Curriculum Guide / Lesson Plan

Extinction: Back from the Brink

Grade Level: 5–9

Subject areas

Science and Technical Subjects, Earth and Space Science, Geologic History, Biology

Overview

This lesson leverages the 5G Labs Virtual Museum and Open Access collections at the Smithsonian Institution, specifically the **Extinct Animals Collection**. Students learn about five mass extinction events that occurred on Earth and the possibility of a sixth on the horizon. Students collaborate to organize key geological events and species according to the fossil record and prepare an action plan to help protect a currently endangered species from extinction.

Lesson in context

If a species can't survive due to changes in habitat or climate, extinction can occur. Today, we are losing species to extinction at an alarming pace. Humans are accelerating the processes of change on the planet to such an extent that a new name has been proposed for our geological epoch: the Anthropocene.

Yet two types of extinction typically occur as a part of evolution: background extinction and mass extinction. Background extinction is a natural process that is always occurring, while catastrophic events and major environmental changes have caused mass extinctions during at least five periods of Earth's history.

The fossil record is a collection of fossils that, when arranged chronologically, tell the story of life on Earth. Fossil chronology is based on undisturbed rock layers. The fossil record allows scientists to place important events and species in the correct geological order by era. In the 1950s, radiocarbon dating improved the accuracy of the fossil record and our understanding of environmental impacts.

Lesson summary

What do we know about extinct animals from the fossil record? Students will investigate an extinct organism, using the 5G Labs Virtual Museum and Open Access collections at the Smithsonian Institution, and explore the difference between background extinction and mass extinction.

As environments change, individuals that are able to adapt are better able to survive

and reproduce. These adaptations slowly spread in the population. What environmental changes are occurring in our world today? And what kinds of changes are happening too quickly for animals to adapt?

Students will select an extinct animal to research, paying particular attention to the causes and conditions that led to its demise, and compare it with an animal on the brink of extinction today. They may use the World Wildlife Fund (WWF) Species Directory, which lists species of concern along with their scientific names and conservation statuses. Each listing links to a page that provides more information on the species and, where applicable, explains how and why it is endangered.

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Learning standards

Next Generation Science Standards

MIDDLE SCHOOL

MS-ESS1-4. Construct a scientific explanation based on evidence from rock strata for how the geologic time scale is used to organize Earth's 4.6-billion-year-old history.

MS-ESS2-2. Construct an explanation based on evidence for how geoscience processes have changed Earth's surface at varying time and spatial scales.

MS-LS4-1. Analyze and interpret data for patterns in the fossil record that document the existence, diversity, extinction and change of life forms throughout the history of life on Earth under the assumption that natural laws operate today as in the past.

MS-LS4-2. Apply scientific ideas to construct an explanation for the anatomical similarities and differences among modern organisms and between modern and fossil organisms to infer evolutionary relationships.

MS-LS2-1. Organisms, and populations of organisms, are dependent on their environmental interactions both with other living things and with nonliving factors.

MS-LS2-1. In any ecosystem, organisms and populations with similar requirements for food, water, oxygen or other resources may compete with each other for limited resources, access to which consequently constrains their growth and reproduction.

MS-LS2-3. Food webs are models that demonstrate how matter and energy are transferred between producers, consumers and decomposers as the three groups interact within an ecosystem. Transfers of matter into and out of the physical environment occur at every level. Decomposers recycle nutrients from dead plant or animal matter back to the soil in terrestrial environments or to the water in aquatic environments. The atoms that make up the organisms in an ecosystem are cycled repeatedly between the living and nonliving parts of the ecosystem.

MS-LS2-4. Ecosystems are dynamic in nature; their characteristics can vary over time. Disruptions to any physical or biological component of an ecosystem can lead to shifts in all its populations.

MS-LS2-5. Biodiversity describes the variety of species found in Earth's terrestrial and oceanic ecosystems. The completeness or integrity of an ecosystem's biodiversity is often used as a measure of its health.

The Common Core State Standards for English Language Arts & Literacy » History/Social Studies

CCSS.ELA-LITERACY.RH.6-8.7: Integrate visual information (e.g., in charts, graphs, photographs, videos or maps) with other information in print and digital texts.

CCSS.ELA-LITERACY.RH.6-8.8: Distinguish among fact, opinion and reasoned judgment in a text.

CCSS.ELA-LITERACY.RST.6-8.2: Determine the central ideas or conclusions of a text; provide an accurate summary of the text distinct from prior knowledge or opinions.

