</b>	<b>Hare</b>
 <p>Yuriy Rzhemovskiy, Unsplash</p>	 <p>Zach Reiner, Unsplash</p>	 <p>Andy Brunner, Unsplash</p>

SET 4

Mountain goat	Fox	Mouse
 <p>Annette Keys, Unsplash</p>	 <p>Gary Bendig, Unsplash</p>	 <p>Alexas_Fotos, Pixabay</p>
Twigs	Earthworm	Seeds
 <p>Ahactacnr, Unsplash</p>	 <p>Natfot, Pixabay</p>	 <p>MabelAmber, Unsplash</p>

## APPENDIX 16

World map (*Lesson 3*)



Clker-Free-Vector-Images, Pixabay

## APPENDIX 17

### Past plant and animal museum discovery worksheet (*Lesson 4*)

Discover the plants and animals of past and present! As you go round the museum, fill in the table below. The first two rows have been filled in as an example.

<b>Plants/animals that you already know</b>	<b>Plants/animals that you did not already know about</b>	<b>Where do they live?</b>	<b>Are they still around?</b>	<b>How do you know this?</b>
<i>Parrot</i>		<i>Tropical rainforest</i>	<i>Yes</i>	<i>I have seen them on the television recently.</i>
	<i>Sabre-toothed tiger</i>	<i>Polar</i>	<i>No</i>	<i>Museum plaque.</i>

## APPENDIX 18

Natural History Museum plaque template (*Lesson 4*)

### Natural History Museum

Exhibit name:

Information:

### Natural History Museum

Exhibit name:

Information:

## APPENDIX 19

Picture of a *Tyrannosaurus rex* (Lesson 4)

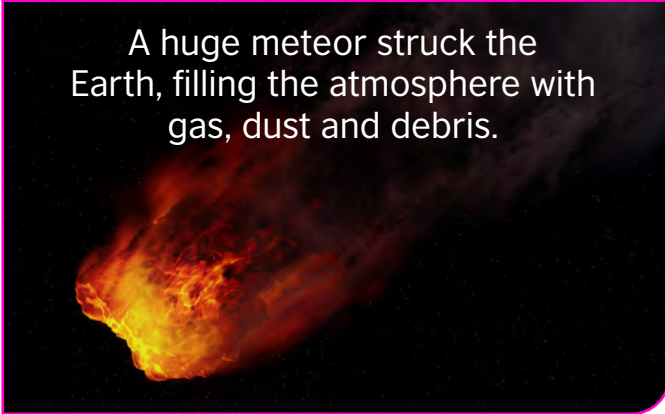


Courtesy of Manchester Museum

## APPENDIX 20

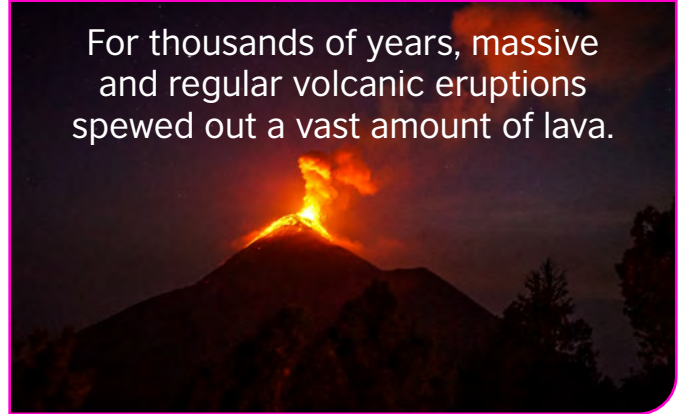
Dinosaur extinction theory summary cards (*Lesson 4*)

A huge meteor struck the Earth, filling the atmosphere with gas, dust and debris.



