



Google Arts & Culture

Biodiversity

Lesson plan
created with



Introduction

Biodiversity

Join us as we learn about the diversity of life on our planet and discover what can be done to protect Earth's biodiversity.

This lesson plan is designed to support you as you explore Google Arts & Culture stories related to the lesson topic. This lesson is suitable for anyone but is recommended for students aged 11-16 years

You can complete the lesson on your own working at home, with a group of friends, or in your classroom. They are designed so that you can work through them at a pace that suits you.

If you get stuck, you can talk to a teacher or parent.

Throughout the lesson you will find tasks to complete and questions to answer, so when you reach the end, you will have used a range of skills to create something on your own that demonstrates your knowledge and understanding of the subject.

All you need to get started is any device with internet access.

Are you ready to learn about the amazing species that populate our planet and help it thrive?

Things you'll need to complete this lesson.



Tablet, laptop or computer with access to the internet.



Paper, or a notebook, and pen to make notes as you go.



Drawing materials, such as coloring pens and pencils, paper etc.



Scissors, glue, scrap paper and general stationery items.



Art materials, specifically paints and brushes.



A printer would be beneficial but not necessary – why not draw instead?

Explore & Discover

Biodiversity

What can you expect to learn?

In the following lesson, you will gain an appreciation of the huge variety of life on earth. You will learn about biodiversity and how living organisms rely on each other to survive. You will explore flora and fauna and see how diverse and beautiful living organisms can be. You will see some amazing creatures and learn more about how we can make the planet safer for all life.

Activities to complete

1. Go on a virtual tour of a biome somewhere in the world and sketch what you see.
2. Discover biodiversity by creating a photo collage of life forms that you can find near where you live.
3. Use a Google Arts & Culture Experiment to create a garden perfect for pollinators.
4. Take part in the end of lesson quiz to test what you have learnt in this lesson.

Outcomes you will achieve

- Discover how life exists in a delicate balance with the environment.
- Find out about how dependent life can be on other living organisms.
- Learn more about a variety of flora and fauna.
- See how habitats can impact on the type of life forms that live there.
- Learn how we are all part of the same ecosystem, in viewing a variety of life forms.

Look out for the following tips which tell you what to do when during the lesson.



Key information to remember and to help guide you through the lesson.



Estimated time to complete a section or activity within the lesson.



Optional headphones to listen to videos and audio recordings.



Explore online content. Discover videos, stories, and zoom into pictures.



Activity - time to design, make or write something of your own.



Vocabulary

Words to look out for in the lesson

agroecology, alpine, amphibian, bacteria, bark, barrier reef, birdsong, botanist, carapace, carnivorous, cascades, chlorophyll, coffee tree, colony, corals, crab apple, deforestation, deposition, desert, ecosystem, ecotourism, elm, environment, evaporation, evolution, expedition, fauna, floodplain, flora, freshwater, fungi, genetic, Ginkgo, glacier, habitat, interactions, invertebrate, lagoon, loch, mammal, mangrove, manta, maple, meander, moisture, mutation, nest, nursery, nutrient, oak, organism, parasitism, perfume, pest, phylum, pine, polar, pollinator, predator, rainforest, reef, repertoire, repopulating, saltwater, seabird, sediment, seed, siphonophore, source, species, superorganism, symbiosis, tadpole, temperate, trunk, turbulent, turtle, water cycle, waterfall, wetlands, zooids

Biodiversity

Introduction

Biodiversity refers to the variety of life on Earth, in all its forms and all its interactions. It encompasses diversity on many levels, including plants, animals, bacteria, fungi, and the different biomes and ecosystems of which they are a part.

Sadly, the Earth's biodiversity is constantly being threatened by activities such as deforestation, over-consumption of natural resources, pollution. These have an impact on climate change.

In this lesson, you will learn about the diversity of life on Earth. You will explore flora and fauna and discover some of the amazing species that populate our planet.

In the final part of the lesson, you will discover why biodiversity is crucial for the survival of all life on Earth.



If you make notes on the stories you read, this will help you for the end of lesson quiz.