CCSS.ELA-LITERACY.RST.6-8.3: Follow precisely a multistep procedure when carrying out experiments, taking measurements or performing technical tasks.

CCSS.ELA-LITERACY.RST.6-8.4: Determine the meaning of symbols, key terms and other domain-specific words and phrases as they are used in a specific scientific or technical context relevant to *grades 6–8 texts and topics*.

CCSS.ELA-LITERACY.RST.6-8.7: Integrate quantitative or technical information expressed in words in a text with a version of that information expressed visually (e.g., in a flowchart, diagram, model, graph or table).

International Society for Technology in Education (ISTE)

CITIZEN

2.3.b: Establish a learning culture that promotes curiosity and critical examination of online resources and fosters digital literacy and media fluency.

2.3.c: Mentor students in safe, legal and ethical practices with digital tools and the protection of intellectual rights and property.

COLLABORATOR

2.4.a: Dedicate planning time to collaborate with colleagues to create authentic learning experiences that leverage technology.

2.4.b: Collaborate and co-learn with students to discover and use new digital resources and diagnose and troubleshoot technology issues.

2.4.c: Use collaborative tools to expand students' authentic, real-world learning experiences by engaging virtually with experts, teams and students, locally and globally.

FACILITATOR

2.6.a: Foster a culture where students take ownership of their learning goals and outcomes in both independent and group settings.
2.6.b: Manage the use of technology and student learning strategies in digital platforms, virtual environments, hands-on makerspaces or in the field.
2.6.d: Model and nurture creativity and creative expression to communicate ideas, knowledge or connections.

ANALYST
2.7.a: Provide alternative ways for students to demonstrate competency and reflect on their learning using technology.

Leveling standards

Next Generation Science Standards (NGSS)
Grades 3–5
ESS1.C: The History of Planet Earth. Local, regional and global patterns of rock formations reveal changes over time due to earth forces, such as earthquakes. The presence and location of certain fossil types indicate the order in which rock layers were formed. [Grade 4]

High School
ESS1.C: The History of Planet Earth. Continental rocks, which can be older than 4 billion years, are generally much older than the rocks of the ocean floor, which are less than 200 million years old. [H.S.]
ESS1.C: The History of Planet Earth. Although active geologic processes, such as plate tectonics and erosion, have destroyed or altered most of the very early rock record on Earth, other objects in the solar system, such as lunar rocks, asteroids and meteorites, have changed little over billions of years. Studying these objects can provide information about Earth's formation and early history. [H.S.]

Objectives

Through this learning experience, students will place key events in Earth's development along a physical model of the geologic timescale. Learners will "analyze and interpret data for patterns in the fossil record that document the existence, diversity, extinction and change of life forms throughout the history of life on Earth under the assumption that natural laws operate today as in the past" (MS-LS4-1).

They will reflect on the reality of mass extinction in the context of geologic time and in human history. Learners will select an extinct species and identify its habitat, ecosystem and diet as well as the time period in which the animal lived based on the fossil record. Students will also investigate an endangered species and propose a plan of action to help it thrive.

Essential questions

What do we know about extinct animals from the fossil record?
What does it mean for a species to become extinct?
What causes extinction?
Why should we care if a species goes extinct today?
What are some negative (or positive) consequences of a species becoming extinct?
What changes can people make in their habits and behaviors to help protect an endangered species?
Is it enough for a species to simply survive?

Materials and preparation

Access to the 5G Labs Virtual Museum website via in-class smart board, projector or other type of screen by the teacher or via students' personal internet-connected devices: https://verizon5glabs.com/virtual-museum/ (site incorporates audio)

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Timeline of Geological Periods handout

A blank note card for each student

Set of key geological events

Nine-meter length of rope or cord

Meter stick, sticky notes and markers

Time allotment

Introduction: 5 minutes
AR and class discussion: 10 minutes
Primary source activity: 10 minutes
Main activity: 20 minutes

Extension activity
Research exercise: 10 minutes to introduce the activity; time for student presentations as needed