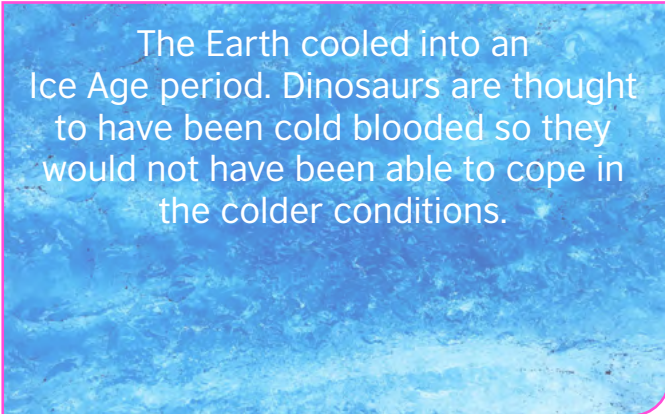
AlexAntropov86, Pixabay

For thousands of years, massive and regular volcanic eruptions spewed out a vast amount of lava.



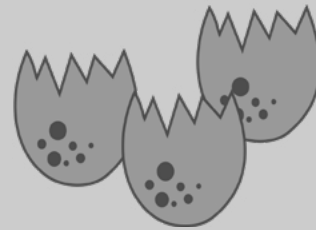
Aaron Thomas, Unsplash

The Earth cooled into an Ice Age period. Dinosaurs are thought to have been cold blooded so they would not have been able to cope in the colder conditions.



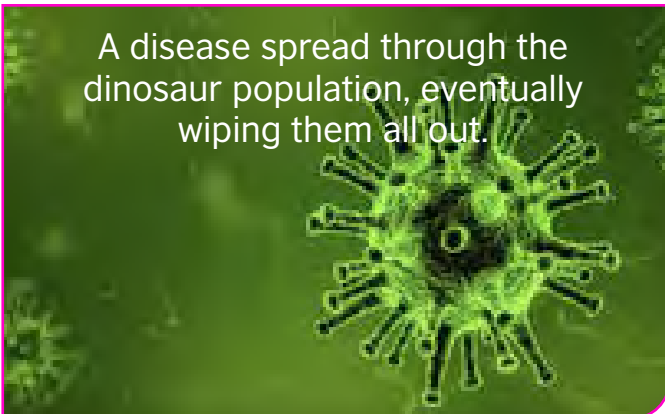
Joyce McCown, Unsplash

New mammals started to compete with dinosaurs, stealing and eating all their eggs.



AceClipart\_Etsy, Pixabay

A disease spread through the dinosaur population, eventually wiping them all out.



qimono, Pixabay

## APPENDIX 21

### Species and extinction timeline (*Lesson 4*)

#### Species and extinction timeline

You will need:

- species timeline (green) and extinction (red) cards (on following page)
- trundle wheel
- rope/string (optional).

**Step 1:** Using a trundle wheel, measure out 46 metres of rope/string in a large space such as the playground.

**Step 2:** Start from the oldest date, when the Earth formed 4,600 Ma (4.6 billion years ago). Place this card on the ground at the start of the rope (zero metres).

**Step 3:** Then, using the table below, use the trundle wheel to measure out and place the next card. For example, the next card '3,600 Ma, Life began – single-celled organisms' should be placed ten metres along the rope.

**Step 4:** Once all the cards are laid out along the rope, go back to the start and walk along your timeline. Notice how short an amount of time humans have been on Earth!

**Step 5:** Lay out the extinction cards on the timeline. What do you notice? When have most of the extinctions taken place?

Card	Measurement to place card
4,600 Ma, Earth formed	0m
3,600 Ma, Life began	10m
1,000 Ma, Cells live together	36m
650 Ma, Many cells form one animal	39.5m
545 Ma, First shelled animals	40.5m
495 Ma, First plants	41m
450 Ma, First insects	41.5m
400 Ma, First amphibians and fish	42m
350 Ma, First reptiles	42.5m
200 Ma, Dinosaurs	44m
150 Ma, First mammals and flowering plants	44.5m
5 Ma, First humans	46m

1m along the timeline = 100 million years

**Did you know: If the history of the Earth was a 24-hour clock, humans would only have been on Earth for one minute and 45 seconds!**