Explore

A bee by a dahlia at Wakehurst, RBG Kew





Highland tropical pitcher plant Rainforest Biome, Eden Project, 2020, Eden Project

What Is This Lesson About?

In this lesson, you will learn about biodiversity, what it is and why it matters. You will explore some of the trees and plants that we need in order to survive on Earth. You will discover some of the amazing species that populate our planet and look at ways we can help to protect Earth's biodiversity.



This lesson will take around 120 minutes.



[Violet Sea Snail. Dimitris Poursanidis/terraSolutions m.e.r, Underwater Earth](#)

What Is Biodiversity and Why Is It Important?

Learn about biodiversity, what it is and why it matters. Watch this [video](#)  to discover the richness of life and the impacts of Earth's ecosystems.



This chapter will take around 30 minutes.



What Is Biodiversity and Why Is It Important?



What is Biodiversity?

[Dormice at Wakehurst, RBG Kew](#)



Interconnected Species

[Ōhi'a lehua Flower](#)
[Molly Hagemann, Bernice Pauahi Bishop Museum](#)



Habitats

[One type of colonial cnidarian, the sea anemone, *Heteractis magnifica*, Holly Bolick, Bernice Pauahi Bishop Museum](#)



Biodiversity is the variety of life, species, and ecosystems that make up our natural world.

Click on the 'Explore' button to learn more about biodiversity and why it is vital to the survival of all life on our planet.

[Explore](#)



Humans are just one of approximately 8.7 million species on Earth that all depend on each other for survival.

Click on 'Explore' to learn how everything on our planet is interconnected and how living organisms rely on each other to survive.

[Explore](#)



A habitat is a place where an organism makes its home and which provides the organism with everything it needs to survive.

Click on the 'Explore' button to learn about different habitats and the life that they support.

Explore



Activity 1

Biodiversity Where You Live



You don't have to travel to the Amazon rainforest or plains of Africa to discover Earth's rich biodiversity. You will be amazed at all the different types of plants and animals you can find right on your doorstep!

Explore biodiversity in your local surroundings, for example near your home or school, and identify at least 10 different life forms. Your selection should include at least one of each of the following:

- plant
- animal (including insects and birds)
- fungi (if any grow near you).

Take a photo of each life form you discover using a camera or device to document what you find. You can either print the photos or use an app to create a collage to show the biodiversity of your local area.



[Bee with Allium schoenoprasum, Howard Rice, 2011, Cambridge University Botanic Garden](#)





[The First Signs Of Spring Are Seen At Kew Gardens, Oli Scarff, 2010, Getty Images](#)

Flora

Plants both on land and in water are critical to the life of humans and every other species. Let's have a look at the trees and plants that we need in order to survive on Earth.



This chapter will take around 30 minutes.



[Mangroves in Hawaii, Toby Matthews / Ocean Image Bank, The Ocean Agency](#)

The Magic of Mangroves

Learn about Mangroves and the important role they play in supporting life on Earth.



[Tree tag for bur oak \(Quercus macrocarpa\), The Morton Arboretum and Earl Richardson, 2016, The Morton Arboretum](#)

Trees of Life

Take a virtual tour around the Morton Arboretum and discover some of its great trees.



[Borneo rainforest, Angelo Chiacchio, 2018, Ephemera documentary](#)

Borneo's Rainforest

Learn about Borneo's rainforest and the threats facing this famous ecosystem.



The Magic of Mangroves

The world's most important trees

Mangroves are a group of trees and shrubs that live along sheltered coastlines in the tropics or subtropics. They are one of the world's most important ecosystems, providing essential habitat for thousands of species.

With their sturdy root systems, mangroves create natural barriers against storms, and other extreme weather events, preventing soil erosion and protecting millions of people from flooding every year. Mangroves' ability to store vast amounts of carbon also makes them especially valuable in the fight against climate change.



Click on 'Explore' to learn seven facts about mangroves.



Consider how important mangroves are to supporting life on Earth. Jot down some key things you think make them so important.



[Explore](#)

Trees of life

Visit an arboretum

An arboretum is a botanical garden specializing in trees. Think of it as a tree museum where many varieties of trees are grown for research, educational, and preservation purposes.