Vocabulary

absolute dating: an estimate of a rock or mineral's true age based on the rate of decay of radioactive elements
adaptation: the process by which a species becomes fitted to its environment
Anthropocene: the current geological epoch, in which human activity is the dominant influence on climate and the environment
chronology: a sequence of events over time
ecosystem: living organisms, their physical environments, and their interrelationships in a particular place
endangered: at serious risk of becoming extinct
era: the second-largest division of geologic time, based on the characteristics of fossils
extinction: the complete disappearance of a species from Earth
fossil: an impression or part of a prehistoric organism preserved in petrified form
fossil record: a collection of fossils that, when arranged chronologically, tell the story of life on Earth.
geologic time: a system of chronological measurement that relates fossils to time
mya: an abbreviation for "million years ago"
period: a division of geologic time smaller than an era
relative dating: the dating of events based on the order in which evidence appears in the geologic record
stratigraphy: the layers, or strata, of rocks on Earth's surface, or the study thereof

Key links

Verizon 5G Labs Virtual Museum
https://verizon5glabs.com/virtual-museum/

***Smithsonian* magazine, Travel through Deep Time with This Interactive Earth**

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https://www.smithsonianmag.com/science-nature/travel-through-deep-time-interactive-earth-180952886/

Diademodon tetragonus
https://www.yahoo.com/immersive/diademodon-tetragonus-205920014.html?site=verizon

Thrinaxodon
https://www.yahoo.com/immersive/thrinaxodon-205908619.html?site=verizon

Triceratops
https://www.yahoo.com/immersive/triceratops-202429220.html?site=verizon

Megalodon tooth
https://www.yahoo.com/immersive/megalodon-tooth-203128901.html?site=verizon

Woolly mammoth
https://www.yahoo.com/immersive/smithsonian-woolly-mammoth.html?site=verizon

Center for Biological Diversity, 23 Species from 19 States Lost to Extinction
https://biologicaldiversity.org/w/news/press-releases/23-species-from-19-states-lost-to-extinction-2021-09-29/

World Wildlife Fund, Species Directory
https://www.worldwildlife.org/species/directory?direction=desc&sort=extinction_status

Background for the instructor

Geologic time scale

Earth is 4.6 billion — that is, 4,600 million — years old.

Events that happened millions or billions of years ago are measured on the geologic time scale. This scale describes Earth's chronology, from its formation through all of its major changes up to the present. Scientists have explored these changes and developed a timeline based on the ages of rocks and the fossils found within them. The timeline sometimes changes as new discoveries are added to the fossil record.

The geologic time scale is divided into eons, eras, periods, epochs and ages. Eons are the longest time categories, and ages are the shortest. The four geological eras, from oldest to newest, are the Precambrian, Paleozoic, Mesozoic and Cenozoic eras.

According to the fossil record, single-celled life first appeared on Earth around 3.5 billion years ago. The oldest bacteria microfossils date to that time.

Five mass extinctions

Source: Smithsonian
https://naturalhistory.si.edu/education/teaching-resources/paleontology/extinction-over-time

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During the Paleozoic era, 500 million years ago, life developed to include marine plants, invertebrates, fish and amphibians. However, the end of the Paleozoic (the Permian period) marked Earth's largest extinction event. Extinction is the death of all members of a species of plants, animals or other organisms. Mass extinctions are periods when huge numbers of species disappear in a relatively short period of time.

There have been five mass extinctions in the past. The Smithsonian Institute describes them as follows:

"End of the Cretaceous (66 million years ago): Extinction of many species in both marine and terrestrial habitats, including pterosaurs, mosasaurs and other marine reptiles, many insects and all non-Avian dinosaurs. The scientific consensus is that this mass extinction was caused by environmental consequences from the impact of a large asteroid hitting Earth in the vicinity of what is now Mexico.

"Late Triassic (199 million years ago): Extinction of many marine sponges, gastropods, bivalves, cephalopods [and] brachiopods, as well as some terrestrial insects and vertebrates. The extinction coincides with massive volcanic eruptions along the margins of what is now the Atlantic Ocean.

"End Permian (252 million years ago): Earth's largest extinction event, decimating most marine species such as all trilobites, plus insects and other terrestrial animals. Most scientific evidence suggests the causes were global warming and atmospheric changes associated with huge volcanic eruptions in what is now Siberia.

"Late Devonian (378 million years ago): Extinction of many marine species, including corals, brachiopods and single-celled foraminiferans, from causes that are not well understood yet.

"Late Ordovician (447 million years ago): Extinction of marine organisms such as some bryozoans, reef-building brachiopods, trilobites, graptolites and conodonts as a result of global cooling, glaciation and lower sea levels."

Today, we are in the Cenozoic era, which began about 65 million years ago. It is in this era that humans first appeared, along with many other animals. Our era has experienced several ice ages, including times when the human species was nearly wiped out.