Activity inspired by Jill Essam at Harehope Quarry



# 4,600 Ma

4.6 billion years ago

**Earth formed**

# 3,600 Ma

3.6 billion years ago

**Life began – single-celled organisms**



# 1,000 Ma

1 billion years ago

Cells live together –  
sponges



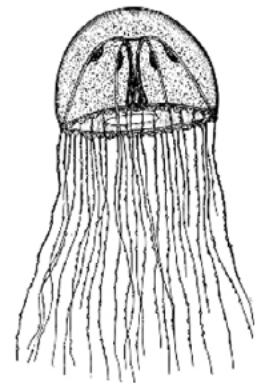
OpenClipart-Vectors, Pixabay



# 650 Ma

650 million years ago

Many cells form one animal



OpenClipart-Vectors, Pixabay

# 545 Ma

545 million years ago

## First shelled animals



Momentmal, Pixabay

# 495 Ma

495 million years ago

## First plants



OpenClipart-Vectors, Pixabay

# 450 Ma

450 million years ago



## First insects

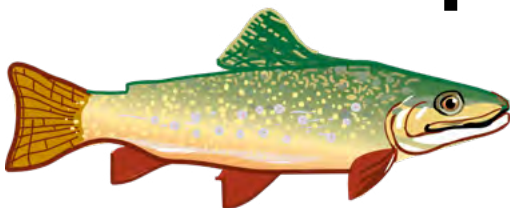
GDJ, Pixabay

# 400 Ma

400 million years ago



## First amphibians and fish



OpenClipart-Vectors, Pixabay; Ciker-Free-Vector-Images, Pixabay

# 350 Ma

350 million years ago

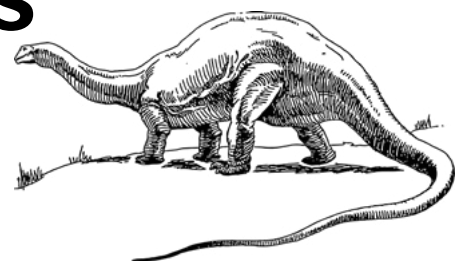
## First reptiles

Capri23auto, Pixabay

# 200 Ma

200 million years ago

## Dinosaurs



Clkr-Free-Vector-Images, Pixabay



# 150 Ma

150 million years ago



## First mammals and flowering plants

Clkr-Free-Vector-Images, Pixabay; OpenClipart-Vectors, Pixabay

# 5 Ma

5 million years ago

## First humans

CAN'T FIND SHOT

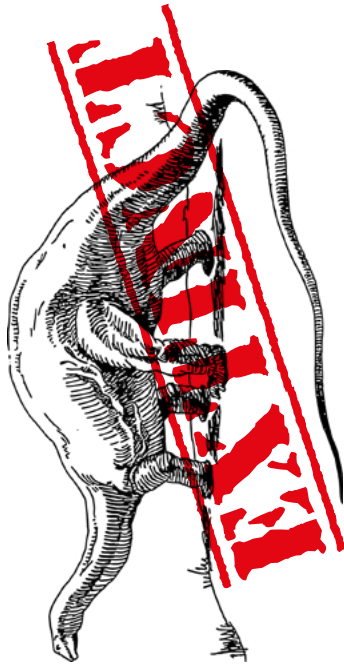
Clkr-Free-Vector-Images, Pixabay

**1989**  
**Golden toad**



Charles H. Smith,  
Wikimedia Commons

**66 Ma**  
66 million years ago  
**Dinosaurs**



Clkr-Free-Vector-  
Images, Pixabay

**2003**  
**Saint Helena olive plant**



John Charles Meliss,  
Wikimedia Commons

**2019**  
**Polynesian tree snail**



Hadfield, M. and Hadway, L.,  
Wikimedia Commons;

**10,000 years ago**  
**Mammoth**



tony241969, Pixabay

**10,000 years ago**  
**Sabre-toothed tiger**



DK Find Out

**1850**  
**Great auk**



OpenClipart-Vectors, Pixabay

**1662**  
**Dodo**



OpenClipart-Vectors, Pixabay



7,700 years ago

Irish elk



Pavel, Riha, Cb,  
Wikimedia Commons

1768

Steller's sea cow



J. F. Brandt,  
Wikimedia Commons

2012  
Pinta Island tortoise



Mike Weston,  
Flickr

1936

Thylacine  
(Tasmanian tiger)



G. J. Broinowski,  
Wikimedia Commons

## APPENDIX 22

### Age of humanity timeline (*Lesson 4*)

#### Age of humanity timeline

You will need:

- human history timeline (green) and mass extinction (red) cards (located on the following page).