[Find out more about the important role played by arboreta across the globe.](#)

There are about 3 trillion trees on our planet. These outnumber the stars in the Milky Way. You probably live not that far from a tree where you live. If not, you will find them in a local park, wood or near-by forest. Trees provide shade for us, generate oxygen throughout the day and are a home for a variety of wildlife. It is for these reasons that trees are vital to the survival of all life on this planet.

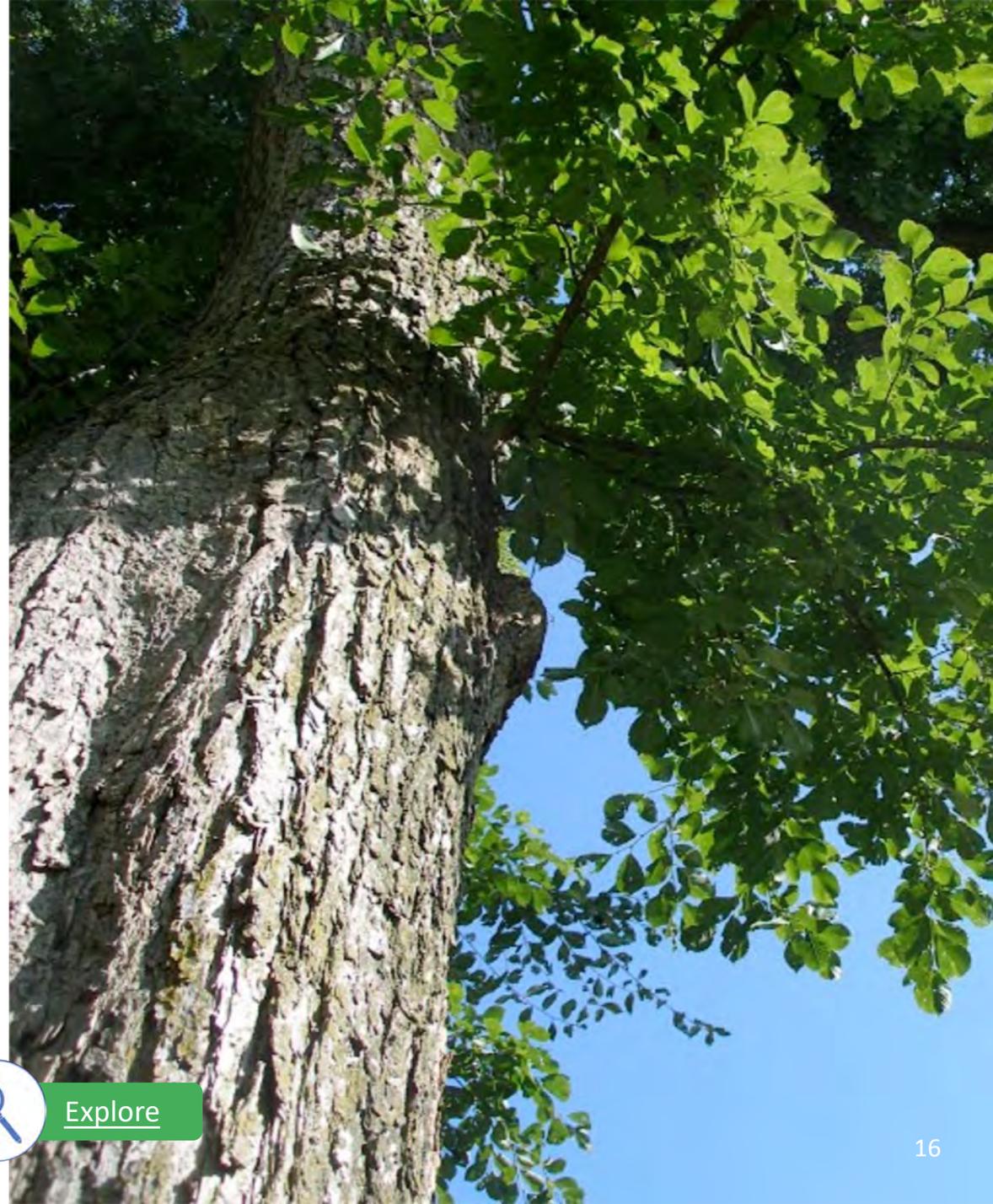
Trees are vital to biodiversity by providing oxygen, storing carbon, conserving water, preserving soil, and supporting many different species of plants, animals, insects, and fungi. Arboreta, like Morton, play a vital role in tree conservation, allowing scientists and researchers to study them and understand what it takes to protect them.