Recent extinctions

Source: Smithsonian

https://naturalhistory.si.edu/education/teaching-resources/paleontology/extinction-over-time

"At the end of the last ice age, 10,000 years ago, many North American animals went extinct, including mammoths, mastodons and glyptodonts. While climate changes were a factor, paleontologists have evidence that overhunting by humans was also to blame. Early humans worked cooperatively to trap and slaughter large animals in pits. About the same time, humans began farming, settling down and making drastic changes in the habitats of other species.

"Starting in the 1800s, industrialization drove up extinction rates and has continued to do so. For example, Chinese river dolphins, foothill yellow-legged frogs and sockeye salmon are among the many species currently endangered by water pollution, dams and other industrial pressures on rivers."

"One of the most dramatic examples of a modern extinction is the passenger pigeon. Until the early 1800s, billions of passenger pigeons darkened the skies of the United States in spectacular migratory flocks. Easy to trap or shoot, passenger pigeons became a popular, cheap food. Commercial hunters killed them in vast numbers, eventually decimating the population. The last passenger pigeon, named Martha, died in the Cincinnati Zoological Garden in 1914 and was donated to the Smithsonian Institution.

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"The passenger pigeon is one of many hundreds of extinctions that have been caused by human activities in the past few centuries." Other examples include:

- 1690: The dodo bird, "extinct from predation by introduced pigs and cats"
- 1768: Steller's sea cow, "extinct from hunting for fur and oil"
- 1870: The Labrador duck, "extinct from human competition for mussels and other shellfish"
- 1900: The Rocky Mountain locust, "extinct from habitat conversion to farmland"
- 1936: The Tasmanian wolf, "extinct from hunting, habitat loss and competition with dogs"
- 1952: The deepwater cisco fish, "extinct from competition and predation by introduced fishes"
- 1962: The Hawaii chaff flower, "extinct from habitat conversion to military installations"
- 1989: The golden toad, "extinct from climate change or other impacts"
- 2004: The Saint Helena olive tree, "extinct from logging and plantations"

Preventing the extinction of species is the traditional goal of conservationists, but this may not go far enough. It is important that all organisms fulfill their roles within their ecosystems so that species not only survive but thrive.

Welcome to the Anthropocene

Source: Smithsonian

https://humanorigins.si.edu/research/age-humans-evolutionary-perspectives-anthropocene

"Human activity has fundamentally changed our planet. We live on every continent and have directly affected at least 83% of the planet's viable land surface. Our influence has impacted everything from the makeup of ecosystems to the geochemistry of Earth, from the atmosphere to the ocean. Many scientists define this time in the planet's history by the scale of human influence and label it as a new geological epoch called the Anthropocene. . . .

"The beginning of the Anthropocene is a subject of heated debate among geologists, anthropologists and others in the scientific community. . . . Some argue that the Anthropocene began with the advent of agriculture, because certain agriculture-related activities such as rice paddy irrigation and deforestation may have led to sharp rises in concentrations of CO2 and methane as early as 8,000 years ago. Many believe that it was not until the Industrial Revolution that our exploitation of fossil fuels and monumental increases of energy use and population started to push us far enough to 'show a discernible human influence beyond natural [Holocene] variability.' A third proposed start date is the Great Acceleration, or the beginning of the nuclear age in the mid-1940s. In this period, not only did our testing and use of atomic weaponry leave a distinctive radioactive signature in the sediments of Earth, but almost all human activities, from water use to fertilizer consumption to globalization, saw a dramatic intensification.

"No matter when it began, the concept of the Anthropocene is significant. It highlights the scale of our impact on Earth. By defining a new geological epoch, we are declaring that the impact of our activities is global and irreversible. It allows us to unite many different discussions regarding the state of the planet, from climate change to loss of biodiversity to environmental degradation, by identifying the one thing they have in common: they have all been affected by human influence."

Today, many species of plants and animals are endangered, meaning they are at serious risk of extinction.

Step-by-step classroom guide

Classroom procedure

Introduction: 5 minutes

Pair up: Ask students to pair up and make a list of all the endangered species they can think of. Allow three minutes. Ask one student from each pair to read their list. Record responses on the board until all mentions are exhausted. Add additional endangered species not mentioned in class. (Examples here: https://www.worldwildlife.org/species/directory?direction=desc&sort=extinction_status)

Ask: What does it mean for a species to become extinct? (It disappears forever from Earth.)