**Step 1:** Lay out all the human history cards.

**Step 2:** Lay out the mass extinction cards. The first five will be before the human history timeline starts.

Discuss the sixth mass extinction card; are we the cause? How do the causes of the five previous mass extinctions compare?

# 55 Ma

55 million years ago

**First primitive primates evolved**



Nobu Tamura, Wikimedia

# 6 Ma

6 million years ago

**Chimp and human lineages diverge**



# 5.8 Ma

5.8 million years ago

***Orrorin tugenensis***

**Oldest human ancestor thought  
to have walked on two legs**

Human population = <1 billion

Smithsonian National Museum of Natural History



# 2.5 Ma

2.5 million years ago

***Homo habilis***

**Start to use stone tools, created  
by splitting pebbles**

Human population = <1 billion

Locotus Borg, Wikimedia Commons



# 1.8 Ma

1.8 million years ago

## *Homo erectus*

First true hunter-gatherer and first to migrate out of Africa, in large numbers

Human population = <1 billion

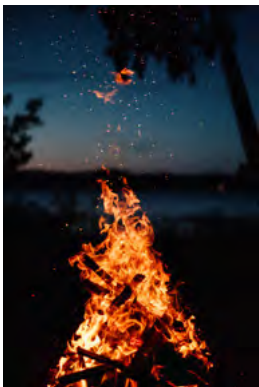
Manchester Museum, Alan Seabright

# 0.78 Ma

780,000 years ago

## First use of fire

Human population = <1 billion



Nathan Lindahl, Unsplash

# 0.5 Ma

500,000 years ago

First purpose-built  
shelters (wooden huts)

Human population = <1 billion

# 0.195 Ma



195,000 years ago

*Homo sapiens*

Our own species appears and begins  
to migrate across Asia and Europe

Human population = <1 billion

# 0.05 Ma

50,000 years ago

**Human culture starts to change  
much more rapidly than before**

People begin burying their dead ritually, create clothes from animal hides and develop complex hunting techniques

Human population = <1 billion

# 0.033 Ma

33,000 years ago

**Oldest cave art**



Human population = <1 billion

Thomas Quine, Wikimedia Commons



# 0.005 Ma

5,500 years ago

## Bronze Age begins

Humans begin to smelt and work copper and tin. They use them instead of stone implements

Human population = <1 billion

Caroline Barton, The British Museum, Wikimedia Commons

# 0.004 Ma

4,000 years ago

## The Sumerians of Mesopotamia develop the world's first civilisation

Human population = <1 billion



# 0.000183 Ma

183 years ago  
Start of the Victorian era

Human population = >1 billion

# 0 Ma

Present day



Human population = >7 billion

# Mass extinction 1

## 439 Ma

439 million years ago

**Cause:** A drop in sea levels as glaciers formed followed by rising sea levels as glaciers melted.

**25% of all marine families lost**

# Mass extinction 2

## 364 Ma

364 million years ago

**Cause:** Little evidence found. Theories suggest global cooling.

**22% of all marine families lost**

# Mass extinction 3 251 Ma

251 million years ago

**Cause:** No direct evidence found but theories suggest asteroid/comet impact or volcanic eruption.

**95% of all species lost**

# Mass extinction 4 199 Ma

199 million years ago

**Cause:** Volcanic eruption caused massive lava floods.

**22% of all marine families lost and unknown percentage of vertebrates (species with backbones) lost**

# Mass extinction 5 65 Ma

65 million years ago

**Cause:** There are several theories, including global cooling, asteroid impacts and volcanic activity.

**16% of marine families and 18% of land vertebrate families (including the dinosaurs) lost**

# Mass extinction 6 Present

0 years ago

**Cause: ?**

**Current extinction rates are 1,000 times higher than natural background rates. Scientists suggest that we are at the beginning of the sixth mass extinction**

## APPENDIX 23

Danger prompt cards (*Lessons 5 + 7*)

### **Invasive species**

Other, new species are brought into habitats which become competition for the native species living there.

### **Climate change**

Rising global temperatures and changing weather patterns are affecting plants' and animals' habitats and food sources.

### **Litter**

Litter dropped on the ground, rather than put into bins, can injure animals.

### **Building**

New roads, houses and other buildings are being built on animals' habitats and can interrupt their migration.

### **Deforestation**

Cutting down trees for wood destroys animals' and plants' habitats and food sources.