Click on 'Explore' to take a virtual tour around the Morton Arboretum and learn more about some of its great trees.



Explore

ACCOLADE® elm, The Morton Arboretum, 2009, The Morton Arboretum





Borneo's Rainforest

A famous ecosystem orphaned by its region's economic growth

The forests of Borneo and Sumatra are among the most biologically diverse habitats on Earth.

The biodiversity of Borneo's rainforests is among the richest in the world and is home to numerous endangered species, including the Bornean Orangutan, the Sumatran Rhinoceros, and the last remaining Sumatran tigers.

Sadly, logging, land-clearing and conversion of natural forests to palm oil and timber plantations are destroying this diverse ecosystem at an alarming rate, threatening wildlife, indigenous people's livelihoods and contributing to climate change.



Click on 'Explore' to learn more about Borneo's rainforest.

Read the story then consider:

- What are the threats facing the rainforest?
- What can we do to help protect this famous ecosystem?



Explore



Activity 2

Conserving the World's Rainforests



You may need help from your parents or teacher with this activity



Global demand for palm oil has pushed some countries to convert large areas of rainforest in order to build more palm oil plantations. It is estimated that palm oil is to blame for 39% of forest loss in Borneo since 2000. However, there are more than 3 million farmers who depend on producing palm oil for their livelihood.



Making informed choices on sustainable palm oil in your purchases is one of the best ways you can make a real difference to conserving ecosystems like Borneo's rainforest.



- Think about how you would create a campaign to spread awareness of the importance of using products that only use sustainable palm oil.
- Conduct some research on sustainable palm oil, including which products/brands currently use it. These links are a good starting point: [what is palm oil](#) | [agroecology](#).
- What would you consider to be the important facts that would engage people to change their shopping habits? What media would you use to spread the word? What other methods could you employ to engage the local community?



[Oil palm plantation, Nanang Sujana/CIFOR, 2017, he CGIAR Research Program on Forests, Trees and Agroforestry \(FTA\)](#)





Anna's Hummingbird, Molly Hagemann, Bernice Pauahi Bishop Museum

Fauna

We share the planet with thousands of species of animals. In this chapter we will take a closer look at three of them. Siphonophore, bees and birds. Find out more about these amazing species that populate our planet and help it thrive.



This chapter will take around 30 minutes.

Fauna



Siphonophore

[Hula skirt siphonophore,](#)
[Steve Haddock, Monterey Bay](#)
[Aquarium Research Institute](#)



Bees

[Bumblebee on dahlia 'Moonfire' \(Asteraceae\)](#)
[flower, 2016, Historic Royal Palaces](#)



Birds

[Firecrest \(*Regulus ignicapilla*\),](#)
[2015, Regional Government of](#)
[Galicia](#)



Whilst similar in appearance to jellyfish, a siphonophore is actually a colony of single celled organisms called zooids.

Link to a 3D model of a siphonophore ([click here](#))

To find out more about these amazing creatures, click on 'Explore'.

[Explore](#)



Bees are part of the biodiversity on which we all depend for our survival yet bee populations continue to decline due to agricultural practice and climate change.

Click on the 'Explore' button to find out why bees are one of the most essential animals on the planet and what we can do to help protect this important species.

[Explore](#)



Birds are an important part of ecosystems. They play a vital role in controlling pests, acting as pollinators, dispersing seeds and spreading nutrients.

Click on 'Explore' to discover a variety of birds that can be seen throughout the year.

[Explore](#)



Activity 3

Pollinator Pathmaker



As human actions are causing an alarming decline in pollinators around the world, how and what we plant matters.