Why do species of animals, plants and fungi become extinct? (Their basic requirements for life are not met, including space to live, a supportive climate, food and water; they are killed by other means.)

Explain that there are two types of extinction — background extinction, a natural part of evolution, and mass extinction, usually involving a catastrophic event.

Display or hand out the Timeline of Geological Periods: https://upload.wikimedia.org/wikipedia/commons/2/2d/Timeline_Earth_Geological.png

Introduce the geologic time scale, and explain how scientists have constructed this chronology based on the fossil record.

AR and class discussion: 10 minutes

Access 3D models of extinct animals at https://verizon5glabs.com/virtual-museum/ to learn about each of the following five animals represented there:

Diademodon tetragonus: https://www.yahoo.com/immersive/diademodon-tetragonus-205920014.html?site=verizon

Thrinaxodon: https://www.yahoo.com/immersive/thrinaxodon-205908619.html?site=verizon

Triceratops: https://www.yahoo.com/immersive/triceratops-202429220.html?site=verizon

Megalodon tooth: https://www.yahoo.com/immersive/megalodon-tooth-203128901.html?site=verizon

Woolly mammoth: https://www.yahoo.com/immersive/smithsonian-woolly-mammoth.html?site=verizon

Click the speaker icon to activate the brief audio presentation.

Ask a volunteer to read aloud the museum card displayed.

Questions for discussion

Examine the 3D object from all sides.

How does it make you feel to see the fossilized remains of these animals? (Answers will vary.)

Why should we care about extinct species? *(Answers will vary. If not mentioned, prompt that we learn a lot about the future of all species on Earth by studying the past.)*

Which animals were interesting to you, and what questions do you have about them? *(Answers will vary. Questions should include the following: Where and how long did the species live on Earth? What did it eat? What other animals did it live with? Why did it become extinct?)*

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Distribute a blank note card to each student. Instruct them to write their name, one of the five animals from the Virtual Museum and one of the endangered animals on the board. These are the two animals they will research later. They should keep the card in a safe place.

Primary source activity: 10 minutes

Use a smart board or similar classroom technology to explore the following URL with students.

***Smithsonian* magazine, Travel through Deep Time with This Interactive Earth**
https://www.smithsonianmag.com/science-nature/travel-through-deep-time-interactive-earth-180952886/

"Explore key moments in Earth's transformative history as continents drift and climate fluctuates over 4.6 billion years."

Take students through this interactive journey, reading the accompanying text as you go. If you have distributed copies of the Timeline of Geological Periods handout, ask learners to pinpoint on the timeline each of the nine events described during the interactive presentation.

Question for discussion or five-minute writing prompt

Why is it important to understand geologic time? *(Sample answers: Understanding Earth today requires a basic understanding of geologic time; plate tectonics help us understand and predict earthquakes; principles of erosion teach us about the formation of canyons and other landforms; extinctions and climate changes in the past help us better understand changes today caused by human actions.)*

Main activity: 20 minutes

Create a geologic time strip using a length of rope, string or cord, about nine meters (30 feet) in length. You may need to use more than one classroom wall, a hallway or an outdoor location to pin up the time strip. (Alternative: If such a space is not available, modify the activity to use a shorter length and smaller labels.)

Using a meter stick, divide the time strip into four approximately equal lengths. Label each length as follows, going from right to left: 1 billion years ago, 2 billion years ago, 3 billion years ago and 4 billion years ago. This can be done by folding sticky notes around the cord at the appropriate intervals. The label "4b years ago" should be near the far left, or beginning, of the time strip. Another label reading "Today" should be near the far right, or end, of the time strip. Some space can also be left for the future.

Remind students that mya stands for "million years ago" and that there are a thousand millions in one billion.

Organize the class into four groups. Each group will receive a separate list of geological events. Using sticky notes and markers, group members will position their events on the timeline in chronological order. (Alternative: make up labels in advance to distribute to the class in order to save time.)