### **Farming**

To create land for farm animals to live and graze on, plants' and animals' habitats are destroyed.

### **Food**

Over-fishing/hunting animals and replacing plants with crops is reducing biodiversity and species numbers.

### **Poaching**

Illegal poaching of animals for fur, ivory, food and to sell as pets, for entertainment, etc. occurs around the world.

### **Disease**

Disease outbreaks and epidemics can wipe out animal and plant species.

### **Pollution**

Increasing pollution levels are affecting animals. Oil spills, polluted water, etc. can cause serious harm.

## APPENDIX 24

### Exploring and mapping local habitats: Teacher notes (*Lesson 5*)

#### Exploring and mapping local habitats

This is a guide to creating a map of the school grounds and local area for your pupils to colour in and record land use on.

##### 1. Google Earth

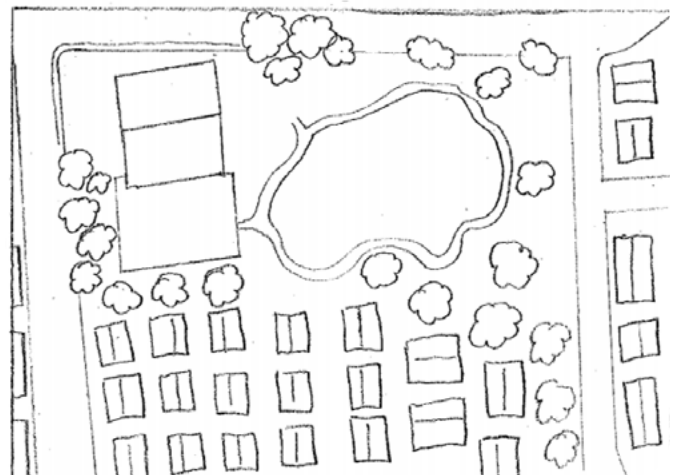
Search for your school on Google Earth. Use the print screen function button or snipping tool to take a screenshot. Paste it into a Word document or equivalent.

##### 2. Draw/Trace

There are two options to create an outline map for pupils to use.

**1. Draw:** Using a pencil on plain white paper, draw an outline of all of the main features. Photocopy it to get multiple copies.

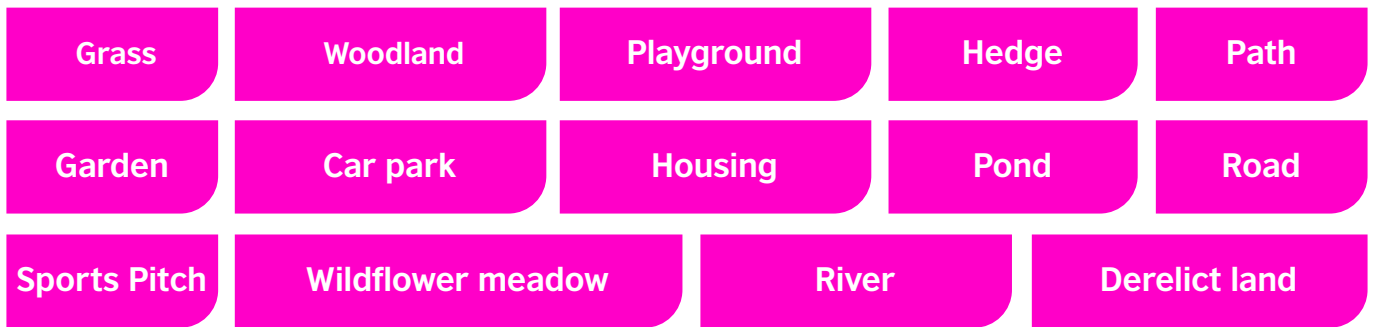
**2. Trace:** Print your Google Earth screenshot. Place a piece of tracing paper over your printed map and trace the main features. Place a piece of white paper behind your completed tracing paper map and photocopy it to get multiple copies.