Click on this [link](#) to access the Google Arts & Culture Experiment on Pollinators.



Watch the video which provides a background to this experiment.



Read the instructions carefully. Then launch the experiment to make your own pollinating garden. Follow the steps in the toolbox and your garden will be generated for you.

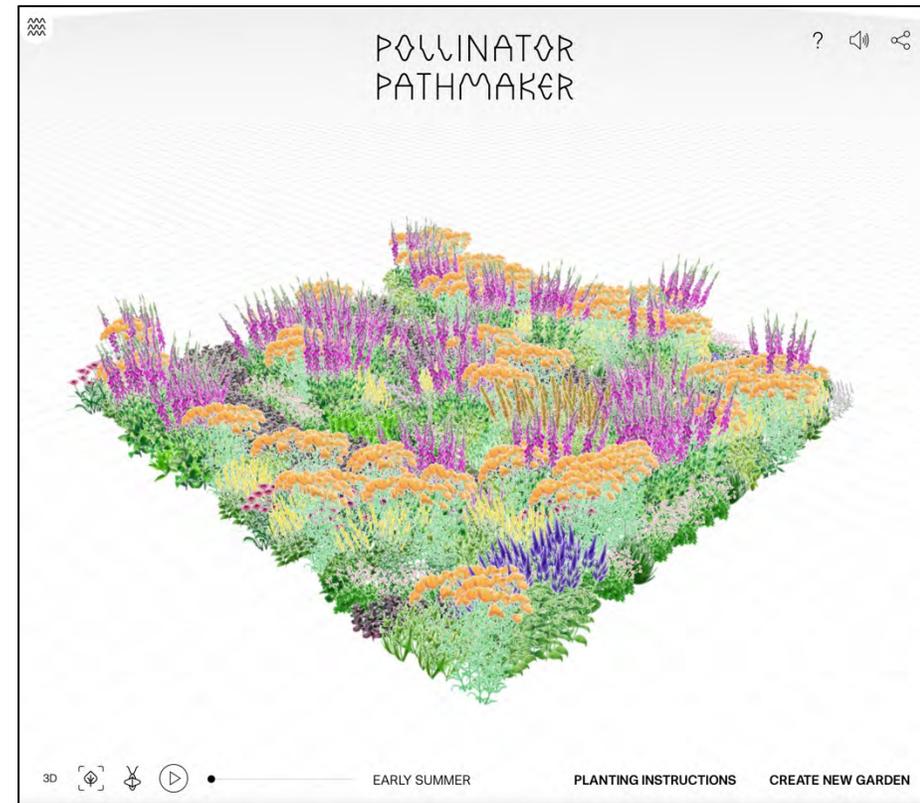
Extra Challenge

Once you have created your garden design, follow the instructions to plant it. If your garden is a large window box or in pots, you can scale it down. Find a more detailed guide to planting and caring for your garden here:

pollinator.art/resources/how-to-plant



You may need help from your parents or teacher with this activity



Pollinator Pathmaker, Google Arts & Culture



10 to 15-minute activity



[Biodiversity - Biodiversity Lanes, Soil Heroes, 2021, Soil Heroes](#)

Protecting Biodiversity

We need biodiversity in order to be able to live on this planet. But with so many species of plants and animals in danger, how can we make sure we create a planet that is safe for both humans and nonhumans?



This chapter will take around 30 minutes.



[Biodiversity – Pattern, Hannah Grace, 2021, Soil Heroes](#)

Web of Life

Discover how soil supports the existence of life on this planet.



[Leatherback \(*Dermochelys coriacea*\) hatchling in Comboios, state of Espírito Santo, TAMAR Image Bank, 2009, TAMAR](#)

Sea Turtles

Learn about how flagship species, like the turtle, can educate the public about the need to protect lesser-known species and their habitats.



[Borneo rainforest, Angelo Chiacchio, 2018, Ephemera documentary](#)

We Are All Part of the Same

Explore a variety of ecosystems from around the world.