Labels

Formation of the sun
4,600 mya

Formation of the moon
4,500 mya

Asteroids and comets bringing water to Earth
4,400 mya

Indirect evidence of photosynthesis
4,100 mya

Simple single-celled life
4,000 mya

Oldest microfossils
3,600 mya

First complex single-celled life
1,800 mya

Green algae colonies in the seas
1,400 mya

Rodinia supercontinent
1,000 mya

Snowball Earth period
720 mya

Evidence of first multicelled animals
635 mya

Major diversification of life in the Cambrian period
480 mya

First green plants and fungi on land
450 mya

First vascular plants (plants that conduct water and minerals)
425 mya

Primitive trees and first land vertebrates (animals with backbones)
330 mya

First reptiles
303 mya

Permian-Triassic extinction of 95% of life on Earth
283 mya

Pangaea supercontinent
254 mya

Dinosaurs dominant on land and pterosaurs in the sky
208 mya

Many types of dinosaurs
175 mya

First birds
157 mya

Tyrannosaurs evolve on land
100 mya

Asteroid impact and extinction of the non-avian dinosaurs
59 mya

Rapid evolution of mammals, flowering plants
28 mya

Ancestor of apes, including humans
23 mya

Gradual separation of human and chimpanzee ancestors
11.6 mya

Early human genus *Australopithecus* common in East Africa
3.6 mya

Start of Quaternary glaciations, extensive ice sheets
2.5 mya

Rise of *Homo sapiens* (modern humans)
0.77 mya

Last glacial period, ending with megafauna extinction
0.12 mya

Early agriculture
0.011 mya

Discuss insights from the activity. Were students surprised that most events occurred relatively recently on the time strip? For what percentage of the total time strip have humans been on Earth? *(0.007% of the entire history of the planet)* If the total time strip represents **one year**, how long have *Homo sapiens* been on Earth? *(about 18 minutes)*

Lesson extension (homework)



Independent research activity: 10 minutes to instruct students on the task; additional time for student presentations as needed

Students will independently research the two animal species they wrote down on their note cards.

Instruct students to compare and contrast information about their animals, including ecosystem, habitat, life span and diet. They should describe events that led to the extinction of their ancient species and the pressures that have endangered their modern species.

Next, students will formulate a general plan that includes at least three actions society could take to help protect endangered species and a personal plan that includes at least three actions they can take that may help protect their endangered species.

Students can present their findings in the form of a written paper or an oral or multimedia presentation.

(Sample answer: ***The Megalodon and the African Wild Dog***

While they may seem very different at first glance, the megalodon and the African wild dog share certain similarities. They are both predators whose ancestors spent millions of years on Earth, far more than humans. Wild dogs descend from primitive carnivores known as miacids. Miacids ranged from squirrel-sized to dog-sized animals that lived about 52 million years ago. Megalodon roamed the shallow waters that covered much of Earth about 23 million years ago.

The megalodon was the largest shark ever to swim the oceans. Its fossilized bones and teeth help scientists understand what the shark was like and when it became extinct. Megalodons may have gone extinct when the Ice Age began 3.5 million years ago. Even so, megalodons lasted for nearly 20 million years.

The megalodon's name means "giant tooth." The largest megalodon tooth ever found measures almost 18 centimeters in length, three times longer than a great white shark's tooth. Based on this, scientists think the megalodon could grow up to 18 meters long.

The megalodon was a lone hunter that fed on big marine mammals, such as whales and dolphins. It was a giant predator at the top of the food chain.

The African wild dog is also an opportunistic predator, although it hunts medium-sized animals such as gazelles. But unlike the megalodon, wild dogs hunt in packs and have a complex social life. Wild dogs take care of one another and will even share food with dogs that did not take part in the hunt. Packs consist of anywhere from 10 to 40 members.

African wild dogs are one of the world's most endangered species. They face increasing threats from habitat loss and diseases such as rabies and distemper, which they can get from invasive species. They are killed by humans and lions. Farmers especially are concerned about wild dogs stealing their smaller animals, such as chickens. Other problems occur when humans take over their wild habitats.

There are several actions that can help protect the wild dogs of Africa. First, provide farmers with information about the need to protect this species and show them ways to protect their own animals from harm. The creation of protected areas and "wildlife corridors" will help species such as the African wild dog avoid areas of

human density. Increasing the availability of the prey the dogs depend on would also reduce the need for them to hunt domestic animals.

Dog lovers in particular can relate to these wild creatures. Social media and crowdfunding sites can be used to increase awareness about their plight and raise the needed funds to help protect them. Videos and documentaries also help people learn about these amazing dogs.

My action plan is to tell people I know about African wild dogs. I'd like to make an annual contribution to the World Wildlife Fund or other conservation groups that help protect them. I'd also love to volunteer at an animal shelter to learn more about dogs of all kinds. The more we understand animals, the better we can work with them and help them thrive wherever they live.)