### Habitats and land uses

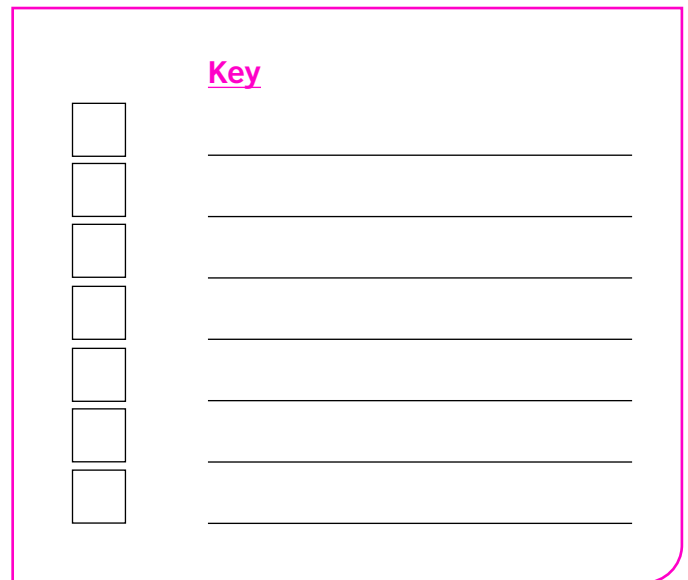
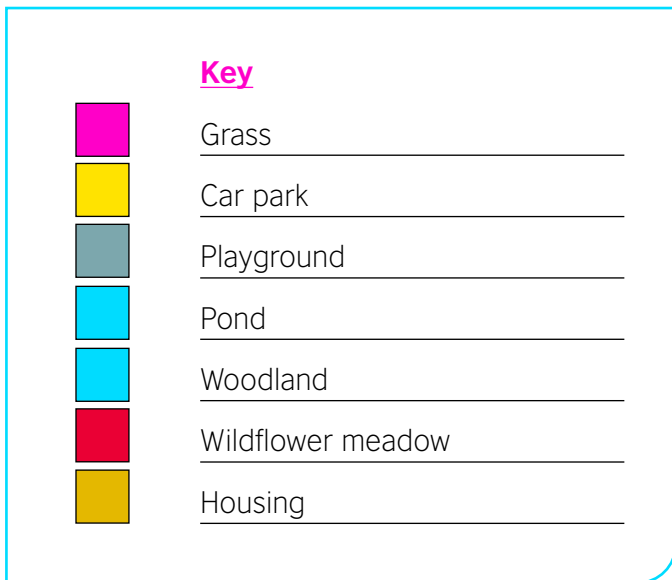
In and around the school grounds you will find lots of different habitats and land uses.

Here are some different habitats and land uses that you may find in your school grounds and local area:



Create a key for the children to use such as the example below:

Alternatively, give the children a blank key to fill in:



## APPENDIX 25

### Minibeast investigation: Teacher notes (Lesson 6)

#### Minibeast investigation

##### Health and safety

Children should be reminded not to touch or put anything in their mouth during the investigation. All pupils must wash their hands afterwards.

Check if any of the children in your class have allergies to insect stings. Seek first aid if an insect sting does occur.

Set clear boundaries when exploring the different habitats.

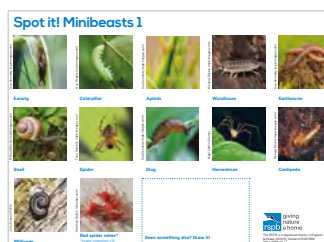
##### ID sheets

Download minibeast ID sheets. Here are some suggested ones:

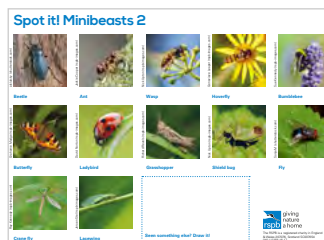
- 1 Woodland Trust common minibeasts: <https://www.woodlandtrust.org.uk/blog/2019/04/minibeast-hunt/>
- 2 RSPB common minibeasts 1: <https://www.rspb.org.uk/globalassets/downloads/activities-pdfs/spot-it-minibeasts-1.pdf>
- 3 RSPB common minibeasts 2: <https://www.rspb.org.uk/globalassets/downloads/activities-pdfs/spot-it-minibeasts-2.pdf>



1



2



3



### Identifying habitats

Identify three contrasting habitats for the children to carry out a minibeast investigation. These can be around the school grounds and local area, e.g. woodland, tarmac playground and long grass.