The Web of Life

The Importance of Soil

Soil is by far the most biologically diverse material on Earth. It is a vital component of ecosystems, contributing to a wide range of essential services such as water filtration, cycling of nutrients, and providing habitat for billions of organisms. These diverse organisms interact with one another and with the various plants and animals in the ecosystem forming a complex web of life.

Click on the 'Explore' button to learn how soil supports the existence of life on Earth.



Mellany Klompe talks about the importance of soil biodiversity and the problems biodiversity face as a result of farming practices.



Consider how important soil is in supporting life on earth. Jot down some key things you think make it so important and what we can do to protect it.



Explore

Sea Turtles

Flagship species

Like the giant panda, polar bear, and elephant, sea turtles are considered a flagship species throughout the world.

A flagship species is an animal selected to act as an ambassador or symbol to help raise awareness about the need to protect lesser-known species and their habitats. These animals are usually among the most threatened or endangered species.

As a result of climate change, egg trade, plastic pollution, and fishing activity, nearly all species of sea turtle are classified as endangered.

Click on 'Explore' to find out about five species of turtle that occur in Brazil.



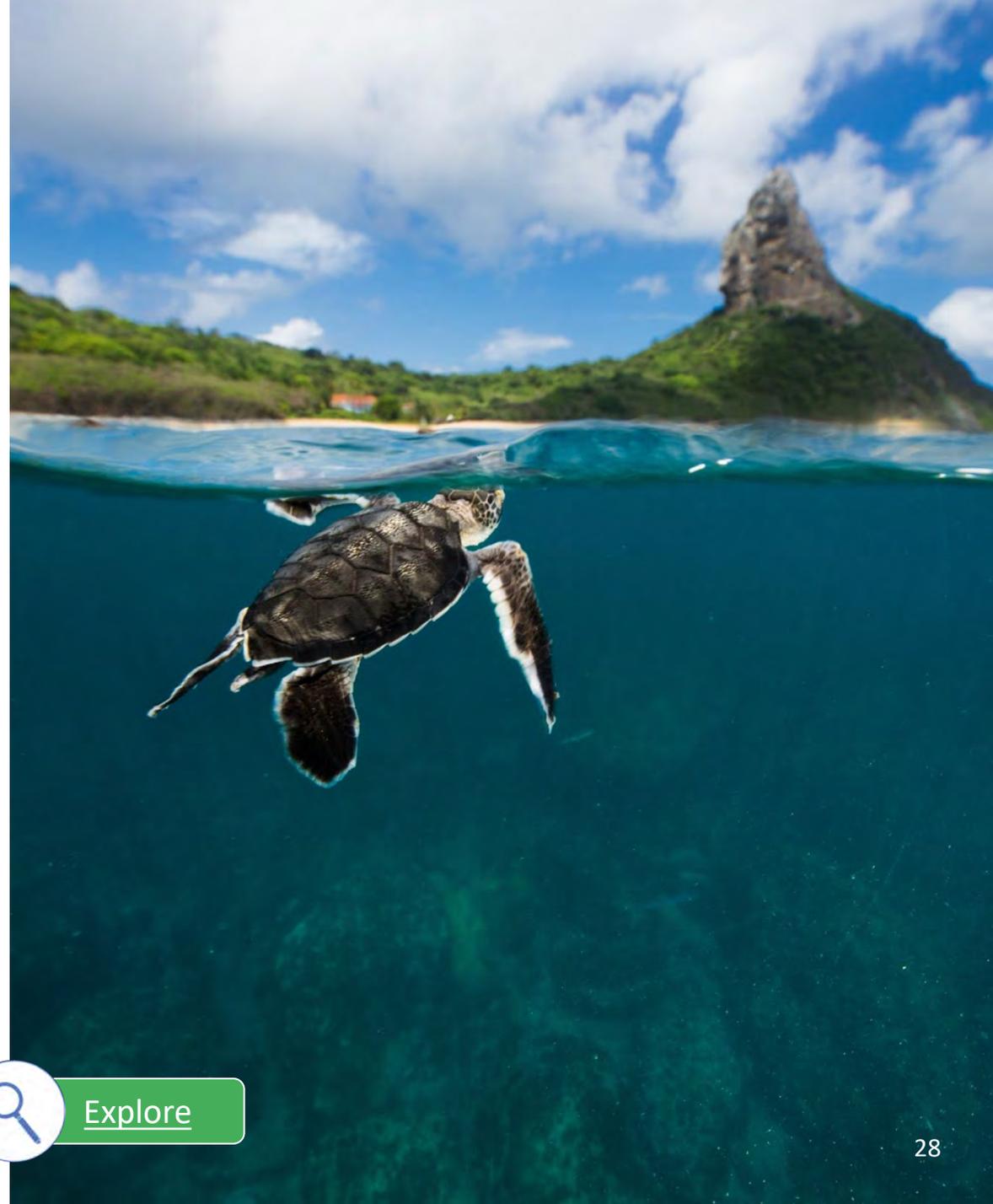
Conduct some research into the threats to sea turtles, including those that are manmade. Consider:

- Why are sea turtles important?
- What can we do right now to protect sea turtles?



Explore

Picture of sea turtle hatchling in open ocean, Banco de Imagens Projeto TAMAR, 2013, TAMAR





We Are All Part of the Same Ecosystems around the World

The Earth is made up of a series of connected ecosystems, from wetlands to deserts to tropical rainforests. An [ecosystem](#) (or ecological system) is defined as the habitat in which plants, animals, and microorganisms interact with the physical environment such as the landscape and weather.

Different parts of an ecosystem depend on each other, and there's a fine balance between them. A change in one part of the ecosystem will affect other parts and upset the balance. For example, a change in the temperature of an ecosystem can affect what plants will grow there. As a result, the animals that depend on these plants for food and shelter will have to adapt to the changes or move to another ecosystem in order to survive.

Click on 'Explore' to discover how we are all part of the same ecosystem and how we depend on each other to thrive.



Choose one of the ecosystems described in the story.

List the features of these ecosystems that support life.



Think about and map out what could happen to the chosen ecosystem if one its species is drastically reduced (or wiped out altogether) or a new species is introduced.



Explore



Quiz

End of Lesson Quiz

See if you can recall what you have learned from this lesson. How many questions can you answer without going back through the pages.

1. Name the 5 species of sea turtle found in Brazil.
2. What is a habitat?
3. In the Web of Life you came across Mellany Klomper, Director of Soil Heroes. She is a _____ and a _____ (*Fill in the blanks*).
4. What is Biodiversity?
5. Which of the land habitats you studied holds the greatest variety of life forms?
6. What percentage of the world's tropical fish do mangroves provide a nursery for?
7. Name 3 of the great trees you explored in this lesson.
8. What is a siphonophore?
9. _____ are the building blocks of all life. (*Fill in the blanks*).
10. In the Flora section of the lesson, you studied a rainforest. Which country was it in?



[arcade game: Computer Quiz Nutting Associates, 1968, The Strong National Museum of Play](#)



[Red Bryozoan \(Integripelta bilabiata\), Christian Schwarz, 2018, Bernice Pauahi Bishop Museum](#)

Want to Learn More?



Now you've completed this lesson you may want to continue to find out more about biodiversity, [this](#) is a good place to start. If you want to learn more about Siphonophores, and how they teach us to coexist with other species, click [here](#). To find out more about climate change and how humans are connected to the environment, click [here](#).

Quiz Answers

End of Lesson Quiz

Here are the answers to the quiz. How did you do?

1. Green, Leatherback, Loggerhead, Hawksbill, Olive ridley
2. Where a living things spends it time
3. Farmer and Botanist.
4. Is the variety of life on earth. Includes all the plants and animals, but also invertebrates, fungi and bacteria.
5. Rainforest
6. 75%.
7. Any three from from the following list: (Bur) oak, (Paper-barked) Maple, Ginkgo, (Gansu) elm, (Wild sweet) crabapple, Japanese zelkova, (Tanyosho) pine, Katsura, Kentucky coffee tree. *() means do not need for your answer.*
8. A colony of many genetically identical individuals called zooids.
9. Cells
10. Borneo