Short grass (e.g. field)



Hedge



Log piles/under logs



Leaf litter



Playground



Wildflower



Trees and woodland



School garden



Long grass

## Minibeast investigation equipment

There are lots of different techniques to collect minibeasts. The following guide will outline and detail how to use different pieces of equipment.

### Magnifying glass

Magnifying glasses can be used to look closely at different areas of a habitat and to examine a minibeast's size, shape, colour, etc. in detail. Most schools will already have magnifying glasses for science lessons.



### Bug pot

Bug pots are clear pots with a magnified lid, which are used to view minibeasts more closely. It is important that there is only one minibeast at a time in the pot as some minibeasts eat other types of minibeasts. Children should be careful when capturing and releasing the minibeast and always put it back where they found it.



### White tray

Very few minibeasts are white, so a white tray helps children to clearly see each minibeast collected. The best method for using a white tray is to place it under a tree branch, then shake the tree branch. This will result in minibeasts dropping into the tray. Again, the minibeasts should be released with care.



### Sweep net

There are different types of sweep net. You can create a simple one using an old white sheet. Hold the sheet under a tree branch and shake the tree branch to collect minibeasts.

A sweep net with a handle can be purchased or made. It is swept through long grasses to collect minibeasts.



## APPENDIX 26

Taking action: Teacher notes (*Lesson 7*)

### Taking action

There are lots of different ways children can take action to support and encourage biodiversity on land.

#### Raise awareness

Create posters, leaflets and information boards. Develop and deliver an assembly to other members of the school community.

#### Write to politicians

Write to local leaders or politicians to highlight the importance of encouraging biodiversity and caring for life on land. Find out what action they are taking about this in your local area and across the country.

#### Create new or improve existing habitats

Lots of habitats can be created or improved in the school grounds. Make bug hotels, build bird boxes, plant trees, create log piles, turn derelict land into wildflower meadows, design a hedgehog home, etc.

The Wildlife Trust has fantastic guides to taking simple action for wildlife in your school grounds:

<https://www.wildlifetrusts.org/actions>

#### Community action

Get involved in the local community and take action!

Carry out a litter pick or find your local wildlife charity/reserve and see what events and activities they are running. Why not go on a school trip to volunteer for the day, or tell parents and carers about volunteering events they could get involved in over the weekend or during school holidays?

Find out what local nature reserves and green spaces are near your school: <https://www.gov.uk/find-nature-reserves-national-parks-and-greenspaces>

#### Fundraise

Organise a fundraiser to raise money for local or global wildlife charities. Have a bake sale, run a non-uniform day and dress up as an animal, organise a fun run, etc.

## APPENDIX 27

### Biodiversity pledge (Lesson 9)

#### Biodiversity pledge

I.....am concerned about biodiversity loss because

.....  
.....  
.....  
.....

I am consequently pledging to: .....

.....  
.....  
.....  
.....  
.....

in the hope that my actions will help.

## Acknowledgements

This resource was produced in collaboration with teachers from the UK and Nepal who are part of a Connecting Classrooms learning cluster with Manchester Museum. We would like to thank all of the teachers and contributors who made this resource possible.

Fraser Macdonald Oulds and Sian St Rose,  
Heald Place Primary School

Ashish Lamichhane and Nabin Ayudhagic,  
Kadar Bahadur Rita Secondary School

Nicki Maddern, Manley Park Primary School,  
and Chandra Adhikari (Chama Nath Adhikari),  
Kunwarwanti English Boarding School

Audrey Out, New Islington Free School and  
Ravi Raj Kafle, Pamir International Academy

Naima Essat, Webster Primary School and Kamal  
Dhakal, Paramount Boarding Secondary School

Hannah Burke, Whalley Range High School  
and Shree Shanti, Namuna Secondary School

Amy McDowall and Dr Hannah-Lee Chalk,  
Manchester Museum, The University of Manchester

Jacquie Ayre, Liverpool World Centre

Hannah Fishburn and Joanne Appleby, Outdoor  
and Sustainability Education Specialists (OASES)

This resource was developed through the Connecting Classrooms through Global Learning programme, which ran between 2018–2022 and was co-funded by the British Council from our grant-in-aid, and the Foreign, Commonwealth and Development Office (FCDO) using UK aid.

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